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Air Force Systems Command

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AFOSR-TR- 88-0938

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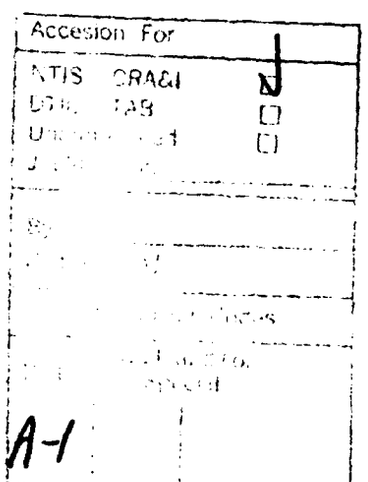

PREPARED BY:
DEBRA TYRRELL, CHIEF
TECHNICAL DOCUMENTS SECTION
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INTRODUCTION

The Air Force Office of Scientific Research Technical Report Summaries are published quarterly as of March, June, September, and December of each calendar year. They consist of a brief summary of each AFOSR technical report received in the Technical Information Division and submitted to the Defense Technical Information Center (DTIC) for that quarter. The summaries contain two indexes for easily locating the technical reports that may be of interest to the user. These are followed by abstracts of the reports.

1) SUBJECT INDEX

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   b. Title of Report
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PURPOSE

The purpose of this report is to inform Air Force Laboratories about the science that the Air Force Office of Scientific Research is supporting.

AFOSR MISSION

The Air Force Office of Scientific Research (AFOSR) is the Single Manager of the Air Force Defense Research Sciences Program (Program Element 61102F) and the primary Air Force agency for the extramural support of fundamental scientific research. The AFOSR is organizationally under the DCS/Science and Technology, Air Force Systems Command.

AFOSR awards grants and contracts for research in areas of science relevant to the needs of the Air Force. Research is selected for support from proposals received in response to the Broad Agency Announcement originating from scientists investigating problems involving the search for new knowledge and the expansion of scientific principles. Selection is on the basis of scientific potential for improving Air Force operational capabilities, originality, significance to science, the qualification of the principal investigators, and the reasonableness of the proposed budget.

KEY TO READING THE DATA

The summaries consist of two indexes and the abstracts. From one of the two indexes, locate the AD number of the report that is of interest to you. Use this number to locate the abstract of the report in the abstracts section. The first report submitted to DTIC during the quarter (the one with the lowest AD number) appears on the last page of the abstracts section. The last report submitted to DTIC during the quarter (the one with the highest DTIC number) appears on the first page of the abstracts section. The following terms will give you a brief description of the elements used in each summary of this report.

DTIC Report Bibliography - DTIC's brief description of a technical report.

Search Control Number - A number assigned by DTIC at the time a bibliography is printed.

AD Number - A number assigned to each technical report when received by the DTIC.

Field & Group Numbers - (appearing after the AD number) First number is the subject field and the second number after the slash is the particular group under that subject field.

Corporate Author/Performing Organization - The organization; e.g., college/university, company, etc., at which the research is conducted.

Title - The title of the technical report.

Descriptive Note - Gives the type of report; e.g., final, interim, etc., and the period of the time of the research.

Date - Date of the technical report.

Pages - Total number of pages contained in the technical report.

Personal Author - Person or persons who wrote the report.

Contract/Grant Number - The instrument control number identifying the contracting activity and funding year under which the research is initiated.

Project Number - A number unique to a particular area of science; e.g., 2304 is the project number for mathematics.

Task Number - An alphanumeric number unique to a specific field of the main area of science; e.g., 2304 is the project number for mathematics and A3 is the task number for computational sciences.

Monitor Number - The number assigned to a particular report by the government agency monitoring the research. The number consists of the government monitor acronym, the present calendar year and the technical report assigned consecutively; e.g., AFOSR-TR-83-0001 is the first number used for the first technical report processed for Calendar Year 1983.

Supplementary Note - A variety of statements pertaining to a report. For example, if the report is a journal article, the supplementary note might give you the journal citation, which will include the name of the journal the article it appears in, and the volume number, date, and the page numbers of the journal.

Abstract - A brief summary describing the research of the report.

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AD-B119367L REPORT DATE: 15 OCT 87 FINAL REPORT

Theoretical Investigation of Optical Computing Based on Neural Network Models.
AD-A191688 REPORT DATE: 29 SEP 87 ANNUAL REPORT

Theoretical Investigation of 3-D Shock Wave-Turbulent Boundary Layer Interactions. Part 6.
AD-A191546 REPORT DATE: JAN 88 ANNUAL REPORT

Theoretical Plasma Physics Research of Active Space Experiments.
AD-A192075 REPORT DATE: 87 FINAL REPORT

Theory and Simulation of Relaxed Plasmoids.
AD-A192884 REPORT DATE: DEC 87 FINAL REPORT

Theory of Interactions of Intense Light with Nonlinear, Inhomogeneous, and Periodic Structures and Its Applications to Optical Bistability, Optic Gyroscopes, Nonlinear Spectroscopy, Radiation Protection, X-Ray Emission, and Related Fields.
AD-A190040 REPORT DATE: OCT 87 FINAL REPORT

Theory of Low-Temperature Adsorption,
AD-A192879 REPORT DATE: FEB 88 FINAL REPORT

Thermal Runaway Due to Strain-Heading Feedback,
AD-A189798 REPORT DATE: 28 MAY 85 FINAL REPORT

Thin Film Research Diagnostics Instrumentation.
AD-A191240 REPORT DATE: 21 OCT 87 FINAL REPORT

Thin Superconducting Film Characterization by Surface Acoustic Waves.
AD-A190417 REPORT DATE: 30 OCT 87 ANNUAL REPORT

Third Harmonic Generation from a Monolayer Film of a Polydiacetylene, Poly-4-BCMU,
AD-A190737 REPORT DATE: 01 AUG 87 ANNUAL REPORT

Three-Dimensional Aspects of Fatigue Crack Closure.
AD-A192296 REPORT DATE: FEB 88 FINAL REPORT

Thyroid and Biochemical/Metabolic Effects of PFDA (Perfluoro-n-decanoic Acid).
AD-A192185 REPORT DATE: 04 JAN 88 FINAL REPORT

Time Scale Analysis Techniques for Flexible Manufacturing Systems.
AD-A191949 REPORT DATE: DEC 87 FINAL REPORT

Topical Meeting on Picosecond Electronics and Optoelectronics.
AD-A189686 REPORT DATE: 10 OCT 87 FINAL REPORT

Transformation Toughening of Ceramics.
AD-A190399 REPORT DATE: OCT 87 ANNUAL REPORT

Transformations of Concurrent Algorithms for Highly Parallel Systems: A One Year Project Summary Report.
AD-A190236 REPORT DATE: OCT 87 FINAL REPORT

Transition-Strength Fluctuations and the Onset of Chaotic Motion,
AD-A189687 REPORT DATE: 08 DEC 86 ANNUAL REPORT

Transmitting Boundary for Finite-Difference Calculations with Finite Modeling of An Infinite Medium.
AD-A191441 REPORT DATE: 20 NOV 87 FINAL REPORT

The Transport and Growth of Soot Particles in Laminar Diffusion Flames,
AD-A192733 REPORT DATE: 87 ANNUAL REPORT

Travelling Wave Concepts for the Modeling and Control of Space Structures.
AD-A191235 REPORT DATE: 31 JAN 88 FINAL REPORT

Tunneling and Dynamic Tunneling by an Algebraic Approach,
AD-A189806 REPORT DATE: 88 ANNUAL REPORT

Turbulent Reacting Flows and Supersonic Combustion.
AD-A189690 REPORT DATE: 30 SEP 87 ANNUAL REPORT

Two Classes of Self-Similar Stable Processes with Stationary Increments.
AD-A192842 REPORT DATE: JAN 88

An Unconditionally Stable Convergent Finite Difference Method for Navier-Stokes Problems on Curved Domains,
AD-A192917 REPORT DATE: DEC 87 ANNUAL REPORT

Undrained Stress-Strain Behavior of Unsaturated Sands. Volume 1.
AD-A191924 REPORT DATE: 25 JAN 88 FINAL REPORT

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AD-A192043 REPORT DATE: APR 86 FINAL REPORT

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AD-A191282 REPORT DATE: DEC 87 ANNUAL REPORT

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AD-A191121 REPORT DATE: DEC 87 ANNUAL REPORT

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AD-A191122 REPORT DATE: DEC 87 ANNUAL REPORT

United States Air Force Summer Faculty Research Program (1987). Program Management Report.
AD-A191120 REPORT DATE: DEC 87 ANNUAL REPORT

United States Air Force Summer Faculty Research Program (1987). Program Technical Report. Volume 1.
AD-A191283 REPORT DATE: DEC 87 ANNUAL REPORT

United States Air Force Summer Faculty Research Program (1987). Program Technical Report. Volume 2.
AD-A191284 REPORT DATE: DEC 87 ANNUAL REPORT

United States Air Force Summer Faculty Research Program (1987). Program Technical Report. Volume 3.
AD-A191285 REPORT DATE: DEC 87 ANNUAL REPORT

University Research Instrumentation Program. Equipment for Instrumentation of Bridge Rehabilitation and Geotechnical Explosives Testing.
AD-A190647 REPORT DATE: 23 NOV 87 FINAL REPORT

Unsteady Flame Propagation in a Two-Dimensional Spray with Transient Droplet Vaporization,
AD-A191886 REPORT DATE: JAN 88 FINAL REPORT

Unsteady Flow in Supersonic Inlet Diffuser.
AD-A190405 REPORT DATE: NOV 87 FINAL REPORT

An Unusually Large Secondary Deuterium Isotope Effect. Thermal Trans-Cis Isomerization of trans-1-Phenylcyclohexene,
AD-A190891 REPORT DATE: 87 FINAL REPORT

Use of Tyrosine or Foods to Amplify Catecholamine Release.
AD-A190830 REPORT DATE: 02 NOV 87 FINAL REPORT

Vacuum Spectrograph for E-Beam Ablation Studies.
AD-A190831 REPORT DATE: 31 JUL 87 FINAL REPORT

Velocity Measurements and Flow Visualization in Turbulent Three-Dimensional Supersonic Flows Using Oxygen Flow Tagging.
AD-A192551 REPORT DATE: 17 FEB 88 FINAL REPORT

Vibration Control of Large Structures.
AD-A191358 REPORT DATE: SEP 87 FINAL REPORT

Vibrations of Structures with Parametric Uncertainties.
AD-A190400 REPORT DATE: 31 OCT 87 FINAL REPORT

Visual Information Processing in the Perception of Features and Objects.
AD-A192028 REPORT DATE: 22 JAN 88 ANNUAL REPORT

The VIte Model: A Neural Command Circuit fo r Generating Arm and Artuculator Trajectories,
AD-A192715 REPORT DATE: MAR 88 ANNUAL REPORT

Vortices in Long Josephson Junctions.
AD-A190338 REPORT DATE: NOV 87 ANNUAL REPORT

VPC - A Proposal for a Vector Parallel C Programming Language.
AD-A190885 REPORT DATE: 30 OCT 87 FINAL REPORT

Wave Packet Studies of gas-Surface Inelastic Scattering and Desorption Rates,
AD-A192509 REPORT DATE: 15 JAN 88 FINAL REPORT

Wave Propagation and Dynamics of Lattice Structures.
AD-A190037 REPORT DATE: 01 OCT 87 FINAL REPORT

Wave Propagation and Dynamics of Lattice Structures.
AD-A190611 REPORT DATE: 01 OCT 87 FINAL REPORT

A Wong-Zakai Type Theorem for Certain Discontinuous Semimartingales,
AD-A192713 REPORT DATE: JAN 88 ANNUAL REPORT

Working Memory Capacity: An Individual Differences Approach.
AD-A192359 REPORT DATE: 11 FEB 88 ANNUAL REPORT

Workshop on Future Opportunities through GaAs on Silicon Held in Marina del Ray, California on June 18-19, 1987.
AD-A190552 REPORT DATE: DEC 87 FINAL REPORT

Workshop on Optical Artificial Intelligence Held in Gold Lake, Colorado on 3-5 August 1987.
AD-A192300 REPORT DATE: 03 FEB 88 FINAL REPORT

TITLE INDEX

1,6-Dimethyl-1(alpha),4a(alpha),5(alpha),8(beta),8a(alpha)-hexahydro-1,4-methanonaphthalene-5,8-diol,
AD-A191812 REPORT DATE: 87 FINAL REPORT

1987 Gordon Research Conference on Neural Plasticity.
AD-A190996 REPORT DATE: 02 OCT 87 FINAL REPORT

An 'E Matrix' for the Loewdin Alpha Function, Expanded in a Taylor Series: An Analytic Treatment of Molecular Charge Density Near the Origin,
AD-A191816 REPORT DATE: 87 FINAL REPORT

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-B120 071L 17/11 17/5

E-TEK DYNAMICS INC MELBOURNE FL

(U) Optical Multiple Targets Surveillance, Pointing, Acquisition, and Tracking Sensors. Phase I.

DESCRIPTIVE NOTE: Final technical rept. Apr 83-Nov 87,

JAN 88 327P

PERSONAL AUTHORS: Fleeter, Sanford

REPORT NO. ME-TSPC-TR-88-10

CONTRACT NO. F49620-83-K-0029

PROJECT NO. 2307

TASK NO. A4

MONITOR: AFOSR
TR-88-0045

UNCLASSIFIED REPORT

Distribution limited to U.S. Gov't. agencies only; Proprietary Info.; 22 Jan 88. Other requests must be referred to USASDC, Attn: CSSD-H-MPL, P. O. Box 1500, Huntsville, AL 35807-3801.

ABSTRACT: (U) For the space-based strategic defense system, conventional optical beam pointing/steering/tracking system using mechanical gimbals has numerous shortcomings, such as heavy weight, high probability of errors, long acquisition time, and large frictional and bearing noise. The conventional mechanical servo cannot track multiple targets simultaneously, and cannot perform wide angle surveillance due to limited bandwidth of servo loops. To reduce or eliminate these shortcomings, a wide view, fast steering optical surveillance, acquisition, pointing, and tracking sensors for multiple targets is required. To address this need, multiaperture compound eye configurations and optical multibeam phased steering arrays for multiple targets surveillance, acquisition, pointing, and tracking were investigated, analyzed, and compared against derived design parameters. Optical power combining and beam sharpening can be achieved using phased-array techniques. The investigation results indicate that both linear and planar optical phased-array

AD-B120 071L

AD-B120 071L CONTINUED

using semiconductor laser diodes can provide microradian sharp beam with nanosecond steering speed.

DESCRIPTORS: (U) *ACQUISITION, *SERVOMECHANISMS, *STEERING, *TRACKING, *PHASED ARRAYS, *DETECTORS, *SEMICONDUCTOR DIODES, *SEMICONDUCTOR LASERS, OPTICS, WEIGHT, NOISE, OPTICAL PROPERTIES, GIMBALS, MECHANICAL COMPONENTS, PARAMETERS, FRICTION, ERRORS, BANDWIDTH, LONG RANGE(TIME), APERTURES, CHEMICAL COMPOUNDS, CONFIGURATIONS, TARGETS, PLANAR STRUCTURES, LOOPS, SERVOMECHANISMS, DEFENSE SYSTEMS, MILITARY STRATEGY, SPACE BASED, SHARPNESS, STEERING, VELOCITY, WIDE ANGLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A4.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-B119 367L 9/1

ENERGY COMPRESSION RESEARCH CORP DEL MAR CA

(U) The Theoretical and Experimental Limits of Power Density and Gain of Lass Devices.

DESCRIPTIVE NOTE: Final rept. 1 Jul 85-31 May 87.

OCT 87 59P

CONTRACT NO. F49620-85-C-0109

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR TR-87-1748

UNCLASSIFIED REPORT

Distribution limited to U.S. Gov't. agencies only; Proprietary Info.; 27 Jan 88. Other requests must be referred to AFOSR/XOTD. Bolling AFB, DC 20332-6448.

ABSTRACT: (U) The objective of this program was to develop a fundamental understanding of the mechanisms which limit the power density and risetime of light activated junction semiconductor switches for extremely fast pulsed power applications. The investigators were able to theoretically establish and experimentally confirm several critical aspects of switch operation. Specifically, they conducted a theoretical and experimental program to demonstrate the solid state switches are capable of achieving pulse risetimes below 100 ps and power densities on the order of 10(10) W/cm(3). Keywords: Lass, Switch, Semiconductor.

DESCRIPTORS: (U) *SWITCHES, DENSITY, LIMITATIONS, OPERATION, POWER.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A7.

AD-B119 367L

AD-B119 223L 11/2

CERAMATEC INC SALT LAKE CITY UT

(U) New Mechanism for Toughening Ceramic Materials.

DESCRIPTIVE NOTE: Quarterly status rept. no. 1,

NOV 87 8P

PERSONAL AUTHORS: Cutler, Raymond; Matsumoto, Roger; Virkar, Anil; Richerson, David W.

CONTRACT NO. F49620-87-C-0077, DARPA Order-5994

PROJECT NO. 5994

TASK NO. 00

MONITOR: AFOSR TR-87-1881

UNCLASSIFIED REPORT

Distribution limited to U.S. Gov't. agencies only; Proprietary Info.; 14 Jan 88. Other requests must be referred to AFOSR/XOTD. Bolling AFB, DC 20332-6448.

ABSTRACT: (U) The overall objective of the current program is to achieve an improved understanding of the toughening mechanisms in cesium TZP based ceramics and to utilize this understanding to develop zirconia based materials which retain toughness to higher temperature. A specific objective is to determine if a ferroelastic toughening mechanisms is present, or if some other toughening mechanism in addition to transformation toughening is present. Progress on Task 1 Processing and Characterization of Zirconia and Hafnia based compositions. Initial emphasis has been on compressive stress-strain measurements as a function of dopant composition and dopont level. Three strain gauges are mounted on each rectangular shaped sample in such a way that two of them detect strain in the loading direction (in compression) while the third one detects strain in the lateral (orthogonal) direction. Very accurate volume changes, such as would occur during transformation from the tetragonal to monoclinic phase; can be measured. The initial material being evaluated in Task 3 is vanadium oxide V204. VO2 is reported to be fully ferroelastic with a Curie temperature of about 78C.

AD-B119 223L

AD-B119 223L CONTINUED

DESCRIPTORS: (U) *CERAMIC MATERIALS, CESIUM, COMPRESSIVE PROPERTIES, CURIE TEMPERATURE, MATERIALS, MEASUREMENT, OXIDES, STRAIN GAGES, STRESS STRAIN RELATIONS, TEMPERATURE, TOUGHNESS, TRANSFORMATIONS, VANADIUM COMPOUNDS, VOLUME, ZIRCONIUM OXIDES, TOUGHNESS.

IDENTIFIERS: (U) WUAFOSR599400, PE61102F.

AD-B118 807L 7/3 21/2 21/8.2

ROCKWELL INTERNATIONAL CANOGA PARK CA ROCKETDYNE DIV

(U) Basic Research in the Chemistry and Combustion of Nitroform Compounds.

DESCRIPTIVE NOTE: Annual rept. 1 Dec 86-1 Dec 87, JAN 88

PERSONAL AUTHORS: Flanagan, J. E.; Woolery, D. O.

REPORT NO. RI/RD88-102

CONTRACT NO. F49620-86-C-0017

MONITOR: AFAL, AFOSR TR-88-005, TR-88-0455

UNCLASSIFIED REPORT
EXPORT CONTROL

Distribution limited to DoD and DoD contractors only; Critical Technology; Jan 88. Other requests must be referred to AFAL/TSTR, Edwards AFB, CA 93523-5000. This document contains export-controlled technical data.

ABSTRACT: (U) The burning rates for 17 trinitromethyl-, halodinitromethyl-, and dinitromethylene-substituted solid oxidizers were determined as neat pellets. In general, the highest burning rates were observed for trinitromethyl-compounds (0.55 to 1.52 inch/second). Replacement of nitro by methyl or halogen reduced the burning rates (0.16-0.52 inch/second). A correlation of the observed burn rates with structure and physical data, including melting point, a decomposition kinetics, is described. Keywords: Oxidizers; Pyrolysis products.

DESCRIPTORS: (U) *NITROMETHANE, *OXIDIZERS, *PYROLYSIS, *REACTION KINETICS, BURNING RATE, CHEMISTRY, COMBUSTION, DECOMPOSITION, HIGH RATE, KINETICS, MELTING POINT, PHYSICAL PROPERTIES, SOLID PROPELLANTS, MONOPROPELLANTS, NITRAMINES, METHYLENES.

IDENTIFIERS: (U) *Nitroform compounds, EXPORT CONTROL, WUAFAL5Q.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-B118 589L 20/3

HYPRES INC ELMSFORD NY

(U) SIS (Superconductor-Insulator-Superconductor) Mixer.

DESCRIPTIVE NOTE: Annual rept. no. 1,

NOV 87 51P

PERSONAL AUTHORS: Whiteley, Stephen R.

CONTRACT NO. F49620-87-C-0014

PROJECT NO. 2005

TASK NO. A1

MONITOR: AFOSR
TR-87-1741

UNCLASSIFIED REPORT

Distribution limited to U.S. Gov't. agencies only; Proprietary Info.; 14 Jan 88. Other requests must be referred to AFOSR/XOTD, Building 410, Bolling AFB, DC 20332-6448.

ABSTRACT: (U) Progress towards the realization of an efficient and high performance all-niobium superconductor-insulator-superconductor mixer assembly is described in this first yearly report. To date, optimization of the fabrication process for the superconducting devices has received a major amount of effort and a new fabrication technique which promises lower parasitic capacitance has been developed. The new process is based on lift-off patterning of low dielectric constant dual ion beam deposited silicon dioxide. In conjunction with the National Radio Astronomy Observatory, a mask set containing a wide variety of mixer structures has been designed. Device testing has been restricted to low frequency and the new mask will allow testing at the design frequency of 100 GHz. The electrical properties of the fabricated mixer junctions have been studied in order to extract parameters necessary for the design of useful mixer systems. Transmission structures which are capable of carrying wide bandwidth signals with minimal thermal conduction have been characterized with a 40 GHz scaler network analyzer, with positive results.

AD-B118 589L CONTINUED

DESCRIPTORS: (U) *SUPERCONDUCTORS, *MIXERS(ELECTRONICS), ASTRONOMICAL OBSERVATORIES, BROADBAND, CAPACITANCE, FABRICATION, LIMITATIONS, LOW FREQUENCY, MASKS, OPTIMIZATION, RADIO ASTRONOMY, SIGNALS, STRUCTURES, THERMAL CONDUCTIVITY, TRANSMITTANCE, EXTREMELY HIGH FREQUENCY, LAYERS, ELECTRICAL INSULATION, NIOBIUM, CHIPS(ELECTRONICS), TRANSMISSION LINES, JOSEPHSON JUNCTIONS, TUNNELING(ELECTRONICS), FIGURE OF MERIT.

IDENTIFIERS: (U) Insulators, SNAP(Selective Niobium Anodization Process), PE61102F, WUAFOSR2005A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-B118 453 19/12 20/9 4/1

AUSTIN RESEARCH ASSOCIATES TX

(U) Propagation Characteristics of Long Cylindrical Plasmoids.

DESCRIPTIVE NOTE: Final rept. 1 Sep 86-31 Aug 87,

OCT 87

PERSONAL AUTHORS: Sloan, M. L.

REPORT NO. I-ARA-87-U-40

CONTRACT NO. F49620-86-C-0087

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR TR-87-1753

UNCLASSIFIED REPORT
EXPORT CONTROL

Distribution limited to U.S. Gov't. agencies and their contractors; Critical Technology; 20 Jan 88. Other requests must be referred to AFOSR/XOTD, Building 410, Bolling AFB, DC 20332-6448. This document contains export-controlled technical data.

ABSTRACT: (U) Dense plasmoid bodies may provide an effective means for transport of lethal energies over large distances if suitable modes of stable propagation can be realized. The problem underlying propagation resides in the fact that such plasmoids, being a collection of ionized matter consisting of ions and electrons, have no inherent material structure to hold them together and, if unaided, ballistically disassemble in flight. Criteria for effective propagation of plasmoids across an ambient Earth strength magnetic field have been developed, both for the case of vacuum propagation in a tenuous atmosphere. Requirements of vacuum propagation are extremely stringent and in many cases probably preclude use of this mode of propagation. Inclusion of an ambient background, however, can result in radially confined plasmoid propagation which satisfies the Virial Theorem and whose parameter requirements may be compatible with existing plasmoid sources. These

AD-B118 453

AD-B118 453 CONTINUED

complex atmospheric aided propagation equilibria merit further investigation. In particular, the question whether the requisite confining axial current in the shock and diffusion models can be maintained collisionally or by other means has yet to be addressed. The relation of the effective coupled density to the ambient ionized and neutral atmospheric densities must also be established to accurately define the altitude windows where atmospheric aided propagation might be applicable. Keywords: Mass loss; Drag forces; Earth magnetic field deflection.

DESCRIPTORS: (U) *WAVE PROPAGATION, *PLASMA WAVES, *DIRECTED ENERGY WEAPONS, ALTITUDE, BACKGROUND, COUPLING(INTERACTION), DEFLECTION, DENSITY, DIFFUSION, DRAG, EARTH(PLANET), ELECTRONS, ENERGY, IONIZATION, IONS, LETHALITY, LOADS(FORCES), LONG RANGE(DISTANCE), LOSSES, MAGNETIC FIELDS, MASS, MODELS, PROPAGATION, REQUIREMENTS, STABILITY, TRANSPORT, VACUUM, WINDOWS, ATMOSPHERIC DENSITY.

IDENTIFIERS: (U) Plasmoids, Mass loss, Virial theorem, EXPORT CONTROL, PE61102F, WUAFOSR2301A.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-B118 431L 20/8 12/5

HUGHES RESEARCH LABS MALIBU CA

(U) Real-Time Implementation of Nonlinear Optical Processing Functions.

DESCRIPTIVE NOTE: Final technical rept. 1 Sep 84-31 Aug 87,

OCT 87 141P

PERSONAL AUTHORS: Soffer, B. H.; Owechko, Y.; Marom, E.

REPORT NO. HAF-REF-F7055

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR TR-87-1921

UNCLASSIFIED REPORT

Distribution limited to U.S. Gov't. agencies only; Proprietary Info.; 7 Jan 87. Other requests must be referred to AFOSR/XOTD, Bldg. 410, Bolling AFB, Washington, DC 20332-6448.

ABSTRACT: (U) For the past two decades optical data processing (ODP) has promised a vast increase in processing capacity and speed over conventional electronic techniques. This promise has never been fulfilled for several reasons, most notably because of the lack of a practical real-time image modulator, or light valve, and because optical techniques wer almost exclusively limited to linear operations. These restrictions have been removed by the development of the liquid-crystal light valve (LCLV) by Hughes Research Laboratories (HRL), and by nonlinear parallel-processing techniques developed by the University of Southern California (USC). Thus, it is important to determine how successfully nonlinear parallel-processing techniques can be implemented in real time with the various LCLVs. In addition, other new optical technologies, highly developed at HRL, such a four-wave mixing and phase conjugation have inspired a novel research direction for this program in the field of optical associative memories and neural networks as models for computing. Here the

AD-B118 431L

AD-B118 431L CONTINUED

phase conjugation provides the desired nonlinearities.

DESCRIPTORS: (U) *OPTICAL PROCESSING, DATA PROCESSING, ELECTRONICS, FUNCTIONS(MATHEMATICS), IMAGES, KERR CELLS, LINEARITY, LIQUID CRYSTALS, METHODOLOGY, NEURAL NETS, OPERATION, OPTICAL DATA, OPTICAL PROPERTIES, OPTICS, PROCESSING, REAL TIME, ASSOCIATIVE PROCESSING, OPTICAL STORAGE, NONLINEAR SYSTEMS, HOLOGRAPHY, LIGHT MODULATORS.

IDENTIFIERS: (U) Nonlinear optics, Phase conjugation, LCLV(Liquid Crystal Light Values), PE61102F, WUAFOSR2305B1.

AD-B118 431L

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 944 4/2

MISSOURI UNIV-ROLLA GRADUATE CENTER FOR CLOUD PHYSICS RESEARCH

(U) Cloud Simulation Warm Cloud Experiments: Droplet Growth and Aerosol Scavenging.

DESCRIPTIVE NOTE: Final technical rept.,

MAR 88 142P

PERSONAL AUTHORS: White, D. R.; Hagen, D. E.; Carstens, J. C.

CONTRACT NO. AFOSR-85-0071

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR TR-88-0317

UNCLASSIFIED REPORT

ABSTRACT: (U) During the research period starting January 1, 1985 and ending December 31, 1987 the following research objectives were achieved: (1) the Proto II facility is operating according to original specifications, including its capability of reaching temperatures sufficiently low (approximately -36 C) to homogeneously nucleate ice from supercooled water drops; (2) the warm cloud experiments, designed to measure the condensation coefficient of water, have been completed as well as the analysis. It has been found that the condensation coefficient tends to decrease from a value near unity to a significantly low value, approximately .01, as the drop grows from submicron size range to several microns, radius; (3) the problem of chamber humidification, the resolution of which became a major research objective during the course of these investigations, has been solved and we are now able to determine initial relative humidities to required accuracy; (4) the larger Romulus chamber is now producing cloud. The scavenging experiment has not been completed, although considerable progress has been made in its design and implementation. We should be producing results on scavenging by summer 1988.

AD-A192 944 CONTINUED

DESCRIPTORS: (U) *AEROSOLS, *NUCLEATION, *CLOUD PHYSICS, *ADHESION, ACCURACY, CLOUDS, COEFFICIENTS, CONDENSATION, DROPS, GROWTH(GENERAL), HUMIDIFIERS, HUMIDITY, ICE, SIZES(DIMENSIONS), SUPERCOOLING, WATER, CLOUD CHAMBERS.

IDENTIFIERS: (U) Scavaging, PE61102F, WUAFOSR2310A1.

AD-A192 944

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A192 943 20/4

ILLINOIS INST OF TECH CHICAGO FLUID DYNAMICS CENTER

(U) Coupled Experimental and Theoretical Investigations of Instability, Chaos and Turbulence in an Axisymmetric Jet Flow.

DESCRIPTIVE NOTE: Final technical rept. 15 Apr 86-15 Oct 87,

JAN 88 9P

PERSONAL AUTHORS: Corke, Thomas C.; Nagib, Hassan M.; Rosenblat, Simon

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR TR-88-0293

UNCLASSIFIED REPORT

ABSTRACT: (U) The theoretical and experimental investigations on the instability, routes to chaos and transition to turbulence of an anisymmetric jet flow has been investigated. The first general task has involved the search for evidence of strange attractors in the unsteady dynamics of naturally (stochastically) and periodically excited jets. A special case of the periodically excited jets were ones having enhanced acoustic feedback. As part of this effort, substantial computer software was developed to analyse velocity time-series to determine attractor dimensions, Lyapunov exponents and topological entropy. Under conditions with strong feedback and without forcing, long highly sampled time-series were analyzed. Using independent measures of attractor dimension by a modified Grassberger-Procaccia algorithm and the singular decomposition method of Broomhead and King, the low-dimensional nature of the dynamics of the initial shear layer up to the point of pairing were confirmed. On the theoretical front, the first part of the work, now completed, dealt with the instability of thin inviscid circular shear layers.

DESCRIPTORS: (U) *AXIALLY SYMMETRIC FLOW, *JET FLOW, *TURBULENCE, *UNSTEADY FLOW, ACOUSTICS, COUPLING(INTERACTION), DECOMPOSITION, DYNAMICS, ENTROPY,

AD-A192 943

AD-A192 943 CONTINUED

FEEDBACK, LAYERS, LYAPUNOV FUNCTIONS, SHEAR PROPERTIES, TOPOLOGY, TRANSITIONS, COMPUTER PROGRAMMING, TIME SERIES ANALYSIS.

IDENTIFIERS: (U) CHAOS, Grassberger Procaccia algorithm, PE61102F, WUAFOSR2307A2.

AD-A192 943

AD-A192 928 14/2 20/6

MICHIGAN UNIV ANN ARBOR DEPT OF CHEMICAL ENGINEERING

(U) Nuclear Magnetic Resonance Spectrometer.

DESCRIPTIVE NOTE: Final rept. 15 Jul 86-15 Jul 87,

87 2P

PERSONAL AUTHORS: Donahue, Francis M.

CONTRACT NO. AFOSR-86-0231

PROJECT NO. 2917

TASK NO. A2

MONITOR: AFOSR
TR-88-0873

UNCLASSIFIED REPORT

ABSTRACT: (U) The major purpose of the spectrometer was to support research on low temperature molten salts. Specifically, to be used in the determination of the composition of the salt solutions (1H and 13C) and as a probe in the determination of the nature of complexation of metal complexes. In the case of the latter, the instrument was used to probe the nature of octahedral cationic complexes of aluminum and gallium in the melts (the first such observations). Some of the aluminum work has been in support of our work at the University of Michigan and some of the aluminum and all of the gallium work is collaboration with the F.J. Seiler Research Laboratory (AFSC) at the Air Force Academy. Keywords: Military procurement, Procurement document.

DESCRIPTORS: (U) *FUSED SALTS, *MILITARY PROCUREMENT, *SPECTROMETERS, ALUMINUM, DOCUMENTS, GALLIUM, LABORATORIES, LOW TEMPERATURE, MELTS, METAL COMPLEXES, NUCLEAR MAGNETIC RESONANCE, NUCLEAR RADIATION SPECTROMETERS, PROCUREMENT, RESEARCH FACILITIES, SALINE SOLUTION, SPECTROMETERS, CARBON, HYDROGEN, SOLUTIONS(MIXTURES).

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A2.

AD-A192 928

AD-A192 927 1/3.12

CALIFORNIA UNIV BERKELEY ELECTRONICS RESEARCH LAB

(U) Numerical Optimization, System Theoretic and Software Tools for the Integrated Design of Flexible Structures and Their Control Systems.

DESCRIPTIVE NOTE: Annual technical rept. 30 Sep 86-29 Sep 87,

APR 88 6P

PERSONAL AUTHORS: Polak, E.

CONTRACT NO. AFOSR-86-0116

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-88-0405

UNCLASSIFIED REPORT

ABSTRACT: (U) This research was motivated by a growing consensus that design specifications for projected controlled flexible aerospace structures, which are becoming larger and more flexible while performance requirements are becoming more stringent, can only be satisfied through an integrated design approach in which one determines simultaneously both structural and control system parameters. The work dealt with nonsmooth optimization techniques for the integrated design of flexible structures and their control systems. Nonsmooth optimization is an ideal tool for integrated design because it allows dynamic constraints and imposes no distinction between control system and structural variables. Major accomplishment include the development and testing of an optimal control algorithm which can be used to solve both free and fixed time optimal control problems, such as the problem of moving a flexible structure, modeled by a partial differential equation, from an in initial to a final position in minimum time, while guaranteeing upper bounds on the controls and deformations of the structure over the entire maneuver; and laying the ground-work for the frequency domain design of finite dimensional feedback controllers for flexible structures, without resorting to modal

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A192 927 CONTINUED

truncation and suffering the resulting spillover effects.

DESCRIPTORS: (U) *FLEXIBLE STRUCTURES, *AEROSPACE SYSTEMS, *STRUCTURAL ENGINEERING, ALGORITHMS, COMPUTER PROGRAMS, CONTROL SYSTEMS, FREQUENCY, INTEGRATED SYSTEMS, NUMERICAL METHODS AND PROCEDURES, OPTIMIZATION, PARAMETERS, PARTIAL DIFFERENTIAL EQUATIONS, THEORY, TRUNCATION, VARIABLES, COMPUTER AIDED DESIGN.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A192 927

AD-A192 925 25/5 12/5

ARIZONA UNIV TUCSON

(U) Saguaro: A Distributed Operating System Based on Pools of Servers.

DESCRIPTIVE NOTE: Final rept. 1 Jan 84-31 Dec 87,

MAR 88 8P

PERSONAL AUTHORS: Andrews, Gregory; Schlichting, Richard

CONTRACT NO. AFOSR-87-0072

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR TR-88-0408

UNCLASSIFIED REPORT

ABSTRACT: (U) The progress achieved of the Saguaro distributed operating system project is presented. The major accomplishments include design of the full system, prototype implementations of major system components on top of UNIX, and the implementation of portions of the system using the distributed programming language SR. Substantial work was also performed on related research, including SR, the MLP system for constructing distributed mixed-language programs, the Psync interprocess communication mechanism, the x configurable operating system kernel, and the development of language mechanisms for performing failure handling in distributed programming languages.

DESCRIPTORS: (U) *COMMUNICATION AND RADIO SYSTEMS, *PROGRAMMING LANGUAGES, DISTRIBUTION, FAILURE, HANDLING, LANGUAGE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A2.

AD-A192 925

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A192 924 12/3

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Statistical Description of Stochastic Dynamics.

DESCRIPTIVE NOTE: Final rept. 1 Jun 87-31 May 88,

MAY 88 5P

PERSONAL AUTHORS: Rochester, Alexander B.

CONTRACT NO. AFOSR-87-0254

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR
TR-88-0407

UNCLASSIFIED REPORT

ABSTRACT: (U) The main result of our research is the establishment of a general relationship for fluctuation of the spectral density of the chaotic motion which is similar to the Einstein fluctuation formula in statistical mechanics. A Gibbs-type partition of the chaotic motion is introduced. The distribution function of the spectral density defined on such partition is Gaussian. The variance of this distribution is the Fourier transform of the correlation function. This is demonstrated by direct numerical computations for the simple models of chaos. These results are the consequence of translational invariance and should be valid for the general case of chaotic motion described by differential equations.

DESCRIPTORS: (U) *STATISTICAL MECHANICS, *STOCHASTIC PROCESSES, COMPUTATIONS, CORRELATION, DIFFERENTIAL EQUATIONS, DISTRIBUTION FUNCTIONS, DYNAMICS, FOURIER TRANSFORMATION, FUNCTIONS(MATHEMATICS), NUMERICAL ANALYSIS, SPECTRAL ENERGY DISTRIBUTION, STATISTICS, MATHEMATICAL MODELS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A4.

AD-A192 923 12/5 20/8

ILLINOIS UNIV AT URBANA COORDINATED SCIENCE LAB

(U) Texture Perception and Shape from Texture.

DESCRIPTIVE NOTE: Final rept. 1 Dec 86-30 Nov 87,

MAR 88 3P

PERSONAL AUTHORS: Ahuja, Narendra

CONTRACT NO. AFOSR-87-0100

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR
TR-88-0581

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes the progress of research in texture perception. The goal of the research included perceptual grouping in dot textures, where the goal was to segment a given dot pattern into its perceptual components, and developing a computational theory for an integrated representation of texture.

DESCRIPTORS: (U) *TEXTURE, *IMAGE PROCESSING, *SEGMENTED, *PATTERN RECOGNITION, COMPUTATIONS, INTEGRATED SYSTEMS, PERCEPTION, THEORY, SPATIAL DISTRIBUTION, ALGORITHMS, THREE DIMENSIONAL.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A7.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 922 11/2 11/4

CALIFORNIA UNIV LOS ANGELES DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) Preparation and Properties of New Inorganic Glasses and Gel-Derived Solids.

DESCRIPTIVE NOTE: Final rept. 1 Oct 83-30 Sep 87,

MAR 88 31P

PERSONAL AUTHORS: Mackenzie, J. D.

CONTRACT NO. AFOSR-84-0022

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-88-0408

UNCLASSIFIED REPORT

ABSTRACT: (U) Research has been carried out on two families of solids. This first one involves solids made by the sol gel process and includes composites. The second one involves non-oxide glasses based on fluorides, chalcogenides and chalcohalides. The structures of oxide gels were studied by X ray photoelectron spectroscopy, and the gelation of gels investigated as a function of temperature and catalyst. A new theory was developed on gel transformations. A number of new composites made by the sol gel route were examined included the using of SiC and diamond powder as fillers and some triphasic solids. The viscosity and viscoelasticity of fluorozirconate glasses and glass fibers have been studied. New chalcohalide glasses were prepared and their optical properties evaluated. Structural information was derived from Raman spectra. Keywords: Halide glasses, Porous glass-polymer composites, Fluorozirconate glasses, Porous glass ferroelectric composites.

DESCRIPTORS: (U) *CHALCOGENS, *GLASS, *CERAMIC MATERIALS, *COMPOSITE MATERIALS, FERROELECTRIC MATERIALS, FLUORIDES, FLUORINE COMPOUNDS, GELATION, GELS, GLASS FIBERS, INORGANIC MATERIALS, OPTICAL PROPERTIES, OXIDES, POLYMERS, POROUS MATERIALS, RAMAN SPECTRA, STRUCTURAL PROPERTIES, VISCOELASTICITY, VISCOSITY, X RAY PHOTOELECTRON

AD-A192 922 CONTINUED

SPECTROSCOPY, ZIRCONATES, SILICON CARBIDES.

IDENTIFIERS: (U) *Chalcohalides, PE61102F, WUAFOSR2303A3.

AD-A192 922

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 921 7/2 11/6.1

AD-A192 921 CONTINUED

COLUMBIA UNIV NEW YORK CENTER FOR STRATEGIC MATERIALS

PE61102F.

(U) A Fundamental Understanding of the Interfacial Compatibility in Hybrid Material Systems.

DESCRIPTIVE NOTE: Annual technical rept. 1 Sep 86-31 Oct 87,

MAR 88 20P

PERSONAL AUTHORS: Tien, John K.

CONTRACT NO. AFOSR-86-0312

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR TR-88-0325

UNCLASSIFIED REPORT

ABSTRACT: (U) Among the problems associated with long-term high temperature service of hybrid material systems is interdiffusional compatibility of the system's component materials. Efforts in this program have focussed on several area of this problem. One of the areas being examined are alkali metal and alkali earth metal diffusion barriers. These barriers are being applied by two different methods: ion implantation and a sol suspension slurry technique. For both methods, the system being utilized as a model is the tungsten/nickel system. Preliminary results of barrier effectiveness are given. Also being studied are the interdiffusional kinetics of metal/intermetallic and intermetallic/intermetallic ternary systems. Hybrids being examined include W/NI3AL and TIAl/NI3AL. Keywords: Nickel aluminides, Titanium aluminide.

DESCRIPTORS: (U) *ALKALI METALS, *COMPATIBILITY, *TITANIUM ALUMINIDE, *TITANIUM ALLOYS, *ALKALINE EARTH METALS, *TUNGSTEN ALLOYS, ALUMINIDES, HYBRID SYSTEMS, INTERFACES, ION IMPLANTATION, NICKEL, SUSPENSION DEVICES, TUNGSTEN, THERMAL CYCLING TESTS, ION IMPLANTATION, SUPERALLOYS, JET ENGINES, COMPOSITE MATERIALS.

IDENTIFIERS: (U) Metal diffusion, Banets, WUAFOSR2306A1,

AD-A192 921

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A192 920 21/2

PURDUE UNIV LAFAYETTE IN

(U) Asynchronous Optical Sampling for Laser-Based Combustion Diagnostics in High Pressure Flames.

DESCRIPTIVE NOTE: Annual rept. 15 Dec 86-14 Dec 87,

JAN 88 22P

PERSONAL AUTHORS: King, Galen B.; Laurendeau, Normand M.; Lytle, Fred E.

CONTRACT NO. AFOSR-84-0323

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-88-0297

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes progress on the development of a new laser based combustion diagnostic for the quantitative measurement of both major and minor species in high pressure flames. The technique, Asynchronous Optical Sampling (ASOPS), is a state-of-the-art improvement in picosecond pump/probe spectroscopy. The timing parameters for the current ASOPS instrument are described and consideration is given to the optimization of these parameters. The first ASOPS measurements in a combustion environment have been made on atomic sodium. These measurements are compared with laser induced fluorescence measurements to demonstrate the viability of ASOPS as a combustion diagnostic.

DESCRIPTORS: (U) *COMBUSTION, *FLAMES, *SAMPLING, *LASER APPLICATIONS, *DIAGNOSTIC EQUIPMENT, *EXHAUST GASES, ASYNCHRONOUS SYSTEMS, ENVIRONMENTS, HIGH PRESSURE, LASER INDUCED FLUORESCENCE, SPECTROSCOPY, LASER PUMPING, NITROUS OXIDE, CARBON MONOXIDE.

IDENTIFIERS: (U) ASOPS(Asynchronous Optical Sampling), PE61102F, WUAFOSR2308A2.

AD-A192 920

AD-A192 919 7/2

ILLINOIS UNIV AT URBANA SCHOOL OF CHEMICAL SCIENCES

(U) Solid-State 29Si NMR Study of Polycondensation During Heat Treatment of Sol-Gel-Derived Silicas,

NOV 87 7P

PERSONAL AUTHORS: Irwin, A. D.; Holmgren, J. S.; Jonas, J.

CONTRACT NO. AFOSR-85-0345

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-88-0328

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Materials Letters, v6 n1/2 p25-30 Nov 87.

ABSTRACT: (U) Solid state magic angle spinning (MAS) and cross polarization Si NMR spectroscopy was used to monitor polycondensation in alkoxide-derived silica gels during thermal treatment from 25 to 800 C. Gels prepared from tetramethylorthosilicate under both neutral and basic conditions were studied, and differences in the evolution of chemical structure during thermal treatment are readily observed by NMR. As thermal treatment proceeds the extent of condensation parallels the BET surface area. For uncatalyzed gels, the amount of cross linking increases, and the BET surface area decreases on each step of heating through 800 C. The base catalyzed gel depolymerizes slightly on heating from 150 to 450 C, accompanied by a slight increase in BET area, then undergoes extensive cross linking on heating from 450 to 800 C, with a large decrease in surface area. After heating to 800 C both gels have similar degrees of cross linking and surface area.

DESCRIPTORS: (U) *CONDENSATION, *SILICA GEL, ANGLES, CATALYSIS, CROSS POLARIZATION, EVOLUTION(GENERAL), HEAT TREATMENT, HEATING, MOLECULAR STRUCTURE, NEUTRAL, SPECTROSCOPY, SPINNING(MOTION), SURFACES.

IDENTIFIERS: (U) WUAFSOR2303A3, PE61102F.

AD-A192 919

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A192 918 20/5 4/1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Monte Carlo Modeling of Oxygen Ion Conic Acceleration by Cyclotron Resonance with Broadband Electromagnetic Turbulence,

NOV 87 16P

PERSONAL AUTHORS: Retterer, John M.; Chang, Tom; Crew, G. B.; Jasperse, J. R.; Winningham, J. D.

CONTRACT NO. F49620-86-C-0128

PROJECT NO. 3484

TASK NO. A2

MONITOR: AFOSR TR-88-0329

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physics of Space Plasmas (1988-7), v8 p97-111 Nov 87.

ABSTRACT: (U) Cyclotron resonance with observed electric field fluctuations is demonstrated to be responsible for production of the oxygen ion conics that are observed by the DE-1 satellite in the CPS region of the Earth's auroral zone. The ion velocity distribution is described by a quasilinear diffusion equation which we solve using the Monte Carlo technique. The acceleration produced by the observed wave spectrum agrees well with the ion observations, in both form and magnitude. To our knowledge, this represents the first successful comparison of an observed conic with any theoretical model. Keywords: Monte Carlo modeling, Oxygen ion conics, Cyclotron, Resonance, Electromagnetic ion cyclotron waves, Reprints.

DESCRIPTORS: (U) *AURORAE, *CYCLOTRON RESONANCE, *DIFFUSION, *ELECTRIC FIELDS, ACCELERATION, BROADBAND, CYCLOTRON WAVES, CYCLOTRONS, DISTRIBUTION, EARTH(PLANET), ELECTROMAGNETIC RADIATION, ELECTROMAGNETISM, IONS, LINEAR SYSTEMS, MODELS, MONTE CARLO METHOD, OXYGEN, PRODUCTION, REPRINTS, SPECTRA, THEORY, TURBULENCE, VARIATIONS, VELOCITY, WAVES, HELIXES.

AD-A192 918 CONTINUED

IDENTIFIERS: (U) CONICS(Atmospheric), PE61102F, WUAFOSR3884A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A192 917 12/2 20/4

PITTSBURGH UNIV PA

(U) An Unconditionally Stable Convergent Finite Difference Method for Navier-Stokes Problems on Curved Domains,

DEC 87 17P

PERSONAL AUTHORS: Ellison, J. H.; Hall, C. A.; Porsching, T. A.

CONTRACT NO. AFOSR-80-0178

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-88-0331

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl. on Numerical Analysis, v34 n6 p1233-1248 Dec 87.

ABSTRACT: (U) A new finite difference scheme is presented for solving two dimensional, transient, incompressible, Navier Stokes problems on a bounded simply connected region for which there exists a C-2 invertible mapping onto the unit square. The method is proven to be unconditionally stable and convergent, and reduces to the well-known Krzhivitsky and Ladyzhenskaya scheme for rectangular domains.

DESCRIPTORS: (U) *NAVIER STOKES EQUATIONS, CURVATURE, FINITE DIFFERENCE THEORY, RECTANGULAR BODIES, REGIONS, REPRINTS, TWO DIMENSIONAL, INCOMPRESSIBILITY, STABILITY.

IDENTIFIERS: (U) WUAFOSR2304A3, PE61102F.

AD-A192 917

AD-A192 916 12/2

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG DEPT OF COMPUTER SCIENCE

(U) HOMPACK: A Suite of Codes for Globally Convergent Homotopy Algorithms,

SEP 87 31P

PERSONAL AUTHORS: Watson, Layne E.; Billups, Stephen C.; Morgan, Alexander P.

CONTRACT NO. AFOSR-85-0250

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-88-0333

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in ACM Transactions on Mathematical Software, v13 n3 p281-310 Sep 87.

ABSTRACT: (U) There are algorithms for finding zeros or fixed points of nonlinear systems of equations that are globally convergent for almost all starting points, ie., with probability one. The essence of all such algorithms is the construction of an appropriate homotopy map and then tracking some smooth curve in the zero of this homotopy map. HOMPACK provides three qualitatively different algorithms for tracking the homotopy zero curve: ordinary differential equation-based, normal flow, and augmented Jacobian matrix. Separate routines are also provided for dense and sparse Jacobian matrices. A high-level driver is included for the special case of polynomial systems.

DESCRIPTORS: (U) *ALGORITHMS, *ALGEBRAIC TOPOLOGY, ALGEBRAIC TOPOLOGY, CONVERGENCE, FLOW, GRAPHS, NONLINEAR SYSTEMS, POLYNOMIALS, TRACKING, GLOBAL.

IDENTIFIERS: (U) WUAFOSR2304A1, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A192 911 12/1

NORTHEASTERN UNIV BOSTON MA

(U) Group Dynamics Systems Methods Renormalization.

DESCRIPTIVE NOTE: Final rept. 1 Oct 86-31 Aug 87,

SEP 87 2P

PERSONAL AUTHORS: Balaban, Tadeusz A.

CONTRACT NO. AFOSR-86-0229

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR
TR-88-0281

UNCLASSIFIED REPORT

ABSTRACT: (U) The work done on this grant focused on the ultraviolet stability problem in the four-dimensional Yang-Mills field theories. Keywords: Renormalization groups; Quantum field theory.

DESCRIPTORS: (U) *GROUP DYNAMICS, FIELD THEORY, STABILITY, ULTRAVIOLET RADIATION.

IDENTIFIERS: (U) WUAFOSR2304A9, PE61102F.

AD-A192 911

AD-A192 909 11/6.1 1/3.12

SOUTHWEST RESEARCH INST SAN ANTONIO TX

(U) Study of the Influence of Metallurgical Factors on Fatigue and Fracture of Aerospace Structural Materials.

DESCRIPTIVE NOTE: Annual rept. 1 Jan 87-31 Dec 87,

JAN 88 34P

PERSONAL AUTHORS: Lankford, James; Davidson, David L.; Chan, Kwai S.; Leverant, Gerald R.

REPORT NO. SWRI-06-8972/2

CONTRACT NO. F49620-86-C-0024

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR
TR-88-0294

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the results of a two-phase study involving (1) experimental characterization and analytical modeling of fatigue crack tip micromechanics in aerospace structural aluminum alloys, and (2) identification and modeling of key microstructural factors controlling fracture in aluminum-iron-x alloys. Dynamic load cycling within the SEM and stereoimaging strain analysis have been used to characterize crack opening loads, strains, and effective stress intensity (delta/Keff) values for large and small cracks in a variety of alloys; both constant amplitude and overload/underload situations were studied. It was found that delta/Keff based on local crack tip opening load was not an adequate crack growth rate correlating factor. Instead, it was necessary to use a new driving force term which includes both closure and local crack tip plasticity. The latter was computed by calculating delta/J integrals within the crack tip plastic zone using local crack tip strain data obtained via high resolution SEM of loaded and unloaded cracks.

DESCRIPTORS: (U) *AEROSPACE CRAFT, *ALUMINUM ALLOYS, *FATIGUE(MECHANICS), *CRACK PROPAGATION, CONSTRUCTION

AD-A192 909

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 909 CONTINUED

MATERIALS, CRACKS, DYNAMIC LOADS, J INTEGRALS, MATHEMATICAL MODELS, METALLURGY, MICROSTRUCTURE, PLASTIC PROPERTIES, STRESSES, TWO PHASE FLOW.

IDENTIFIERS: (U) *Aluminum-Iron-x alloys, PE61102F, WUAFOSR2306A1.

AD-A192 908 20/3

VIRGINIA UNIV CHARLOTTESVILLE DEPT OF ELECTRICAL ENGINEERING

(U) SIS (Superconductor-Insulator-Superconductor) Mixer Research.

DESCRIPTIVE NOTE: Annual technical rept. Nov 86-Nov 87, FEB 88 12P

PERSONAL AUTHORS: Feldman, M. J.

REPORT NO. UVA/525658/EE88/102

CONTRACT NO. AFOSR-86-0056

PROJECT NO. 2305

TASK NO. C3

MONITOR: AFOSR TR-88-0289

UNCLASSIFIED REPORT

ABSTRACT: (U) Theoretical and experimental research has been conducted to elucidate the basic physics behind the properties of superconductor-insulator-superconductor (SIS) tunnel junction receiving devices. The saturation of the gain of the SIS mixer was measured using both monochromatic and thermal signals, and these experiments dramatically verified the theoretical expression derived in the previous report period. A study of the role of the image termination for SIS mixer behavior found that the nonlinear quantum reactance results in an effective time delay at the input port of the mixer. Many aspects of the operation of SIS mixers at submillimeter wavelengths were clarified, including a discussion of the potential of the new oxide superconductors for this field. The goal of the realization of high quality niobium nitride edge junctions was advanced by optimizing the edge profile and by improving the insulating barrier.

DESCRIPTORS: (U) *INSULATION, *SUPERCONDUCTORS, BARRIERS, DELAY, GAIN, IMAGES, INPUT, JUNCTIONS, NONLINEAR SYSTEMS, OXIDES, PHYSICS, QUANTUM THEORY, REACTANCE, SATURATION, TIME INTERVALS, TUNNELING(ELECTRONICS).

AD-A192 909

AD-A192 908

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 908 CONTINUED

IDENTIFIERS: (U) MUAFOSR2306C3, PE61102F.

AD-A192 907 20/3

WESTINGHOUSE RESEARCH AND DEVELOPMENT CENTER PITTSBURGH PA

(U) Superconducting Electronic Film Structures.

DESCRIPTIVE NOTE: Annual rept. 1 Jan-31 Dec 87,

JAN 88 28P

PERSONAL AUTHORS: Braginski, A. I.; Gavaler, J. R.; Talvacchio, J.

REPORT NO. 88-9552-SUPER-R1

CONTRACT NO. F49620-85-C-0043

PROJECT NO. 2306

TASK NO. C1

MONITOR: AFOSR TR-88-0288

UNCLASSIFIED REPORT

ABSTRACT: (U) Bulk samples of the new oxide superconductors were prepared and some of their properties measured. Thin films of yttrium-barium-copper-oxide, completely superconducting below 85K, were prepared by both sputtering and evaporation. The sputtered films on (100) and (110) strontium-titanium-oxide substrates were epitaxial. A correlation between oxygen content in as-deposited films and the formation of non-superconducting surface layers was established. The thickness of these layers was greatly reduced by sputtering in argon and oxygen gas mixtures. The presence of fluorine in the evaporated films was also found effective in minimizing the barium segregation which produces such layers. Zero resistance gold contact layers were obtained on Y-Ba-Cu-O-sputtered films which were processed entirely in situ. Tunneling data using a low-temperature tunneling microscope were obtained on both evaporated and sputtered Y-Ba-Cu-O films. A new surface characterization capability based on the analysis of (Low Energy Electron Diffraction) or (Reflection High Energy Electron Diffraction) diffraction spot intensity was developed.

AD-A192 908

AD-A192 907

AD-A192 907 CONTINUED

DESCRIPTORS: (U) *SUPERCONDUCTORS, *CRYSTAL STRUCTURE, *FILMS, ARGON, DIFFRACTION, ELECTRON DIFFRACTION, ELECTRONIC EQUIPMENT, EVAPORATION, FLUORINE, GASES, INTENSITY, LOW ENERGY, LOW TEMPERATURE, MICROSCOPES, MIXTURES, OXIDES, OXYGEN, REDUCTION, SAMPLING, SEGREGATION(METALLURGY), SPUTTERING, STRUCTURAL PROPERTIES, THICKNESS, THICK FILMS, EPITAXIAL GROWTH, COPPER COMPOUNDS, YTTRIUM COMPOUNDS, TUNNELING(ELECTRONICS).

IDENTIFIERS: (U) Copper Oxides, LEED(Low Energy Electron Diffraction), RHEED(Reflection High Energy Electron Diffraction), Barrium compounds, PE61102F, WUAFOSR2305C1.

AD-A192 907

AD-A192 898 6/1 6/4

YALE UNIV NEW HAVEN CT DEPT OF OPHTHALMOLOGY AND VISUAL SCIENCE

(U) Regulatory Biochemical and Metabolic Responses in Photoreceptors.

DESCRIPTIVE NOTE: Final rept. 1 Jul 84-30 Sep 87,

NOV 87 41P

PERSONAL AUTHORS: Stein, Peter J.

CONTRACT NO. AFOSR-84-0171

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR TR-88-0567

UNCLASSIFIED REPORT

ABSTRACT: (U) Studies of near infrared light scattering changes in disk membrane suspensions revealed three novel phenomena. The light induced scattering changes observed in the presence of Guanosine triphosphate and Cyclic guanosine monophosphate were produced by aggregation/ disaggregation of the membrane vesicles. this aggregation/ disaggregation process was correlated with activation of phosphodiesterase and a change in its apparent solubility. That is, PDE became more tightly bound to the membrane when it was activated. We have begun preliminary studies of near infrared scattering signals in the isolated retina. In this preliminary work, we have observed that IBMX, an inhibitor of phosphodiesterase activity, profoundly affects the infrared light scattering signal in the isolated retina. It seems likely that the in vitro and in vivo signals may share a common origin. In a separate series of experiments, we have purified opsin, the apoprotein of the visual pigment protein, and reconstituted it into phospholipid vesicles. We used patch clamp recording to demonstrate that the purified, reconstituted protein exhibits cGMP-activated single channel activity. These results suggest that opsin, in addition to performing its function as the receptor molecule, may be the light-sensitive pore in the plasma membrane of the rod outer segment.

AD-A192 898

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A192 898 CONTINUED

DESCRIPTORS: (U) *METABOLISM, *PROTEINS, *MICROPHOTOMETERS, *SPECTROPHOTOMETERS, *PHOTORECEPTORS, *NUCLEOTIDES, *EYE PIGMENTS, ACTIVATION, BIOCHEMISTRY, GUANOSINE, IN VITRO ANALYSIS, IN VIVO ANALYSIS, INFRARED RADIATION, INHIBITORS, MOLECULES, NEAR INFRARED RADIATION, OPTICAL IMAGES, PHOSPHATES, PHOSPHODIESTERASE, RECORDING SYSTEMS, RETINA, SENSE ORGANS, SIGNALS, RESPONSE(BIOLOGY), RETINA, MEMBRANES(BIOLOGY).

IDENTIFIERS: (U) *Photoisomerization, Rhodopsin, PE61102F, WUAFOSR2312A2.

AD-A192 897 5/8 6/4

STATE UNIV OF NEW YORK AT BUFFALO AMHERST

(U) The Interaction of Sensory and Perceptual Variables: Spatial, Temporal and Orientation Response to Figure and Ground.

DESCRIPTIVE NOTE: Final rept. 1 Jun 84-31 Aug 87,

FEB 88 34P

PERSONAL AUTHORS: Weisstein, Naomi

CONTRACT NO. AFOSR-84-0115

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR TR-88-0282

UNCLASSIFIED REPORT

ABSTRACT: (U) Numerous experimental observations support the principal investigator's conjecture that human visual segmentation of figure and ground is partly determined by properties of the visual scene. Support derives from observations that: figure and ground occupy different perceptual depth planes; perceived differences of depth are necessary for figure-ground segmentation; patches of an image are assigned to depth planes partly on the basis of their relative spatial frequency content, temporal frequency content (distinguished from perceived velocity), and retinal disparity. Details of these and other experiments are included with discussion and references. Keywords:Space perception.

DESCRIPTORS: (U) *SPACE PERCEPTION, *VISUAL PERCEPTION, *SURFACES, HUMANS, OPTICAL IMAGES, ORIENTATION(DIRECTION), PERCEPTION, RESPONSE, SEGMENTED, VARIABLES, VISION, IMAGE PROCESSING, SPATIAL DISTRIBUTION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A192 896 12/1

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Feedback Control of a Hyperbolic Partial-Differential Equation with Viscoelastic Damping.

APR 88 58P

PERSONAL AUTHORS: Burns, J. A.; Fabiano, R. H.

REPORT NO. LCDS/CCS-88-5

CONTRACT NO. F49620-87-C-0110, F49620-87-C-0088

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-88-0575

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by contract F49620-87-C-0116, and grant AFOSR-85-027.

ABSTRACT: (U) In this paper we consider an approximation scheme for an optimal control problem described by a hyperbolic partial-functional differential equation used to model the elastic motion of a viscoelastic body of Boltzmann type. The method is based on combined finite element/averaging approximations. We present theoretical and numerical results for a problem with quadratic cost functional.

DESCRIPTORS: (U) *DAMPING, *VISCOELASTICITY, *PARTIAL DIFFERENTIAL EQUATIONS, APPROXIMATION(MATHEMATICS), BOLTZMANN EQUATION, CONTROL, COSTS, ELASTIC PROPERTIES, FEEDBACK, FINITE ELEMENT ANALYSIS, MEAN, MOTION, NUMERICAL ANALYSIS, OPTIMIZATION, QUADRATIC EQUATIONS, MATHEMATICAL MODELS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A192 896

AD-A192 895 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Multiple Integration with Respect to Poisson and Levy Processes.

DESCRIPTIVE NOTE: Rept. for Sep 87-Aug 88,

FEB 88 48P

PERSONAL AUTHORS: Kallenberg, Olav; Szulga, Jerzy

REPORT NO. TR-224

CONTRACT NO. F49620-85-C-0144, $NSF-DMS7-03804

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-88-0420

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by grant NSF-DMS7-13103.

ABSTRACT: (U) Necessary and sufficient conditions are given for the existence of a multiple stochastic integral of the form (integral over) fdx1...dXd, where X1,...,Xd are components of a positive or symmetric pure jump type Levy process in R to the dth power. Conditions are also given for a sequence of integrals of this type to converge in probability to zero or infinity, or to be tight. All arguments proceed via reduction to the special case of Poisson integrals. Keywords: Stochastic integrals; Poisson representation; Levy process; Decoupling; Symmetrization; Convergence in probability; Tightness; Completeness.

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, INTEGRALS, POISSON DENSITY FUNCTIONS, SEQUENCES, TIGHTNESS, NUMERICAL INTEGRATION, CONVERGENCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A192 895

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 893 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) A Study on Lebesgue Decomposition of Measures Induced by Stable Processes.

DESCRIPTIVE NOTE: Technical rept. Sep 87-Aug 88,

NOV 87 85P

PERSONAL AUTHORS: De Freitas Marques, Mauro S.

REPORT NO. TR-218

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR
TR-88-0360

UNCLASSIFIED REPORT

ABSTRACT: (U) The Lebesgue decomposition of measures induced by symmetric stable process is considered. An upper bound for the set of admissible translates of a general pth order process is presented, which is a partial analog of the reproducing kernel Hilbert space of a second order process. For invertible processes a dichotomy is established: each translate is either admissible or singular, and the admissible translates are characterized. As a consequence, most continuous time moving averages and all harmonizable processes with nonatomic spectral measure have no admissible translate. Necessary and sufficient conditions for equivalence and singularity of certain product measures are given and applied to the problem of distinguishing a sequence of random vectors from affine transformations of itself; in particular sequences of stable random variables are considered and the singularity of sequences with different indexes of stability is proved. Sufficient conditions for singularity and necessary conditions for absolute continuity are given for the pth order processes. Finally the dichotomy 'two processes are either equivalent or singular', is shown to hold for certain stable processes such as independently scattered random

AD-A192 893

AD-A192 893 CONTINUED

measures and harmonizable processes.

DESCRIPTORS: (U) *MEASURE THEORY, *STOCHASTIC PROCESSES, ANALOG SYSTEMS, CONTINUITY, DECOMPOSITION, HILBERT SPACE, INDEXES, MEAN, MOTION, RANDOM VARIABLES, SCATTERING, SEQUENCES, STABILITY, TIME, KERNEL FUNCTIONS.

IDENTIFIERS: (U) Lebesgue measure, Lebesgue decomposition, Second order processes, PE61102F, WUAFOSR2304A6.

AD-A192 893

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 892 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) On Stable Markov Processes.

DESCRIPTIVE NOTE: Technical rept. Sep 87-Aug 88,

SEP 87 46P

PERSONAL AUTHORS: Adler, Robert J.; Gambanis, Stamatis; Samorodnitsky, Gennady

REPORT NO. TR-203

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-88-0359

UNCLASSIFIED REPORT

ABSTRACT: (U) Necessary conditions are given for a symmetric alpha-stable (SaS) process, 1<alpha<2, to be Markov. These conditions are then applied to find Markov or weakly Markov processes within certain important classes of S/alpha/S processes: time changed Levy motion, sub-Gaussian processes, moving averages and harmonizable processes. Two stationary S/alpha/ S Markov processes are introduced, the right and the left S/alpha/S Ornstein-Uhlenbeck processes. Some of the results are in sharp contrast to the Gaussian case alpha=2. Keywords: Harmonizable process; Stable conditional distribution.

DESCRIPTORS: (U) *MARKOV PROCESSES, CONTRAST, MEAN, MOTION, SHARPNESS, STABILITY.

IDENTIFIERS: (U) Ornstein Uhlenbreck processes, Levy motion, Harmonizable processes, Stable conditional processes, PE61102F, WUAFOSR2304A5.

AD-A192 892

AD-A192 884 3/2 20/9

MISSION RESEARCH CORP ALEXANDRIA VA

(U) Theory and Simulation of Relaxed Plasmoids.

DESCRIPTIVE NOTE: Final rept. 1 Sep 86-31 Oct 87,

DEC 87 27P

PERSONAL AUTHORS: Brandenburg, John; Wahlstrand, Karna

REPORT NO. MRC/WDC-R-148

CONTRACT NO. F49620-86-C-0098

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR TR-88-0552

UNCLASSIFIED REPORT

ABSTRACT: (U) Plasmoids can be described as a group of electrons and ions that propagate as a unit through vacuum. In their present conception they consist of an expanding halo region, carrying return current and bearing a slight charge imbalance, and an equilibrium core region that propagates like a pinched charged particle beam. This model was first suggested by T. Lockner of Sandia. Since they are a type of charged particle beam, they can be generated with higher efficiency and deposit their energy over a deeper distance in matter than laser beams. This makes plasmoids attractive for defense applications; however, the structure, formation, and propagation of plasmoids in a space environment are not known at present. Theory and one-dimensional simulations aimed at finding the core structure of plasmoids by using variational principles have been successful. This report documents the progress made in this first phase of research. A proposed second phase of research will use similar techniques to model the three-dimensional formation and propagation of plasmoids in a space environment.

DESCRIPTORS: (U) *ELECTRONS, *IONS, *PARTICLE BEAMS, *SPACE ENVIRONMENTS, *PLASMAS(PHYSICS), CHARGED PARTICLES, CORES, DEFENSE SYSTEMS, EFFICIENCY, EQUILIBRIUM(GENERAL),

AD-A192 884

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A192 884 CONTINUED

LASER BEAMS, MODELS, ONE DIMENSIONAL, REGIONS, SIMULATION, THREE DIMENSIONAL, VACUUM, VARIATIONAL PRINCIPLES, RELAXATION, PROPAGATION, PINCH EFFECT, LORENTZ FORCE, MAGNETIC FIELDS.

IDENTIFIERS: (U) *Plasmoids, PE61102F, WUAFOSR2301A7.

AD-A192 884

AD-A192 880 7/4

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Surface-Enhanced Correlations between Polarised Photons in Resonance Fluorescence,

FEB 88 17P

PERSONAL AUTHORS: Arnoldus, Henk F.; George, Thomas F.

REPORT NO. TR-82

CONTRACT NO. F49620-86-C-0009

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-88-0339

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physics B, v21 n3 p431-446, 14 Feb 88.

ABSTRACT: (U) Correlations between photons emitted by an atom in a laser field and near a metal surface are studied. With polarization-dependent degenerate substates. Both the Einstein coefficient for spontaneous decay of a particular excited substrate and its branching towards the various ground states depend on the distance between the atom and the surface. A combination of these notions to design a geometry for the correlated detection of polarized photons is employed, in order to predict a strong dependence of the correlation functions on the atom-surface distance. In general, an enhancement of the correlations between emitted photons due to the presence of the metal surface is found, if the atom-surface distance is (roughly) less than 20% of the wavelength of the fluorescence radiation. Especially the correlations between circularly-polarized photons with the same helicity is modified dramatically, and the correlation time tends to infinity if the atom approaches the surface. If is pointed out how the different photon correlations can be understood from a simple interpretation of transition diagrams. Keywords: Resonance fluorescence; Polarized photons; Reprints; Correlations; Metal surface.

AD-A192 880

AD-A192 880 CONTINUED

DESCRIPTORS: (U) *FLUORESCENCE, *PHOTONS, *RESONANCE, ATOMS, CIRCULAR, CORRELATION, DECAY, DETECTION, DIAGRAMS, FUNCTIONS(MATHEMATICS), GROUND STATE, LASERS, METALS, OPTIMIZATION, POLARIZATION, RADIATION, RANGE(DISTANCE), REPRINTS, SUBSTRATES, SURFACES, TIME, TRANSITIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A192 879 20/10

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Theory of Low-Temperature Adsorption,

FEB 88 33P

PERSONAL AUTHORS: Chung, S. G.; George, Thomas F.

REPORT NO. TR-58

CONTRACT NO. F49620-86-C-0009

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-88-0340

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Surface Science, v194 p347-378 1988.

ABSTRACT: (U) A general and qualitatively exact theory is developed for quantum sticking coefficients alpha (k) in the small wave number limit k - approaches. The theory covers Morse-type to inverse-square potentials, the latter representing long-range potentials. The theory gives unambiguous answers to crucial questions in the problem and helps lead to an overall understanding of low-temperature adsorption. Keyword: Reprints; Low temperature adsorption; Morse type potentials; Inverse square potentials.

DESCRIPTORS: (U) *RADIATION ABSORPTION, *QUANTUM THEORY, COEFFICIENTS, INVERSION, LONG RANGE(DISTANCE), LOW TEMPERATURE, REPRINTS, THEORY, MORSE POTENTIAL.

IDENTIFIERS: (U) Inverse Problems, Inverse Square Potential, PE61102F, WUAFOSR2303B3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 878 20/5 20/10

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Coherent States for the Damped Harmonic Oscillator,

DEC 87 8P

PERSONAL AUTHORS: Yeon, K. H.; Um, C. I.; George, Thomas F.

REPORT NO. TR-58

CONTRACT NO. F49620-86-C-0009

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-88-0355

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review A, v36 n11 p5287-5291 Dec 87.

ABSTRACT: (U) Using the Caldirol-Kanai Hamiltonian for the damped harmonic oscillator, exact coherent states are constructed. These new coherent states satisfy the properties which coherent states should generally have. Keywords: Damped harmonic oscillator; Coherent states; Caldirola-Kanai Hamiltonian; Quantum dissipative system; Reprints.

DESCRIPTORS: (U) *DISSIPATION, *HARMONIC GENERATORS, *HARMONIC ANALYSIS, DAMPING, QUANTUM THEORY, REPRINTS, HAMILTONIAN FUNCTIONS.

IDENTIFIERS: (U) Caldirola Kanai Hamilton functions, Harmonic oscillators, PE61102F, WUAFOSR230383.

AD-A192 878

AD-A192 874 7/2

VANDERBILT UNIV NASHVILLE TN DEPT OF CHEMISTRY

(U) Ab Initio Structures of Phosphorus Acids and Esters. 3. P-O-P Bridged Compounds H4P2O2n-1 for n = 1 to 4,

88 9P

PERSONAL AUTHORS: Ewig, Carl S.; Van Wazer, John R.

CONTRACT NO. AFOSR-86-0148

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-88-0084

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of American Chemical Society, v110 n1 p79-86 1988. See also rpeort dated 1985, AD-A161 216.

ABSTRACT: (U) The detailed molecular structures including the equilibrium conformations and energies of the four prototype phosphorus compounds exhibiting a phosphorus oxygen phosphorous(P-O-P) interconnection, H4P2O2n-1 for n=1 to 4, were determined by ab initio quantum chemical calculations. The size, bending force constant, and barrier to linearity of the P-O-P angle were investigated for the n=1 to 3 species and found to be consistent with the large (up to 180) angles seen in pyrophosphate salts. The enthalpies and free energies of the hydrolysis reactions, replacing P-O-P linkage with two P-O-H groups to form the monoacids, were found to increase slightly with increasing numbers of substituents, being positive or close to zero in the gas phase. Keywords: Molecular structure, Phosphorus acids.

DESCRIPTORS: (U) *MOLECULAR STRUCTURE, *PHOSPHORUS COMPOUNDS, *PHOSPHORIC ACIDS, BENDING, ESTERS, PHOSPHATES, PHOSPHORUS, QUANTUM CHEMISTRY, QUANTUM STATISTICS, VAPOR PHASES, CROSSLINKING(CHEMISTRY), HYDROLYSIS, ENTHALPY, FREE ENERGY, CHEMICAL BONDS, REPRINTS.

IDENTIFIERS: (U) Chemical bridges, PE61102F, WUAFOSR230383.

AD-A192 874

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 873 7/4

VANDERBILT UNIV NASHVILLE TN DEPT OF CHEMISTRY

(U) Conformations of Tartaric Acid and Its Esters,

87 8P

PERSONAL AUTHORS: Polavarapu, P. L.; Ewig, C. S.; Chandramouly, T.

CONTRACT NO. AFOSR-86-0148

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-88-0197

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of American Chemical Society, v109 n24 7382-7386 1987.

ABSTRACT: (U) Vibrational circular dichroism (VCD) spectra of optically active tartaric acid and its dimethyl, diethyl and diisopropyl esters were measured. It is found that VCD associated with the C -O stretching vibrations is identical in all species and reveals a configurational correlation. Ab initio calculations of the energies of several conformers in three levels of approximation indicated that the trans COOH conformation with hydrogen bonding between OH and C=O groups on the same chiral carbon is invariably of lowest energy. This then permits an explanation of the experimental absorption and VCD intensities.

DESCRIPTORS: (U) *SUCCINIC ACID, *STEREOCHEMISTRY, *TARTRATES, *HYDROXYL RADICALS, ABSORPTION, CARBON, CIRCULAR, CONFORMITY, DICHROISM, ENERGY, ESTERS, HYDROGEN BONDS, ORGANIC ACIDS, REPRINTS, VIBRATION, CARBOXYL GROUPS, CONFIGURATIONS.

IDENTIFIERS: (U) *Tartaric acid, Optical activity, Dimethyl tartrate, Diethyl tartrate, Diisopropyl tartrate, Carbon-Oxygen bonds, Stretching, PE61102F, WUAFOSR230383.

AD-A192 873

AD-A192 843 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Stopping Rules and Ordered Families of Distributions.

DESCRIPTIVE NOTE: Technical rept. Sep 87-Aug 88,

DEC 87 18P

PERSONAL AUTHORS: Bather, John

REPORT NO. TR-219

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-88-0358

UNCLASSIFIED REPORT

ABSTRACT: (U) There are good reasons for using sequential methods in some statistical decision problems, but a stopping rule that is helpful for deciding whether theta>0 or theta<0 may not be so good for estimating theta. This paper considers the construction of confidence bounds on a real parameter and investigates the relation between the ordering of boundary points that are accessible under the stopping rule and the natural ordering of the parameter space. Keywords: Confidence intervals; Monotone likelihood ratios; Stochastic ordering; Sequential decisions.

DESCRIPTORS: (U) *STOPPING RULES(MATHEMATICS), *PROBABILITY DISTRIBUTION FUNCTIONS, CONFIDENCE LEVEL, CONFIDENCE LIMITS, DECISION MAKING, DECISION THEORY, INTERVALS, PARAMETERS, SEQUENTIAL ANALYSIS, STATISTICS, STOCHASTIC CONTROL.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A192 843

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 842 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Two Classes of Self-Similar Stable Processes with Stationary Increments.

DESCRIPTIVE NOTE: Rept. for Sep 87-Aug 88,

JAN 88 34P

PERSONAL AUTHORS: Cambanis, Stamatis; Maejima, Makoto

REPORT NO. TR-220

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-88-0357

UNCLASSIFIED REPORT

ABSTRACT: (U) Two disjoint classes of self-similar symmetric stable processes with stationary increments are studied. The first class consists of linear fractional stable processes, which are related to moving average stable processes, and the second class consists of harmonizable fractional stable processes, which are connected to harmonizable stationary stable processes. The domain of attraction of the harmonizable fractional stable processes is also discussed. Keywords: Self similar processes; Stable processes; Harmonizable fractional processes; Domain of attraction; Linear fractional process.

DESCRIPTORS: (U) *STABILITY, *STOCHASTIC PROCESSES, STATISTICAL PROCESSES, STATIONARY, SYMMETRY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A192 841 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) A Note on Vector Bimeasures.

DESCRIPTIVE NOTE: Rept. for Sep 87-Aug 88,

NOV 87 8P

PERSONAL AUTHORS: Houdre, Christian

REPORT NO. TR-214

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-88-0349

UNCLASSIFIED REPORT

ABSTRACT: (U) A Fubini type theorem is obtained for vector bimeasure integrals.

DESCRIPTORS: (U) *INTEGRALS, *THEOREMS, VECTOR ANALYSIS, STOCHASTIC PROCESSES, BANACH SPACE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A192 840 5/9 5/8 12/5 12/6

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF PSYCHOLOGY

(U) Assessing and Enhancing Human Performance: Utility of a Workstation Network.

DESCRIPTIVE NOTE: Final rept. 1 Oct 86-1 Oct 87,

MAR 88 10P

PERSONAL AUTHORS: Green, Bert F., Jr.; Breckler, Steven J.; Egeth, Howard E.; Cohen, Neal J.

REPORT NO. JHU-RR-88-100

CONTRACT NO. AFOSR-87-0068

PROJECT NO. 2917

TASK NO. A4

MONITOR: AFOSR
TR-88-0440

UNCLASSIFIED REPORT

ABSTRACT: (U) An articulated state of the art network of computer based workstations has been installed and is being used for behavioral and personnel research. This report describes the network configuration, discusses the current experience in using the equipment, and identifies current research projects that are using the equipment. Keywords: Laboratory computer system, Work station network.

DESCRIPTORS: (U) *NETWORKS, *PERFORMANCE(HUMAN), BEHAVIOR, CONFIGURATIONS, LABORATORIES, PERSONNEL, STATIONS, WORK, COMPUTER ARCHITECTURE, COMPUTER APPLICATIONS, COMPUTERIZED SIMULATION, COMPUTER AIDED INSTRUCTION, COMPUTER PROGRAMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A4.

AD-A192 839 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Computation of Filters by Sampling and Quantization.

DESCRIPTIVE NOTE: Rept. for Sep 87-Aug 88,

SEP 87 31P

PERSONAL AUTHORS: Korezlioglu, A. H.

REPORT NO. TR-208

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

MONITOR: AFOSR
TR-88-0358

UNCLASSIFIED REPORT

ABSTRACT: (U) Various approximation procedures of filters by sampling and quantization are considered for effective computation. The corresponding approximation degrees are estimated without the boundedness condition on the modulated signal. Keywords: Stochastic filtering.

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, *MATHEMATICAL FILTERS, MODULATION, SAMPLING, SIGNALS, QUANTIZATION, STATISTICAL SAMPLES.

IDENTIFIERS: (U) Kalman Bucy filters, Zakai equations, Markov chains, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 838 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) On the Exceedance Random Measures for Stationary Processes.

DESCRIPTIVE NOTE: Rept. for Sep 87-Aug 88,

NOV 87 27P

PERSONAL AUTHORS: Leadbetter, M. R.

REPORT NO. TR-215

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR TR-88-0350

UNCLASSIFIED REPORT

ABSTRACT: (U) Two common approaches to extremal theory for stationary processes involve (a) consideration of point processes of upcrossings of high levels and (b) use of the total exceedance time above such levels. The approach (a) yields a greater variety of interesting results regarding the global and local maxima, but requires more by way of regularity conditions on the sample paths, than does the approach (b). This work combines both approaches by consideration of the exceedance random measure thereby obtaining general results under weak conditions on the sample functions. These include previously known results in the case where more sample function regularity is assumed.

DESCRIPTORS: (U) *STATISTICAL PROCESSES, *STATIONARY, THEOREMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A6.

AD-A192 838

AD-A192 780 8/1 24/4

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF GEOGRAPHY AND ENVIRONMENTAL ENGINEERI NG

(U) Biotransformation of Hazardous Organic Pollutants.

DESCRIPTIVE NOTE: Final rept. 1 Aug 86-1 Aug 87,

FEB 88 3P

PERSONAL AUTHORS: Bouwer, Edward J.

CONTRACT NO. AFOSR-86-0218

PROJECT NO. 2917

TASK NO. A4

MONITOR: AFOSR TR-88-0218

UNCLASSIFIED REPORT

ABSTRACT: (U) When growing on methane and oxygen, methanotrophic bacteria possess a non-specific enzyme, methane monooxygenase, that has been shown to oxidize halogenated solvents in cell extracts. Methanotrophic bacteria were cultured in batch & column reactors to test their ability to oxidize a number of organic contaminants. Transformation pathways and rates will be determined using the instrumentation funded by OSR. The fundamental concepts derived from laboratory experiments and data are being formulated into a computer biofilm model to predict regions in a contaminated subsurface where the proper environment occurs for contaminant biotransformation. This model will aid the design of biological in situ treatment processes that hold promise to permanently clean up contaminated aquifers.

DESCRIPTORS: (U) *ORGANIC MATERIALS, *POLLUTANTS, *BIODETERIORATION, *WATER RECLAMATION, AQUIFERS, BACTERIA, CELLS(BIOLOGY), CONTAMINANTS, CONTAMINATION, ENZYMES, HAZARDS, LABORATORY TESTS, METHANE, OXYGEN, SUBSURFACE, CHEMICAL CONTAMINATION, WATER SUPPLIES, WASTE TREATMENT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A4.

AD-A192 780

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 750 8/2 6/1

ILLINOIS UNIV AT URBANA

(U) Structure and Function of Cytochrome P-450 Genes.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 86-30 Aug 87,

JAN 88 10P

PERSONAL AUTHORS: Kemper, Byron

CONTRACT NO. AFOSR-84-0317

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-88-0253

UNCLASSIFIED REPORT

ABSTRACT: (U) The cytochrome P450IIC2 (previously designated P-450PBc) subfamily of the phenobarbital-inducible family of cytrochrome P-450 contains several closely related members. We have reported previously the characterization of complementary deoxyribonucleic acids for four of these P-450's, partial characterization of three of the corresponding genes and have shown that phenobarbital-induction can largely be accounted for by an increase in transcription rates. In year 3 we have continued our analysis of the genes of this subfamily concentrating on the 5' flanking regions which probably contain regulatory regions. To complement our previous characterization of the 3' end of the P450IIC3 gene we have isolated a lambda phage clone containing the 5' portion of the gene. This cloned genomic fragment contained exons 2-6 and combined with the earlier work defines the structure of exons 2-9 into the 3' flanking region spanning more than 25 kilobase pairs. We are continuing our search for a cloned genomic fragment containing exon 1 and the 5' flanking region. We have also characterized a genomic fragment containing exons 1-5 of the phenobarbital-in-ducible P450IIC4 gene. We are presently continuing the isolation and characterization of the genes and have begun to study the effect of phenobarbital on the chromatin structure of these genes and to characterize nuclear proteins that bind to the genes.

AD-A192 750

AD-A192 750 CONTINUED

DESCRIPTORS: (U) *GENES, BARBITURATES, CHROMATIN, CLONES, DEOXYRIBONUCLEIC ACIDS, ISOLATION, FRAGMENTS, PROTEINS, FUNCTIONS, CELL STRUCTURE, MOLECULAR STRUCTURE, LIVER, RABBITS.

IDENTIFIERS: (U) *Cytochrome P450, *P450 Genes, Transcription rates, Flanking regions, Genomes, Exons, Gene mapping, Nuclear proteins, Regulatory regions, PE61102F, WUAFOSR2312A5.

AD-A192 750

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A192 748 20/5 20/9

YALE UNIV NEW HAVEN CT DEPT OF APPLIED PHYSICS

(U) Plasma Spectroscopy of H, Li, and Na in Plumes Resulting from Laser-Induced Droplet Explosion.

DESCRIPTIVE NOTE: Rept. for Dec 86-Mar 87,

SEP 87 8P

PERSONAL AUTHORS: Eichmans, Johannes H.; Hsieh, Wen-Feng; Chang, Richard K.

CONTRACT NO. F49620-85-K-0002, DAAG29-85-K-0083

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, ARO
TR-88-0321, 22517.15-GS

UNCLASSIFIED REPORT

Pub. in Applied Optics, v26 n17 p3721-3725, 1 Sep 87.

ABSTRACT: (U) The plasma emission resulting from laser-induced breakdown of large transparent H20 droplets (with and without NaC1 or LiC1) has been spectrally and spatially resolved along a strip which encompasses the droplet and two plasma plumes associated with material streaming from the droplet. From the emission line shapes, relative emission ratios, and absorption line reversals, estimates can be made of the electron density, plasma temperature, and spatial inhomogeneity of the plasma along a strip in the direction of the laser beam. Use of the emission lines of H, Li, and Na as atomic tracers for plasma diagnostics is discussed. Keywords: Laser-induced breakdown, Stark broadening, Electron density, Plasma spectroscopy, Atomic temperature.

DESCRIPTORS: (U) *EMISSION SPECTRA, *PLASMAS(PHYSICS), *BREAKDOWN(ELECTRONIC THRESHOLD), ABSORPTION SPECTRA, DROPS, ELECTRON DENSITY, EXPLOSIONS, HETEROGENEITY, LASER BEAMS, LASERS, LINE SPECTRA, PLASMA DIAGNOSTICS, PLUMES, RATIOS, SHAPE, SPATIAL DISTRIBUTION, SPECTROSCOPY, TEMPERATURE, REPRINTS, HYDROGEN, LITHIUM, SODIUM, STARK EFFECT, COLLISION BROADENING, TRACER STUDIES.

AD-A192 748

AD-A192 748 CONTINUED

IDENTIFIERS: (U) Laser produced plasmas, PE61102F, WUAFOSR2308A3.

AD-A192 748

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A192 747 9/3 20/9

YALE UNIV NEW HAVEN CT DEPT OF APPLIED PHYSICS

(U) Propagation Velocity of Laser-Induced Plasma Inside and Outside a Transparent Droplet.

DESCRIPTIVE NOTE: Rept. for Nov 86-Feb 87,

AUG 87 4P

PERSONAL AUTHORS: Hsieh, W.-F.; Zheng, J.-B.; Wood, C. F.; Chu, B. T.; Chang, R. K.

CONTRACT NO. F49620-85-K-0002, DAAG29-85-K-0063

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, ARO
TR-88-0319, 22517.20-GS

UNCLASSIFIED REPORT

Pub. in Optics Letters, v12 n12 p576-578 Aug 87.

ABSTRACT: (U) The supersonic propagation velocity of the emission front of plasma produced by laser-induced breakdown of a micrometer-sized transparent droplet flowing in a gas was measured with a streak camera at three intensity levels. At low input intensity, the plasma velocities in the gas away from and toward the shadow face were determined. At medium input intensity, the plasma velocities in the gas outside the shadow face and within the liquid (traveling toward the illuminated face) were measured. At high input intensity, the plasma velocities in the gas outside the shadow face, within the liquid, and in the gas outside the illuminated face were deduced. Keywords: Laser induced breakdown, Propagation velocity, Plasma, Optical detonation waves, Micrometer droplets.

DESCRIPTORS: (U) *DROPS, *LASERS, *PLASMAS(PHYSICS), DETONATION WAVES, HIGH RATE, INPUT, INTENSITY, LEVEL(QUANTITY), LOW INTENSITY, MEDIUM INTENSITY, MICROMETERS, OPTICS, PROPAGATION, STREAK CAMERAS, SUPERSONIC CHARACTERISTICS, TRANSPARENCE, VELOCITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3.

AD-A192 747

AD-A192 748 21/2 20/13 14/4

YALE UNIV NEW HAVEN CT DEPT OF APPLIED PHYSICS

(U) Explosive Vaporization of a Large Transparent Droplet Irradiated by a High Intensity Laser.

DESCRIPTIVE NOTE: Rept. for Jan 87-May 87,

NOV 87 8P

PERSONAL AUTHORS: Zhang, Jan-Zhi; Lam, Joseph K.; Wood, Carol F.; Chu, Boa-Teh; Chang, Richard K.

CONTRACT NO. F49620-85-K-0002, DAAG29-85-K-0063

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, ARO
TR-88-0320, 22517.18-GS

UNCLASSIFIED REPORT

Pub. in Applied Optics, v26 n22 p4731-4737, 15 Nov 87.

ABSTRACT: (U) Shadowgraph studies of the explosive vaporization of a transparent water droplet after irradiation by a high intensity beam show that dielectric breakdown occurs within the droplet shadow face and generates a dense plasma which absorbs the laser pulse. The convective forces expel the vapor from the droplet shadow face. We have induced (1) the vapor propagation velocities, (2) the recoil velocity of the remaining droplet, and (3) the deformation rate of the illuminated face. Droplets are noted to eject fingerlike material from the surface facing the single laser-vaporized droplet when the asymmetrical vapor intercepts the neighboring droplets. Keywords: Explosive vaporization, Vapor propagation velocity, Droplet deformation rate, Shadowgraphs, Recoil velocity.

DESCRIPTORS: (U) *BREAKDOWN(ELECTRONIC THRESHOLD), *DIELECTRIC PROPERTIES, *DROPS, *SPARK SHADOWGRAPH PHOTOGRAPHY, *WATER, *LASER TARGET INTERACTIONS, *EXPLOSIVE DECOMPOSITION, ASYMMETRY, DEFORMATION, DENSE GASES, EXPLOSIVES, HIGH RATE, INTENSITY, INTERCEPTION, IRRADIATION, LASERS, PLASMAS(PHYSICS), PROPAGATION, PULSED LASERS, RATES, RECOIL, TRANSPARENCE, VAPORIZATION,

AD-A192 748

AD-A192 746 CONTINUED

VAPORS, VELOCITY, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3.

AD-A192 745 9/3 7/4

YALE UNIV NEW HAVEN CT DEPT OF APPLIED PHYSICS

(U) Internal and External Laser-Induced Avalanche Breakdown of Single Droplets in an Argon Atmosphere.

DESCRIPTIVE NOTE: Rept. for Feb-Jun 87,

NOV 87 6P

PERSONAL AUTHORS: Hsieh, W.-F.; Eickmans, J. H.; Chang, R. K.

CONTRACT NO. F49620-85-K-0002, DAAG29-85-K-0063

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR, ARO
TR-88-0322, 22817.14-GS

UNCLASSIFIED REPORT

Pub. in Jnl. of the Optical Society of America B, v4 n11 p1816-1820 Nov 87.

ABSTRACT: (U) Laser induced breakdown of a transparent micrometer sized H20 droplet can be initiated only in the Ar gas in a strip outside the droplet shadow face. At a higher input 0.532 micro Q switched laser intensity, breakdown can also occur within the droplet. The resultant internal plasma blocks the laser from reaching the region outside the shadow face and absorbs more of the laser pulse to produce a shock wave and/or a laser-supported detonation wave. Various combinations of liquid and surrounding gas were investigated at different input intensities in order to provide information on the breakdown processes in a transparent droplet. Keywords: Laser induced breakdown, Location, Transparent liquid droplets, Internal plasma.

DESCRIPTORS: (U) *ARGON, *ATMOSPHERES, *DROPS, *LASERS, DETONATION WAVES, INTERNAL, LIQUIDS, MICROMETERS, PLASMAS(PHYSICS), PULSED LASERS, SHOCK WAVES, TRANSPARENCE, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3.

AD-A192 746

AD-A192 745

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 733 21/2

PENNSYLVANIA STATE UNIV UNIVERSITY PARK

(U) The Transport and Growth of Soot Particles in Laminar Diffusion Flames,

87 28P

PERSONAL AUTHORS: Santoro, R. J.; Yeh, T. T.; Horvath, J. J.; Semerjian, H. G.

CONTRACT NO. AFOSR-87-0145

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-88-0269

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Combustion Science and Tehcnology, v53 p89-115 1987.

ABSTRACT: (U) The formation, growth and burnout of soot particles is examined in a series of ethene/air laminar diffusion flames. Detailed particle, temperature and velocity field measurements are utilized to investigate soot growth along individual particle paths. The importance of changes in the particle residence time, flame geometry and growth rates are evaluated as a function of fuel flow rate. Emphasis is given to the soot volume fraction measurements in two characteristic regions of the flame: the annular region near the flame front where soot is first observed to form, and the center line of the flame. In the annular region, increases in the residence time with increasing fuel flow rate are found to be the major reason for increased soot formation. The rates of soot formation are found to be similar in this region for the range of flow rates investigated. Along the center line, the soot formation processes are observed to be very similar for different flow rates if differences in the temperature-time history are taken into account by introducing a minimum temperature at which soot formation is observed. In the present work this temperature was found to be near 1300K. From these results, it is concluded that processes occurring in the annular region are controlling the

AD-A192 733 CONTINUED

transition from a nonsmoking to a smoking flame. Detailed particle size and number density measurements obtained in these flames are also discusses.

DESCRIPTORS: (U) *FLAMES, *LAMINAR FLOW, *SOOT, *CARBON BLACK, BURNOUT, DENSITY, DIFFUSION, FIELD TESTS, FLOW RATE, FUELS, REPRINTS, TEMPERATURE, LASER APPLICATIONS, LAMINAR BOUNDARY LAYER.

IDENTIFIERS: (U) *Soot particles, *Laminar diffusion flames, PE61102F, WUAFOSR2308A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 718 12/1

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION AND DECISION SYSTEMS

(U) Asymptotic Orders of Reachability in Perturbed Linear Systems,

APR 88 34P

PERSONAL AUTHORS: Oezveren, Cueneyt M.; Verghese, George C.; Willsky, Alan S.

CONTRACT NO. DAAG29-84-K-0005, DAAL03-86-K-0171

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-88-0434

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Grants AFOSR-82-0258 and AFOSR-88-0032.

ABSTRACT: (U) A framework for studying asymptotic orders of reachability in perturbed linear, time-invariant systems is developed. The systems of interest are defined by matrices that have asymptotic expansions in powers of a perturbation parameter about the point 0. The reachability structure is exposed via the Smith form of the reachability matrix. The approach is used to provide insight into the kinds of inputs needed to reach weakly reachable target states, into the structure of high-gain feedback for pole-placement, and into the types of inputs that steer trajectories arbitrarily close to almost (A,B)-invariant subspaces and almost (A,J)-controllability subspaces.

DESCRIPTORS: (U) *ASYMPTOTIC SERIES, *LINEAR SYSTEMS, FEEDBACK, HIGH GAIN, INVARIANCE, PARAMETERS, PERTURBATIONS, TIME, TRAJECTORIES.

IDENTIFIERS: (U) PE61102, WUAFOSR2304A1.

AD-A192 717 12/9

BOSTON UNIV MA CENTER FOR ADAPTIVE SYSTEMS

(U) Neural Network Research: A Personal Perspective,

MAR 88 18P

PERSONAL AUTHORS: Grossberg, Stephen

CONTRACT NO. F49620-86-C-0037, F49620-86-C-0018

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR TR-88-0432

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Grant NSF-IRI84-17756, and Contract DAAG29-85-K-0095.

ABSTRACT: (U) These vision preprocessor and ART autonomous classifier examples are just two of the many neural network architectures now being developed by engineers and scientists worldwide. Some of them provide a fertile ground for gaining a new understanding of biological intelligence. Others suggest novel computational theories with natural realizations as real-time adaptive neural network architectures with promising properties for tackling some of the outstanding problems in computer science and technology today. Still others do both. Whatever the focus, here is a field ready to challenge and reward the sustained efforts of a wide variety of gifted people. Keywords: Adaptive resonance theory.

DESCRIPTORS: (U) *ADAPTIVE SYSTEMS, *NEURAL NETS, ARCHITECTURE, BIOLOGY, COMPUTATIONS, COMPUTERS, PREPROCESSING, RESONANCE, THEORY, VISION, ALGORITHMS, ARTIFICIAL INTELLIGENCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A7.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A192 716 12/9

BOSTON UNIV MA CENTER FOR ADAPTIVE SYSTEMS

(U) Content-Addressable Memory Storage by Neural Networks: A General Model and Global Liapunov Method,

MAR 88 24P

PERSONAL AUTHORS: Grossberg, Stephen

CONTRACT NO. F49620-86-C-0037, F49620-86-C-0018

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR TR-88-0431

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Grant NSF-IRI84-17756.

ABSTRACT: (U) Many neural network models capable of content-addressable memory are shown to be special cases of the general model and global Liapunov function. These include examples of the additive, brain-state-in-a-box, McCulloch-Pitts, Boltzmann machine, shunting, masking field, bidirectional associative memory, Volterra-Lotka, Gilpin-Ayala, and Eigen-Schuster models. The Cohen-Grossberg model thus defines a general principle for the design of content addressable memory, that is shared by all model exemplars of such a general design constitutes a computational invariant. Such a general model and analytic method defines a computational framework within which specialized model exemplars may be compared to discover which models are best able to explain particular parametric data about brain and behavior, or to solve particular technological problems.

DESCRIPTORS: (U) *NEURAL NETS, *MEMORY DEVICES, ASSOCIATIVE PROCESSING, BRAIN, COMPUTATIONS, INVARIANCE, MASKING, MATHEMATICAL ANALYSIS, PARAMETRIC ANALYSIS, MATHEMATICAL MODELS.

IDENTIFIERS: (U) Content addressable memory, PE61102F, WUAFOSR2304A7.

AD-A192 718

AD-A192 715 12/9 8/4 12/5

BOSTON UNIV MA CENTER FOR ADAPTIVE SYSTEMS

(U) The VIte Model: A Neural Command Circuit fo r Generating Arm and Artuculator Trajectories,

MAR 88 23P

PERSONAL AUTHORS: Grossberg, Stephan; Bullock, Daniel

CONTRACT NO. F49620-86-C-0037, $NSF-IRI84-17756

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR TR-88-0384

UNCLASSIFIED REPORT

ABSTRACT: (U) A major issue in research on the neural basis of motor control is the nature of movement planning in systems with many degrees of freedom; for example, an arm with many controlling muscles acting at several joints or a speech system with many articulators. All solutions to the planning problem depend upon assumptions about both the mechanics of the effectors and the sensory and computational resources. For example, if an arm has few mechanical degrees of freedom, than the serial preplanning required to work around the arm's inherent constraints becomes a salient issue. Alternatively, if the arm has many degrees of freedom, the computational load imposed by the need for simultaneous coordination becomes a salient issue. If the arm is part of a body that grows, or if a robotic arm must remain in service without external maintenance despite unpredictable changes in its mechanical parameters, then yet another issue comes into view; autonomous recalibration.

DESCRIPTORS: (U) *ARMS(ANATOMY), *ROBOTICS, *SPEECH, *TRAJECTORIES, *SENSES(PHYSIOLOGY), *COMPUTERIZED SIMULATION, *NEUROMUSCULAR TRANSMISSION, CONTROL, DEGREES OF FREEDOM, MECHANICAL PROPERTIES, MOTORS, MUSCLES, NERVOUS SYSTEM, SENSES(PHYSIOLOGY), BIOMETRY.

IDENTIFIERS: (U) Motor control, *Artuculator trajectories, *Neural command circuits, PE61102F, WUAFOSR2304A7.

AD-A192 715

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 714 12/1

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Approximations of Stochastic Equations Driven by Predictable Processes.

DEC 87 13P

PERSONAL AUTHORS: Ferreyra, Guillermo

REPORT NO. LCDS/CCS-87-39

CONTRACT NO. DAAG29-84-K-0082, $AFOSR-85-0315

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-88-0387

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by contract DAAL03-86-K-0171

ABSTRACT: (U) A theory of stochastic integral equations driven by predictable processes in Stratonovich sense is developed. These driving processes include a large class of discontinuous semimartingales. The theory of stochastic differential equations driven by continuous semimartingales in Stratonovich sense is extended without involving Lebesgue-Stieltjes integrals as done by Meyer. Moreover, a change of variables formula without extra terms involving the jumps of the processes holds for this theory. Results on approximation of driving processes are preserved.

DESCRIPTORS: (U) *INTEGRAL EQUATIONS, *STOCHASTIC PROCESSES, DIFFERENTIAL EQUATIONS, FORMULATIONS, PREDICTIONS, VARIABLES, APPROXIMATION(MATHEMATICS).

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A192 713 12/1

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) A Wong-Zakai Type Theorem for Certain Discontinuous Semimartingales.

JAN 88 17P

PERSONAL AUTHORS: Ferreyra, Guillermo

REPORT NO. LCDS/CCS-88-1

CONTRACT NO. DAAG29-84-K-0082, $AFOSR-85-0315

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-88-0388

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by contract DAAL03-86-K-0171.

ABSTRACT: (U) Solutions of stochastic differential equations having differentials of bounded variation processes on the right hand side can be defined by means of Lebesgue Stieltjes integrals or by continuous extension of Stieltjes integrals. Both solutions are compared here and formulas that extend the Wong-Zakai theorem are obtained.

DESCRIPTORS: (U) *DIFFERENTIAL EQUATIONS, *STOCHASTIC PROCESSES, VARIATIONS, THEOREMS, HYPOTHESES.

IDENTIFIERS: (U) Semimartingales, Wong Zakai type theorem, PE61102F, WUAFOSR2304A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 712 9/1 12/1

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Approximations and Optimal Control for the Pathwise Average Cost per Unit Time and Discounted Problems for Wideband Noise Driven Systems.

JAN 88 35P

PERSONAL AUTHORS: Kushner, Harold J.

REPORT NO. LCDS/CCS-88-3

CONTRACT NO. DAAL03-86-K-0171, $AFOSR-85-0315

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-88-0394

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by contract N00014-85-K-0807.

ABSTRACT: (U) Average cost per unit time (over an infinite time horizon) optimal control problems for diffusion and other Markov models have been dealt with in various ways. We treat such a problem for 'wideband noise driven' and related systems, which are 'close' to a diffusion, and when the average is in the pathwise but not necessarily in the mean value sense. The general method works for many other classes of processes which are suitable approximated by an appropriate controlled Markov process. The results have applications to many other problems where pathwise averages are important, and the noises are 'wideband'.

DESCRIPTORS: (U) *BROADBAND, *COST ANALYSIS, CONTROL, COSTS, MARKOV PROCESSES, MATHEMATICAL MODELS, OPTIMIZATION, TIME, APPLIED MATHEMATICS, WHITE NOISE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A192 712

AD-A192 711 20/12

TEXAS UNIV AT AUSTIN DEPT OF PHYSICS

(U) Bulk Plasmon Enhanced Photoemission from Nb(100) Surface Resonances.

DESCRIPTIVE NOTE: Rept. for 1 Apr 87-31 Mar 88,

APR 88 17P

PERSONAL AUTHORS: Fang, B. S.; Ballentine, C. A.; Erskine, J. L.

CONTRACT NO. AFOSR-86-0109

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-88-0426

UNCLASSIFIED REPORT

ABSTRACT: (U) The electronic properties of Nb(100) are studied using angle-resolved photoemission. Several surface resonances are identified. One surface resonance exhibits significant enhancement of the photoemission cross section at the bulk plasma energy suggesting a novel probe of surface resonances having high degree of second-layer charge density. We report the observation of bulk plasmon enhanced photoemission from Nb(100) surface resonances. This effect offers a sensitive direct probe of the spatial extent of surface states and surface resonances at metal surfaces in cases where a high degree of second-layer charge density exists in the two-dimensional Brillouin zone. A related enhancement effect has been recently reported by Drube and Himpsel for inverse photoemission. Photoemission cross section resonances associated with surface states which arise from final state effects have also been observed on silver and copper surfaces. However, these resonances are produced by a distinctly different mechanism than the one described in this paper.

DESCRIPTORS: (U) *PHOTOELECTRIC EMISSION, *PLASMONS, BRILLOUIN ZONES, COPPER, CROSS SECTIONS, INVERSION, METALS, OBSERVATION, OPTIMIZATION, PLASMAS(PHYSICS), PROBES, RESONANCE, SENSITIVITY, SILVER, SURFACE

AD-A192 711

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 711 CONTINUED

PROPERTIES, SURFACES, TWO DIMENSIONAL, NIOBIUM, FERMI SURFACES, MOLYBDENUM, TUNGSTEN.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A2.

AD-A192 710 7/4

MARYLAND UNIV COLLEGE PARK DEPT OF PHYSICS AND ASTRONOMY

(U) Scanning Tunneling Microscopy as a Surface Chemical Probe.

DESCRIPTIVE NOTE: Final rept. 1 Aug 86-31 Jan 88,

MAR 88 3P

PERSONAL AUTHORS: Williams, Ellen D.

CONTRACT NO. AFOSR-86-0235

PROJECT NO. 2917

TASK NO. A2

MONITOR: AFOSR TR-88-0427

UNCLASSIFIED REPORT

ABSTRACT: (U) This grant sponsored purchase of surface characterization spectrometers, data acquisition hardware, and sample manipulation for an ultrahigh vacuum chamber equipped with scanning tunneling microscope. This apparatus is designed to map atomic-scale surface morphology of well-controlled samples, particularly for absorbate-covered metal surfaces. The equipment assembly has been completed and experiments are underway.

DESCRIPTORS: (U) *MICROSCOPY, *SCANNING, *TUNNELING, ASSEMBLY, CONTROL, DATA ACQUISITION, MICROSCOPES, PROBES, PROCUREMENT, SAMPLING, SPECTROMETERS, SURFACE CHEMISTRY, SURFACES, ULTRAHIGH VACUUM, VACUUM CHAMBERS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 589 20/14

PROMETHEUS INC MIDDLETOWN RI

(U) Polynomials with Restricted Coefficients and Their Applications.

DESCRIPTIVE NOTE: Final rept. 6 Mar-30 Sep 87,

87 145P

PERSONAL AUTHORS: Byrnes, James S.; Newman, Donald J.; Goldstein, Martin

CONTRACT NO. F49620-87-C-0048

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR TR-88-0092

UNCLASSIFIED REPORT

ABSTRACT: (U) Certain design restrictions growing out of antenna theory yield a beautiful class of complex variables problems. Our work was devoted to formulating these problems in mathematical terms, solving some of them, and beginning work on the others. One important result achieved was the development of a new method of estimating Gaussian-type exponential sums. Improvements of our previous results in null steering and notch filtering were also attained. Other findings were obtained in the areas of: the robustness of polynomials with unimodular coefficients; the effect of errors in such standard and crucial approximations as the far-field, Fresnel, and Doppler compensation; the effect of errors in the noise covariance matrix; and the Parabolic Equation Method in underwater acoustics.

DESCRIPTORS: (U) *ANTENNA RADIATION PATTERNS, *BEAM STEERING, ANTENNAS, COEFFICIENTS, COMPENSATION, COMPLEX VARIABLES, DOPPLER SYSTEMS, EQUATIONS, LIMITATIONS, NULLS(AMPLITUDE), PARABOLAS, POLYNOMIALS, THEORY, UNDERWATER ACOUSTICS, YIELD, MATHEMATICAL FILTERS, ADAPTIVE FILTERS.

IDENTIFIERS: (U) Parabolic Equation Method, Exponential Sums, Least Mean Squares, Sidelobe Cancellers, PE61192F,

AD-A192 589 CONTINUED

WUAFOSR2304A9.

AD-A192 589

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 574 9/3 20/6

YALE UNIV NEW HAVEN CT DEPT OF APPLIED PHYSICS

(U) Micrometer-Size Droplets as Optical Cavities: Lasing and Other Nonlinear Effects.

DESCRIPTIVE NOTE: Rept. for Jul 86-Nov 86,

FEB 88 8P

PERSONAL AUTHORS: Chang, Richard K.

CONTRACT NO. F49620-85-K-0002, DAAG29-85-K-0063

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR
TR-88-0324

UNCLASSIFIED REPORT

Pub. in Advances in Laser Science-II, p509-516 1987.

ABSTRACT: (U) The morphology of a droplet enhances the internal and external intensities at specific locations and produces high Q-factor feedback for specific wavelengths of emission generated inside a droplet. Coherent nonlinear emissions have been observed from micrometer-size droplets along with other nonlinear effects such as wavelength broadening due to the intensity-dependent refractive index. Physical and chemical properties of the droplet can be reduced from such coherent emissions. Laser-induced droplet explosion and a laser-supported dotonation wave result at input intensity levels higher than those necessary to observe such nonlinear effects. The use of spatially resolved spectroscopy to analyze emissions resulting from microexplosion has provided some preliminary details about droplet and air breakdown mechanisms. Keywords: Morphology dependent resonances; Nonlinear optical effects; Spatially resolved spectroscopy; Q factor of cavity; Laser induced breakdown; Reprints.

DESCRIPTORS: (U) *DROPS, *LASERS, *NONLINEAR SYSTEMS, *OPTICS, CAVITIES, CHEMICAL PROPERTIES, COHERENCE, EMISSION, EXPLOSIONS, EXTERNAL, FREQUENCY, INTENSITY, INTERNAL, MORPHOLOGY, OPTICAL PROPERTIES, PHYSICAL

AD-A192 574 CONTINUED

PROPERTIES, POSITION(LOCATION), REFRACTIVE INDEX, REPRINTS, RESONANCE, SPECTROSCOPY, WAVES.

IDENTIFIERS: (U) PE61102F,WUAFOSR2308A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 572 20/4 21/2

CORNELL UNIV ITHACA NY

(U) Numerical Experiments on Turbulent Mixing.

DESCRIPTIVE NOTE: Final rept. Dec 84-Dec 87,

FEB 88 7P

PERSONAL AUTHORS: Pope, Stephon B.

CONTRACT NO. AFOSR-85-0083

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-88-0258

UNCLASSIFIED REPORT

ABSTRACT: (U) Mixing in simple turbulent flows has been investigating using 64 cubed and 128 cubed Direct Numerical Simulations. In turbulent combustion, mixing by molecular transport is an essential process that is not well understood. Because mixing occurs on the smallest length and time scales it is difficult to study experimentally. Instead, we have employed direct numerical simulation of turbulence, initially for a conserved passive scalar in homogeneous isotropic turbulence. The Eulerian velocity and scalar fields are calculated from the exact evolution equations, and both Eulerian and Lagrangian statistics are deduced from the computed fields. A particle-tracking scheme, needed to extract Lagrangian information, has been implemented. The testing of a number of such particle tracking schemes has been completed with good results: accurate Lagrangian information can be extracted at a modest computational cost. In order to study processes in stationary turbulence, a forcing algorithm has been implemented. Tests on this scheme are complete, again with good results: the small scales are unaffected by the details of the forcing. Studies have been performed of: the mixing of a passive scalar; Lagrangian velocity, Acceleration and dissipation statistics; and Mixing and combustion problems viewed in terms of surfaces.

DESCRIPTORS: (U) *COMBUSTION, *MIXING, *TURBULENT FLOW,

AD-A192 572

AD-A192 572 CONTINUED

ALGORITHMS, COMPUTATIONS, EQUATIONS, EVOLUTION(GENERAL), LAGRANGIAN FUNCTIONS, MATHEMATICAL MODELS, MOLECULAR PROPERTIES, NUMERICAL ANALYSIS, NUMERICAL METHODS AND PROCEDURES, PARTICLES, PASSIVE SYSTEMS, SCALAR FUNCTIONS, SCALE, STATIONARY, STATISTICS, TIME, TRACKING, TRANSPORT PROPERTIES, TURBULENCE, VELOCITY, ACCELERATION, DISSIPATION, SURFACES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A192 572

AD-A192 568 8/3

NORTHWEST RESEARCH ASSOCIATES INC BELLEVUE WA

(U) Effect of Nonlinear Instability on Gravity-Wave Momentum Transport,

NOV 87 24P

PERSONAL AUTHORS: Dunkerton, Timothy J.

CONTRACT NO. F49620-86-C-0026

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR
TR-88-0244

UNCLASSIFIED REPORT

Pub. in Jnl. of the Atmospheric Sciences, v44 n21 p3187-3209, 1 Nov 87.

ABSTRACT: (U) Internal gravity waves, with their induced stress divergence and turbulence induced are essential components of the atmospheric and oceanic general circulations. Theoretical studies have not yet reached a consensus as to how gravity waves transport and deposit momentum. The two best-known theories, resonant interaction and Eikonal saturation, yield contradictory answers to this question. In resonant interaction theory, an energetic, high-frequency, low-wavenumber wave is unstable to two waves of approximately half the frequency and is backscattered by a low-frequency wave or mean finestructure of twice the vertical wavenumber. By contrast, the Eikonal saturation model, as it is commonly used, ignores reflection by assuming a slowly varying basic state and does not question the longevity of the primary wave in the presence of local Kelvin-Helmholtz or convective instabilities. The resonant interaction formalism demands that the interactions be weakly nonlinear instability with respect to other horizontal wavenumbers by invoking the linear of quasi-linear assumption. To help bridge the gap between the two theories, results from prototype, nonlinear numerical simulations are presented. Attention is directed at the nonlinear instability of gravity waves in a slowly varying basic state. Parametric instability theory yields

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a group trajectory length scale for the primary wave expressed in terms of the dominant vertical theory yields a group trajectory length scale for the primary wave expressed in terms of the dominant vertical wavelength and degree of convective saturation.

DESCRIPTORS: (U) *GRAVITY WAVES, *INTERNAL WAVES, *PARAMETRIC INSTABILITIES, ATMOSPHERIC MOTION, CIRCULATION, CONVECTION, DEPOSITS, FREQUENCY, INTERACTIONS, MODELS, NONLINEAR ANALYSIS, NONLINEAR SYSTEMS, NUMERICAL ANALYSIS, OCEANS, RESONANCE, STABILITY, TRAJECTORIES, TRANSPORT, TURBULENCE, VERTICAL ORIENTATION, PARAMETRIC ANALYSIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

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NORTHWEST RESEARCH ASSOCIATES INC BELLEVUE WA

(U) Resonant Excitation of Hemispheric Barotropic Instability in the Winter Mesosphere,

AUG 87 16P

PERSONAL AUTHORS: Dunkerton, Timothy J.

CONTRACT NO. F49620-86-C-0026

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR TR-88-0243

UNCLASSIFIED REPORT

Pub. in Jnl. of the Atmospheric Sciences, v44 n16 p2237-2251, 15 Aug 87.

ABSTRACT: (U) The subtropical mesospheric jet observed by the Nimbus 7 Limb Infrared Monitor of the Stratosphere in late 1978 was flanked to the north and south by regions of reversed potential vorticity gradient. In mid-December, enhanced planetary wave activity propagating upward into the mesosphere led to visible overreflection from the low-latitude reversed gradient region and rapid deceleration of the jet. It is argued, first, that the overreflection visible in the geopotential height field was probably genuine, and not likely to have been due to Rossby waves incident on an inertially unstable region. Nor was it due to the opposing mean meridional circulation. Second, the observed dominance of wave 1 in the overreflected flux may have been attributable to hemispheric barotropic instability: a low-wavenumber type of instability on the sphere related to the midlatitude modes discovered by Hartmann. In comparison to the barotropically unstable eigenmodes for higher zonal wavenumbers, the wave 1 mode has a slower growth rate but larger spatial extent. For practical purposes, it is a radiating mode excitable by sources in the far field. Equally important, the phase speed of the eigenmodes can be made exactly zero when the mean flow vanishes just within this region, as observed in mid-December 1978. Resonant excitation is therefore possible. Realistic

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opposing mean meridional advection has only a slight effect on the barotropic eigenmode, provided that high-wavenumber oscillations are filtered out of the calculation, acting to reduce the growth rate and shift the subtropical secondary amplitude maximum a few degrees towards the pole.

DESCRIPTORS: (U) *MESOSPHERE, ADVECTION, AMPLITUDE, BAROMETRIC PRESSURE, DECELERATION, EIGENVECTORS, EXCITATION, FAR FIELD, JET FLOW, GEOPOTENTIAL, GRADIENTS, GROWTH(GENERAL), HEIGHT, HEMISPHERES, MEAN, RADIATION, RATES, REPRINTS, RESONANCE, REVERSIBLE, ROSSBY WAVES, SECONDARY, STABILITY, STRATOSPHERE, SUBTROPICAL REGIONS, VELOCITY, VORTICES, WAVES, WINTER, JET STREAMS, ATMOSPHERIC PHYSICS, REFLECTION, PERTURBATIONS, LONG WAVELENGTHS.

IDENTIFIERS: (U) *Barotropic instability, Planetary waves, Overreflected waves, Quantization, Atmospheric circulation, Instability, PE61102F, WUAFOSR2310A1.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 551 20/4

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Velocity Measurements and Flow Visualization in Turbulent Three-Dimensional Supersonic Flows Using Oxygen Flow Tagging.

DESCRIPTIVE NOTE: Final technical rept. 1 Nov 86-31 Oct 87,

FEB 88 4P

PERSONAL AUTHORS: Miles, Richard B.

CONTRACT NO. AFOSR-86-0219

PROJECT NO. 2917

TASK NO. A1

MONITOR: AFOSR TR-88-0267

UNCLASSIFIED REPORT

ABSTRACT: (U) An axisymmetric jet flow facility with a laser fluorescence flow visualization system has been developed. Advanced techniques in nonlinear optics and spectroscopy are being used to track oxygen molecules for velocity measurements. Similar techniques are being used to determine the distribution of energy states of oxygen molecules for temperature measurements. Density can also be measured by observing the direct light scattering from both oxygen and nitrogen. The great advantage of these techniques is they are non-obtrusive, instantaneous, two-dimensional and require no seeding of the flow with foreign material. Keywords: Flow visualization, Laser fluorescence.

DESCRIPTORS: (U) *AXIALLY SYMMETRIC FLOW, *FLOW VISUALIZATION, *JET FLOW, *OXYGEN, FACILITIES, FLOW, FOREIGN, LASER INDUCED FLUORESCENCE, LIGHT SCATTERING, MATERIALS, MEASUREMENT, MOLECULES, NITROGEN, NONLINEAR SYSTEMS, OPTICS, SEEDING, SPECTROSCOPY, SUPERSONIC FLOW, TEMPERATURE, THREE DIMENSIONAL FLOW, TURBULENT FLOW, VELOCITY.

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OKLAHOMA STATE UNIV STILLWATER DEPT OF CHEMISTRY

(U) Wave Packet Studies of gas-Surface Inelastic Scattering and Desorption Rates,

JAN 88 9P

PERSONAL AUTHORS: Jezercak, Michael; Agrawal, P. M.; Smith, Charles B.; Raff, Lionel M.

CONTRACT NO. AFOSR-86-0043

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-88-0108

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. Chemical Physics, v88 n2 p1264-1271, 15 Jan 88.

ABSTRACT: (U) A previously formulated and semiclassical wave packet method is used to investigate the importance of different surface phonon modes and the Debye surface temperature upon inelasticity in atomic gas-surface collisions. Desorption rates are calculated as a function of potential-well depth and the rate law for process is examined. The incident beam is represented by a quantum mechanical wave packet whose momentum distribution is nearly square. This wave packet is coupled to a three-dimensional model lattice through a time-varying potential field obtained by solution of the classical motion equations for the lattice. Calculated final-state momentum and energy distributions are found to be strongly dependent upon the particular surface phonon mode into which the initial lattice energy is partitioned. In general, energy transfer occurs predominantly to and from those modes for which the lattice atom in the impact region have motion in the direction of the momentum vector of the incoming wave packet. The inelasticity of the collision is found to increase as the lattice force constants and the surface Debye temperature decrease. The peak spacings in the final-state momentum and energy distributions are found to correlate well with the surface phonon frequencies. Desorption is found to be

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well described by a first-order rate law for small potential-well depths. For larger well depths, the first-order decay plots begin to show an increasing amount of curvature. Desorption rate coefficients obtained from the slopes of the decay plots show an approximate exponential dependence upon the potential-well depth.

DESCRIPTORS: (U) *DESORPTION, *INELASTIC SCATTERING, COEFFICIENTS, COLLISIONS, DECAY, DISTRIBUTION, ELASTIC PROPERTIES, ENERGY, ENERGY TRANSFER, EQUATIONS OF MOTION, IMPACT, PHONONS, PLOTTING, QUANTUM THEORY, RATES, REGIONS, SURFACE TEMPERATURE, SURFACES, TIME, VARIATIONS, WAVE PACKETS, REPRINTS, SURFACE CHEMISTRY, CRYSTAL LATTICES, QUANTUM CHEMISTRY.

IDENTIFIERS: (U) Debye surface, PE61102F, WUAFOSR2303B3.

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ILLINOIS UNIV AT URBANA LASER AIDED MATERIALS PROCESSING LAB

(U) Laser Cladding of Ni-Cr-Al-Hf on Inconel 718 for Improved High Temperature Oxidation Resistance,

AUG 87 8P

PERSONAL AUTHORS: Singh, J.; Nagarathnam, K.; Mazumder, J.

REPORT NO. LAMP-AF04

CONTRACT NO. AFOSR-85-0333

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-87-1862

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in High Temperature Technology, v5 n3 p131-138 Aug 87.

ABSTRACT: (U) In situ Ni-Cr-Al-Hf alloy has been developed by laser surface cladding with a mixed powder feed for improved high temperature oxidation resistance. Oxidation-resistant materials for operation at elevated temperatures must satisfy two requirements: diffusion through the oxide scale must occur at the lowest possible rate, and the oxide scale must resist spallation. Formation of an Al2O3 protective scale fulfills the former requirement but its adherence is poor. A reactive metal such as Hf is added to improve adhesion. A 10 kW CO2 laser was used for laser cladding. Optical, SEM and STEM microanalysis techniques were employed to characterize the different phases produced during the cladding process. Microstructural studies showed a high degree of grain refinement, increased solid solubility of Hf in the matrix and the formation of Hf-rich precipitates. A thermogravimetric analysis was carried out to determine the oxidation properties of these clad alloys with an extended solid solution of Hf. Considerable improvement over the base metal was observed. This paper discusses microstructural development in this laser clad alloy and its effect on oxidation. Keywords:

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

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Nickle; Chromium; Aluminum; Hafnium; Reprints.

DESCRIPTORS: (U) *ALLOYS, *CLADDING, *LASERS, ADHESION, ALUMINUM, BASE METAL, CHROMIUM, FEEDING, GRAIN STRUCTURES(METALLURGY), HAFNIUM, HIGH TEMPERATURE, MATERIALS, METALS, MICROSTRUCTURE, MIXING, OPERATION, OXIDATION, OXIDATION RESISTANCE, OXIDES, POWDERS, REACTIVITIES, REFINING, REPRINTS, REQUIREMENTS, SCALE, SOLID SOLUTIONS, SOLIDS, SOLUBILITY, SPALLATION, SURFACES, THERMOGRAVIMETRIC ANALYSIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A2.

AD-A192 448 12/7 12/5

INTEGRATED SYSTEMS INC SANTA CLARA CA

(U) COMPUTER-Aided-Control Engineering (CACE) PRimitives for Robust and Adaptive control Systems.

DESCRIPTIVE NOTE: Final technical rept. Aug 86-Feb 87,

OCT 87 50P

PERSONAL AUTHORS: Kosut, Robert L.; Vidyasagar, M.

REPORT NO. ISI-108

CONTRACT NO. F49620-86-C-0100

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-2024

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of the past research was the development of some mathematical and computational tools that are appropriate to the next generation of CACE (Computer-Aided-Control-Engineering) environments. These CACE packages will be radically different than the present analysis packages in that they will truly be able to perform control system synthesis. In order for this ideal situation to come about, it is necessary first to solve some important problems in the mathematics of control systems as well as in computational techniques. Phase I of the research program addressed the feasibility of solving some of the problems. Phase II will extend the results of Phase I as well as developing primitives for performing robust and adaptive control design. In particular, we will address the following control problems: (i) synthesis of linear control systems, (ii) analysis of transfer function estimation, (iii) analysis of parameter adaptive control, and (iv) language architecture for control design.

DESCRIPTORS: (U) *ADAPTIVE CONTROL SYSTEMS, COMPUTATIONS, ESTIMATES, LINEAR SYSTEMS, MATHEMATICAL MODELS, MATHEMATICS, PARAMETERS, TRANSFER FUNCTIONS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

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IDENTIFIERS: (U) CACE(Computer Aided Control Engineering) , PE61102F, WUAFOSR2304A5.

AD-A192 444 20/4

NORTHERN TELECOM ELECTRONICS LTD OTTAWA (ONTARIO)

(U) Spectral Methods for Discontinuities.

DESCRIPTIVE NOTE: Final rept.,

JUN 85 4P

PERSONAL AUTHORS: Gottlieb,

CONTRACT NO. AFOSR-83-0089

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1794

UNCLASSIFIED REPORT

ABSTRACT: (U) The investigators pursued research on the use of spectral methods in computational fluid dynamics. The implementation are examined for the solution of time dependent partial differential equation. Other topics pursued included the adaptation of spectral methods for compressible flow problems involving shodes, and the exploration of information content in spectral calculations. Papers produced during this effort included such titles as Spectral methods for time dependent partial differential equations, recovering pointwise values of discontinuous data within spectral accuracy, and Information content in spectral calculations.

DESCRIPTORS: (U) *COMPRESSIBLE FLOW, *FLUID DYNAMICS, COMPUTATIONS, SPECTRA, COMPUTER PROGRAMS.

IDENTIFIERS: (U) Computational fluid dynamics, PE61102F, WUAFOSR2304A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 442 12/3

CONNECTICUT UNIV STORRS

(U) Dual Control.

DESCRIPTIVE NOTE: Journal rept.,

FEB 88 9P

PERSONAL AUTHORS: Bar-Shalom, Yaakov

CONTRACT NO. AFOSR-84-0112

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-88-0140

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub in Systems and control Encylopedia, Theory, Technology, Applications, p1253-1258, 2 Feb 88.

ABSTRACT: (U) This article explores the connection between extraction of information from the system (estimation/identification) and control of the system on the basis of this information for the case of stochastic control systems.

DESCRIPTORS: (U) *STOCHASTIC CONTROL, *BAYES THEOREM, CONTROL SYSTEMS, INFORMATION RETRIEVAL, REPRINTS.

IDENTIFIERS: (U) WUAFOSR2304A1, PE61192F.

AD-A192 439 6/1 6/11

MICHIGAN STATE UNIV EAST LANSING DEPT OF PEDIATRICS/ HUMAN DEVELOPMENT

(U) The Role of Chemical Inhibition of Gap Junctional Intercellular Communication in Toxicology.

DESCRIPTIVE NOTE: Annual rept. 15 Feb 87-14 Feb 88,

FEB 88 27P

PERSONAL AUTHORS: Trosko, James E.

CONTRACT NO. AFOSR-88-0084

PROJECT NO. 2312

TASK NO. AS

MONITOR: AFOSR
TR-88-0248

UNCLASSIFIED REPORT

ABSTRACT: (U) Our goal has been to study the mechanism by which non-genotoxic chemicals act. To this end, we are testing the hypothesis that chemical modulation of gap junctional intercellular communication can lead to many toxic endpoints, such as teratogenesis, tumor promotion, immune-, reproductive and neurotoxicities. Our aims have been (a) to study the biochemical mechanisms by which inhibitors of gap junctions work; (b) to develop and apply new in vitro techniques to measure gap junction function; and (c) to test if known non-genotoxic chemicals inhibit gap junctions in various cell types. Results to data have validated the 'fluorescence recovery after photobleaching' and scrape-loading/dye transfer techniques for measuring gap junction function. In addition, we have shown that protein kinase C, the ras oncogene and the neurotoxicant, heptachlor, all seem to work via different mechanisms to block intercellular communication. *Results described in this report have been* communicated at several meetings, while abstracts, preprints and reprints of these reports are attached to the progress report.

DESCRIPTORS: (U) *CYTOCHEMISTRY, *TOXICOLOGY, BIOCHEMISTRY, CELLS(BIOLOGY), CHEMICAL REACTIONS, CHEMICALS, COMMUNICATION AND RADIO SYSTEMS, FLUORESCENCE,

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

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HYPOTHESES, IN VITRO ANALYSIS, INHIBITION, MODULATION, NEOPLASMS, PROMOTION(ADVANCEMENT), RECOVERY, REPR_NTS, TERATOGENIC COMPOUNDS, TOXICITY, TRANSPORT PROPERTIES, HOMEOSTASIS, PHOSPHORUS TRANSFERASES, PROTEINS.

IDENTIFIERS: (U) Gap junctions, Cell communicaiton, Protein kinase C, WUAFOSR2312AS, PE61102F.

AD-A192 431 21/2

NAVAL RESEARCH LAB WASHINGTON DC

(U) Numerical Simulation of Fuel Droplet Interactions and Breakup.

DESCRIPTIVE NOTE: Final rept. 1 Oct 84-30 Sep 87,

DEC 87 92P

PERSONAL AUTHORS: Tishkoff, Julian

CONTRACT NO. MIPR-87-0003

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-88-0247

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of the research in this program was to develop Langrangian methods on triangular grids and apply these methods to the calculation of life history and dynamics of fuel droplets. With respect to numerical technology, the two-dimensional code SPLISH was converted to a VAX and then to a CRAY computer. New graphics systems were developed. Further testing of the basic SPLISH hydrodynamic algorithms as well as the surface tension algorithm were performed on internal gravity and capillary waves. A reorganization of the computer code will make the code user-friendly and portable. Now it should be much easier to use, and therefore useable on many new kinds of problems. First previously calculated flows of the distortion and breakup of a droplet due to differences in flow velocities between the droplet and the external media were recomputed to verify the conversion. Then a number of calculation of droplet distortion and breakup due to shear flows were made. Qualitative comparisons to experimental results were made for the case when the droplet density and external fluid density were nearly equal. Our calculation and the experiments by Mason and coworkers showed small droplets torn off the large drop by the forces in the shear flow. A preliminary calculation of a droplet-droplet collision shows the distortion of droplets before they collide. Forced-flow

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

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and inflow-outflow boundary conditions, needed to do quantitative comparisons to experimental shear flows, were added to the model.

DESCRIPTORS: (U) *DROPS, *DYNAMICS, *FUELS, ALGORITHMS, CAPILLARY WAVES, CODING, COMPUTATIONS, COMPUTER PROGRAMS, DENSITY, DISTORTION, EXTERNAL, FLOW, FLUIDS, GRAPHICS, GRAVITY, HISTORY, HYDRODYNAMICS, INTERACTIONS, INTERFACIAL TENSION, INTERNAL, LIFE(BIOLOGY), MATHEMATICAL MODELS, MEDIA, NUMERICAL ANALYSIS, SHEAR PROPERTIES, TWO DIMENSIONAL, VELOCITY.

IDENTIFIERS: (U) WUAFOSR2308A2, PE61102F.

AD-A192 401 12/3

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Free Boundary Control of the Markov Process.

DESCRIPTIVE NOTE: Final rept. 15 Jul-15 Dec 87,

JAN 88 5P

PERSONAL AUTHORS: Taksar, Michael

CONTRACT NO. AFOSR-87-0278

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-88-0047

UNCLASSIFIED REPORT

ABSTRACT: (U) The investigator made progress extending the theory of free boundary control (or singular control) to the multidimensional case. Two papers were submitted for publication: Optimal corrections problem of a multidimensional stochastic system and Deterministic equivalents for a continuous linear-convex stochastic control problem.

DESCRIPTORS: (U) *MARKOV PROCESSES, *STOCHASTIC CONTROL, BOUNDARIES, CONTROL, CORRECTIONS, OPTIMIZATION, STOCHASTIC PROCESSES, AUTOMATIC PILOTS.

IDENTIFIERS: (U) Multidimensional processes, PE61102F, WUAFOSR2304A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 393 12/1

HOWARD UNIV WASHINGTON D C

(U) Howard University Symposium on Nonlinear Semigroups, Partial Differential Equations and Attractors (2nd) Held in Washington, D. C. on 3-7 August 1987.

DESCRIPTIVE NOTE: Final rept. 1 Jul-30 Sep 87,

SEP 87 13P

PERSONAL AUTHORS:. Gill, Tepper; Zachary, Woodford W.

CONTRACT NO. AFOSR-87-0264, DAAL03-87-G-0097

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR, ARO
TR-88-0238, 24925.1-MA-H

UNCLASSIFIED REPORT

ABSTRACT: (U) This conference will focus on nonlinear partial and integrodifferential equations by considering them as infinite-dimensional dynamical systems. One day will be devoted to new classes of equations that arise via mathematical modelling of large flexible space structures. Some of the topics which will be represented are: Nonlinear Semigroups; Dynamical Systems; Attractors; Reduction to Finite Dimensional Systems; Inertial Manifolds; Bifurcation Theory; Control Theory; Compensated Compactness; Nonlinear Evolution Equations; Reaction-Diffusion Equations; and Stability Analysis of PDE's.

DESCRIPTORS: (U) *PARTIAL DIFFERENTIAL EQUATIONS, CONTROL THEORY, DYNAMICS, EQUATIONS, EVOLUTION(GENERAL), FLEXIBLE STRUCTURES, INERTIAL SYSTEMS, INFINITE SERIES, MATHEMATICAL MODELS, NONLINEAR ALGEBRAIC EQUATIONS, SIZES(DIMENSIONS), SPACECRAFT, STABILITY, SYMPOSIA, THEORY, MAPPING(TRANSFORMATIONS).

IDENTIFIERS: (U) Integrodifferential equations, Bifurcation theory, Manifolds(Mathematics), Homoclinic orbits, PE61102F, WUAFOSR2304A9.

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MISSION RESEARCH CORP ALBUQUERQUE NM

(U) Plasmoid Propagation.

DESCRIPTIVE NOTE: Final rept. Nov 84-Oct 86,

FEB 88 73P

PERSONAL AUTHORS: Kiuttu, Gerald F.; Adler, Richard J.; Richter-Sand, Robert J.; Williams, Michael K.

REPORT NO. MRC/ABQ-R-1039

CONTRACT NO. F49620-85-C-0022

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-88-0382

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with North Star Research Corp., Albuquerque, NM.

ABSTRACT: (U) Simple analytical considerations suggest that for certain parameter regimes for costreaming ion and electron beams, radial equilibrium can be expected without charge or current neutrality. To investigate these predictions experimentally, a pulsed power system comprising separate anode and cathode pulsers was designed and assembled. A double diode was developed to produce the plasmoids, and its steady-state space charge limited current researched over modest distances in terms of net current transport, radial profile, and beam front velocity. The results described in this report include the analysis and methodology leading to the successful production of nonneutral plasmoids and their propagation over distances up to several drift tube radii at currents more than an order of magnitude larger than predicted for either electron or ion constituents separately. Keywords: Plasmoids; Charged particle beams; Beam propagation; Ion diodes; Pulsed power.

DESCRIPTORS: (U) *CHARGED PARTICLES, *ELECTRON BEAMS, *PARTICLE BEAMS, *PLASMA DEVICES, *WAVE PROPAGATION,

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*PLASMA WAVES, BEAMS(RADIATION), CATHODES, DIODES, ELECTRODES, ELECTRONS, EQUILIBRIUM(GENERAL), IONS, NEUTRAL, PARTICLE ACCELERATOR COMPONENTS, POWER, PROPAGATION, PULSE GENERATORS, PULSES, RADIUS(MEASURE), TRANSPORT.

IDENTIFIERS: (U) *Plasmoids, VCID(Virtual Cathode Ion Diodes), Drift tubes, PE61102F, WUAFOSR2301A7.

AD-A192 359 5/8

SOUTH CAROLINA UNIV COLUMBIA DEPT OF PSYCHOLOGY

(U) Working Memory Capacity: An Individual Differences Approach.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jan 87-1 Jan 88,

FEB 88 65P

PERSONAL AUTHORS: Engle, Randall W.

CONTRACT NO. AFOSR-87-0069

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR TR-88-0265

UNCLASSIFIED REPORT

ABSTRACT: (U) Five experiments are described that study the relationship between measures of working memory and reading comprehension. Two experiments investigated whether the complex span measure must be similar to the reading comprehension task to be predictive of comprehension. The correlation found between reading comprehension and two reading-related complex spans was similar to those found between two arithmetic-related complex spans and comprehension. The relationship remained significant when quantitative skills were factored out. The simple digit and word spans (measured without a background task) did NOT correlate with reading comprehension. The complex span/comprehension correlations were a function of the difficulty of the background task. When the difficulty level of the reading-related or arithmetic-related background tasks was moderate, the span/comprehension correlations were higher in magnitude than when the background tasks were simple or very difficult. The third experiment showed that if serial recall was required in the span tasks, simple word span did significantly predict reading comprehension but not as well as the sentence span. The fourth experiment showed that the ordering of list lengths in the span tasks had little influence on the correlation between span scores and comprehension. The fifth experiment is

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the first in a series investigating variables whether variables that influence simple word span also influence the sentence word span. This study demonstrated that the word length has the same effect on the sentence span task as on the simple word span.

DESCRIPTORS: (U) *COMPREHENSION, *MEMORY DEVICES, *READING, BACKGROUND, CAPACITY(QUANTITY), LENGTH, SKILLS, WORDS(LANGUAGE), INFORMATION PROCESSING.

IDENTIFIERS: (U) Individual differences, PE61102F, WUAFOSR2313A4.

AD-A192 353 12/2

PITTSBURGH UNIV PA INST FOR COMPUTATIONAL MATHEMATICS AND APPLICATIONS

(U) Generalized Jordan Chains and Two Bifurcation Theorems of Krasnoselskii.

DESCRIPTIVE NOTE: Technical rept.,

JAN 88 60P

PERSONAL AUTHORS: Rabier, Patrick J.

REPORT NO. ICMA-88-115

CONTRACT NO. AFOSR-84-0131

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-88-0246

UNCLASSIFIED REPORT

ABSTRACT: (U) Given two Banach spaces X and Y over K = R or C and a parameterized family A (mu) an element of L(X, Y) with mu an element of K, partial and algebraic multiplicities of any value mu sub 0 an element of K such that A (mu sub 0) if Fredholm with index zero are defined by the means of generalized Jordan chains. These notions are developed in close connection with bifurcation problems and we show that partial and algebraic multiplicities are not affected by Lyapunov-Schmidt reduction. Properties of invariance under equivalence are also established. These general results are used to give a proof of Magnus' generalization of the classical bifurcation theorem by Krasnoselskii through a somewhat more natural approach than his. But the convincing evidence of the usefulness of the notions developed here has to be found in a new and wide extension of the Boehme-Marino-Rabinowitz theorem on bifurcation for gradient operators, the ancestor of which is also due to Krasnoselskii.

DESCRIPTORS: (U) *BIFURCATION(MATHEMATICS), CHAINS, INVARIANCE, BANACH SPACE, LYAPUNOV FUNCTIONS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 353 CONTINUED

IDENTIFIERS: (U) Jordan chains, Lyapunov Schmidt reduction, PE61192F, WUAFOSR2304A3.

AD-A192 301 9/3

GELTECH INC ALACHUA FL

(U) Development of a High Efficiency Q-Switched Glass Laser Via Sol-Gel Processing.

DESCRIPTIVE NOTE: Final technical rept. 15 Aug 87-14 Feb 88,

FEB 88 26P

PERSONAL AUTHORS: Moreshead, William V.

CONTRACT NO. F49620-87-C-0087

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR TR-88-0096

UNCLASSIFIED REPORT

ABSTRACT: (U) The sol-gel process is a logical choice for silica-based laser glasses, since it requires lower processing temperatures than traditional melt glass techniques, and allows good control of purity. This report describes attempts to prepare silica glasses containing neodymium or neodymium and erbium using sol-gel technology. A description of two different doping procedures is given, along with results. The materials produced were characterized and the spectral, thermal, and physical properties are reported. Fluorescence spectra and fluorescence lifetimes are given for three different materials prepared. Keywords include: Sol-gel, Neodymium, Erbium, Silica and laser glass.

DESCRIPTORS: (U) *DOPING, *GLASS, *LASERS, ERBIUM, FLUORESCENCE, LIFE SPAN(BIOLOGY), LOW TEMPERATURE, MELTS, NEODYMIUM, PHYSICAL PROPERTIES, PROCESSING, SILICON DIOXIDE, SPECTRA.

IDENTIFIERS: (U) WUAFOSR3005A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 300 12/9

COLORADO UNIV AT BOULDER DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Workshop on Optical Artificial Intelligence Held in Gold Lake, Colorado on 3-5 August 1987.

DESCRIPTIVE NOTE: Final rept. 1 Aug 87-31 Jan 88,

FEB 88 10P

PERSONAL AUTHORS: Cathey, W. T.

CONTRACT NO. AFOSR-87-0359

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR TR-88-0219

UNCLASSIFIED REPORT

ABSTRACT: (U) To investigate uses of optics in artificial intelligence (AI), 25 researchers met to bring together optics and AI researchers to define the problems and opportunities for the optical solution of AI problems. The group broke into three subgroups that considered (1) perception, (2) optical data base/knowledge base machines, and (3) learning. Keywords: Optical computing; Optical logic; Symposia.

DESCRIPTORS: (U) *ARTIFICIAL INTELLIGENCE, *OPTICAL PROCESSING, COMPUTATIONS, DATA BASES, INTELLIGENCE, LEARNING, LOGIC, OPTICAL DATA, OPTICAL PROPERTIES, OPTICS, PERCEPTION, SOLUTIONS(GENERAL), SYMPOSIA, COMPUTER LOGIC, OPTICAL CIRCUITS, DYNAMIC RANGE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B1.

AD-A192 300

AD-A192 296 20/11 11/9 7/6

PURDUE UNIV LAFAYETTE IN SCHOOL OF AERONAUTICS AND ASTRONAUTICS

(U) Three-Dimensional Aspects of Fatigue Crack Closure.

DESCRIPTIVE NOTE: Final rept.,

FEB 88 205P

PERSONAL AUTHORS: Grandt, A. F.; Pope, J. E.; Ray, S. K.

REPORT NO. AAE-88-1

CONTRACT NO. AFOSR-85-0106

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFOSR TR-88-0268

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report summarizes progress on a basic research effort to determine three-dimensional aspects of the relationship between applied load and fatigue crack face separation. The research was motivated by the well known crack closure phenomenon, which indicates that naturally occurring fatigue cracks are physical held shut (or propped open) at zero load, so that crack surfaces do not separate in a linear elastic manner. Although prediction of fatigue crack opening behavior is of fundamental importance to many aspects of crack growth, relatively little is known about the three-dimensional character of closure. The research employed experimental and numerical procedures to develop predictive techniques for this important aspect of crack closure. Optical interference was used to measure crack opening in transparent polymer specimens, along with conventional crack opening and back face strain techniques for measuring crack closure. A numerical algorithm was developed to predict opening loads in surface flawed plates, and was compared with the experimental results. Keywords: Crack propagation, Cracking(Fracturing).

DESCRIPTORS: (U) *CRACKS, *POLYMETHYL METHACRYLATE,

AD-A192 296

AD-A192 296 CONTINUED

*POLYCARBONATES, ALGORITHMS, CRACK PROPAGATION, CRACKING(FRACTURING), ELASTIC PROPERTIES, FATIGUE(MECHANICS), INTERFERENCE, NUMERICAL METHODS AND PROCEDURES, OPTICAL PROPERTIES, POLYMERS, SURFACES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B220.

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AD-A192 291 5/8 6/4

COLORADO UNIV AT BOULDER

(U) Differences between Inbred Strains of Mice in Morris Water Maze Performance,

88 15P

PERSONAL AUTHORS: Upchurch, Margaret; Wehner, Jeanne M.

CONTRACT NO. AFOSR-85-0369, $PHS-HD-07289-01

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR TR-88-0274

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Behavior Genetics, v18 n1 p55-68 1988.

ABSTRACT: (U) Four inbred strains of mice, BALB/cByJ, C3H/2Ibg, C57BL/6Ibg, and DBA/2Ibg, were tested for their learning ability in the Morris water maze. Two forms of learning were examined: cue learning, in which the mice were required to swim toward a submerged platform marked by a proximal visual cue; and place learning, in which the animals were required to use distal visual cues to find a submerged platform. C3H and BALB mice, which lack good visual acuity, were incapable of either form of learning. Both C57 and DBA mice were capable of cue learning, but DBA mice performed poorly at the place learning task. A selective impairment in place learning is typical of rats with disrupted hippocampal function. A similar impairment in DBA mice may indicate that abnormal hippocampal function exists under baseline conditions in this strain.

DESCRIPTORS: (U) *LEARNING, *PERFORMANCE TESTS, *BEHAVIOR, ANIMALS, BASE LINES, CUES(STIMULI), MICE, PLATFORMS, RATS, REPRINTS, STRAINS(BIOLOGY), UNDERWATER, VISUAL ACUITY, VISUAL PERCEPTION, ABNORMALITIES, WATER, FUNCTIONS, BRAIN, MEMORY(PSYCHOLOGY), SPATIAL DISTRIBUTION, PATHS, GENETICS, BREEDING.

IDENTIFIERS: (U) Inbred strains, Mazes, PE61102F.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 290 6/4 6/1

TULANE UNIV NEW ORLEANS LA SCHOOL OF MEDICINE

(U) Reduction of Dye Coupling in Glial Cultures by Microinjection of Antibodies against the Liver Gap Junction Polypeptide.

88 7P

PERSONAL AUTHORS: Dudek, F. E.; Gribkoff, Valentin K.; Olson, James E.; Hertzberg, Elliot L.

CONTRACT NO. AFOSR-85-NL-0317, $PHS-NS-07625

PROJECT NO. 2312

TASK NO. K2

MONITOR: AFOSR TR-88-0263

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Brain Research, v439 p275-280 1988.

ABSTRACT: (U) Intracellular injection of antibodies to the 27-kDa liver gap junction polypeptide have been shown previously to uncouple pairs of cultured mammalian hepatocytes, cardiac myocytes, and ganglionic neurons. In confluent primary cultures of astrocytes, similar injections significantly reduced dye coupling for cells closer than 80 micrometers to the injected glial cell. Western blots identified a 27-kDa protein in extracts of the astrocyte cultures that cross-reach with the gap junction-specific antibodies. These results suggest that homologous gap junction polypeptides exist in liver and glial cells.

DESCRIPTORS: (U) *ANTIBODIES, *COUPLING(INTERACTION), *ASTROCYTES, CELLS(BIOLOGY), DYES, GANGLIA, INJECTIONS(MEDICINE), LIVER, MAMMALS, NERVE CELLS, REDUCTION, REPRINTS, PEPTIDES, TISSUE CULTURE CELLS.

IDENTIFIERS: (U) *Liver gap junction polypeptides, *Glial cells, Microinjection, Polypeptides, *Liver cells, Cardiac myocytes, Western blots, Homologues, PE61102F.

AD-A192 290

AD-A192 227 6/1 6/4

AT AND T BELL LABS MURRAY HILL NJ

(U) An Investigation into the Effects of Peptide Neurotransmitters and Intracellular Second Messengers in Rat Central Neurons in Culture.

DESCRIPTIVE NOTE: Annual rept. 15 Oct 86-15 Oct 87,

FEB 88 8P

PERSONAL AUTHORS: Connor, John A.

CONTRACT NO. F49620-85-C-0009

PROJECT NO. 2312

TASK NO. K2

MONITOR: AFOSR TR-86-0258

UNCLASSIFIED REPORT

ABSTRACT: (U) Research has been carried out in the three areas outlined below. I. Excitatory amino acid responses in adult mammalian hippocampal neurons. This topic has become the focus of extensive research due to its possible relationship to short term memory. We have made the first measurements of calcium ion changes in these cells using fluorescence imaging techniques, and have demonstrated a long lasting response involving calcium flux induced after conditioning input to the cells. II. The developmental time course in culture of ion channels and transmitter sensitivity in cerebellar Purkinje neurons. We have demonstrated differential soma-dendritic responses to depolarization and the neurotransmitter glutamate in these neurons. Parallel immunocytochemical experiments using a number of antibodies have demonstrated the development of antigens in culture in comparison to in vivo development. III. Neuromodulation of synaptic efficacy in an invertebrate preparation that may be a useful model system for the actions of histamine in the central nervous system. Keywords: Cerebellum; Diencephalon; Peptides; Glutamate; Histamine; Presynaptic inhibition; Cyclic adenosine monophosphate; Gamma aminobutyric acid.

DESCRIPTORS: (U) *NERVE CELLS, *NEUROMUSCULAR

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TRANSMISSION, *PEPTIDES, *ADENOSINE PHOSPHATES, ADULTS, AMINO ACIDS, ANTIBODIES, ANTIGENS, BUTYRIC ACIDS, CALCIUM, CENTRAL NERVOUS SYSTEM, CEREBELLUM, CHANNELS, CULTURE, CYTOCHEMISTRY, DEPOLARIZATION, FLUORESCENCE, FLUX(RATE), GAMMA RAYS, GLUTAMIC ACID, HIPPOCAMPUS, HISTAMINE, IMAGES, IMMUNIZATION, IN VIVO ANALYSIS, INVERTEBRATES, IONS, MAMMALS, MEASUREMENT, MODELS, PARALLEL ORIENTATION, PREPARATION, RATS, RESPONSE, SALTS, SENSITIVITY, SYNAPSE, TRANSMITTERS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312K2.

AD-A192 207 6/4

NEW HAMPSHIRE UNIV DURHAM VISION RESEARCH LAB

(U) Interactions between Brief Flashed Lines at Threshold.

DESCRIPTIVE NOTE: Final rept. 1978-1987,

DEC 87 95P

PERSONAL AUTHORS: Smith, Robert A.

CONTRACT NO. AFOSR-86-0152

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-88-0177

UNCLASSIFIED REPORT

ABSTRACT: (U) Our results are concentrated in seven basic areas: 1) We find that masking is subject to considerable learning effects. Weber's Law is only observed--when proper controls are used--in the relatively uninteresting case where it is inherent in the stimulus, and is unaffected by visual physiology. 2) There is a region of space/time separations wherein two flashed lines will show lateral facilitation, rather than inhibition, suggesting the action of a motion-detector. 3) substantial modelling of line interactions confirmed our conclusion that this facilitation was a nonlinear effect, and not predictable from current probability-summation models. 4) Spatial summation and 2-line acuity change very differential with retinal eccentricity; it may be that one taps primarily receptor size while the other taps receptor separation. 5) It is possible to observe visual aliasing in the parafovea without the use of interference fringes. This aliasing appears to be neural, rather than receptoral. 6) Flashed presentations produce a large transient change in the area of spatial summation and in the amount of lateral inhibition. Keywords: Vision; Visual masking; Spatial sampling; Spatial summation; Motion detection.

DESCRIPTORS: (U) *MOTION, *OPTICAL IMAGES, *SPACE PERCEPTION, DETECTION, ECCENTRICITY, INTERFERENCE GUARD BAND, MASKING, NONLINEAR SYSTEMS, PHYSIOLOGY, RETINA,

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 207 CONTINUED

SAMPLING, SENSE ORGANS, SEPARATION, SIZES(DIMENSIONS), TAPS, TRANSIENTS, VISION, IMAGE PROCESSING, PATTERN RECOGNITION, THRESHOLDS(PHYSIOLOGY).

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A5.

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AD-A192 206 9/1 20/3

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES SCHOOL OF ENGINEERING

(U) Joint Services Electronics Program Research in Electronics.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jan-31 Dec 87,

DEC 87 36P

CONTRACT NO. F49620-85-C-0071

PROJECT NO. 2309

TASK NO. A9

MONITOR: AFOSR TR-88-0175

UNCLASSIFIED REPORT

ABSTRACT: (U) This program was designed to investigate the fundamental properties of ultrathin layers and the devices that would be fabricated from them. We have concentrated our investigations on the influence of growth conditions on the interfaces between AlGaAs and GaAs and the effect these properties have upon device performance. This has allowed us to optimize the techniques for interface formation to the point that low interface state densities can be achieved for both normal and inverted heterojunctions. We have also determined the optimal conditions for the growth of quantum well structures and have achieved state of the art low temperature PL linewidths for MOCVD-grown quantum wells (QW). We also investigated and analyzed the design of heterojunction bipolar transistors during the course of this program. Our studies pointed out that a significant opportunity to increase the capabilities of bipolar circuits through the use of complementary device designs had been overlooked. We developed a methodology for device analysis that showed that Pnp HBT's could be designed that were comparable in performance to the Npn designs used by most workers. The realization of this analysis would allow designers to consider low power complementary bipolar circuits in GaAs for the first time. We have proceeded to fabricate Pnp devices that show the expected performance and will continue to optimize them until the current program ends.

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DESCRIPTORS: (U) *BIPOLAR TRANSISTORS, *QUANTUM ELECTRONICS, *HETEROJUNCTIONS, ENVIRONMENTS, GROWTH(GENERAL), HETEROJUNCTIONS, INTERFACES, INVERSION, LAYERS, LOGIC CIRCUITS, LOW DENSITY, LOW TEMPERATURE, OPTIMIZATION, PNP TRANSISTORS, STRUCTURES, THINNESS, BIPOLAR TRANSISTORS, ENVIRONMENTS, GROWTH(GENERAL), HETEROJUNCTIONS, INTERFACES, INVERSION, LAYERS, LOGIC CIRCUITS, LOW DENSITY, LOW TEMPERATURE, OPTIMIZATION, PNP TRANSISTORS, QUANTUM ELECTRONICS, THINNESS, CRYSTAL GROWTH, THIN FILMS, OPTICAL PROCESSING, OPTICAL SWITCHING, BARIUM TITANATES, VAPOR DEPOSITION, GALLIUM ARSENIDES, ALUMINUM GALLIUM ARSENIDE.

IDENTIFIERS: (U) Quantum wells, Phase conjugation, CVD(Chemical Vapor Deposition).

AD-A192 201 11/8.1

STATE UNIV OF NEW YORK AT STONY BROOK DEPT OF APPLIED MATHEMATICS AND STATISTI CS

(U) A Diffusion Model for a System Subject to Continuous Wear.

87 13P

PERSONAL AUTHORS: Baxter, Laurence A.; Lee, Eui Y.

CONTRACT NO. AFOSR-86-0138

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-88-0207

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Probability in the Engineering and Informational Sciences, v1 p405-418 1987.

ABSTRACT: (U) A model for a system whose state changes continuously with time is introduced. It is assumed that the system is modeled by Brownian motion with negative drift and an absorbing barrier at the origin. A repairman arrives according to a Poisson process and increases the state of the system by a random amount if the state is below a threshold alpha. Explicit expressions are deduced for the distribution function of X(t), the state of the system at time t, if X(t) < or = alpha and for the Laplace transform of the density X(t). The stationary case is examined in detail. (Reprints)

DESCRIPTORS: (U) *BROWNIAN MOTION, *DIFFUSION, *LAPLACE TRANSFORMATION, *MODELS, *WEAR, DRIFT, POISSON EQUATION, REPRINTS, STATIONARY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 178 20/3 19/6 20/11 12/5

GT-DEVICES INC ALEXANDRIA VA

(U) Analytic and Numerical Modeling of Heat and Material Transport in Electrical Hypervelocity Guns.

DESCRIPTIVE NOTE: Final rept. 5-6 Sep 86,

DEC 87 85P

PERSONAL AUTHORS: Winsor, Niels K.

CONTRACT NO. F49620-85-C-0134

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR TR-88-0257

UNCLASSIFIED REPORT

ABSTRACT: (U) A computer simulation code has been developed. The physical transport processes of radiation transport, viscosity, electrical and thermal conductivity and turbulence were included in the study. The code benchmarked against material erosion experiments with metals and insulators. The processes occurring near the bore wall of an electrothermal gun have been evaluated. The studies have demonstrated the utility of a gun system redesign which lowers the propelling gas temperature near the wall. This has resulted in the experimental reduction of gun bore erosion to levels at or below the erosion in conventional powder guns. The code results have also been interpreted for the electromagnetic (rail) gun case. Here the unavoidable high propelling gas temperatures cause a more severe erosion problem.

DESCRIPTORS: (U) *COMPUTERIZED SIMULATION, *EROSION, *GUN BARRELS, *HYPERVELOCITY GUNS, *TRANSPORT, *TRANSPORT PROPERTIES, BORES, CODING, COMPUTER PROGRAMS, ELECTRICAL CONDUCTIVITY, GASES, INSULATION, MATERIALS, MATHEMATICAL MODELS, METALS, POWDERS, PROPELLING CHARGES, RADIATIVE TRANSFER, REDUCTION, TEMPERATURE, THERMAL CONDUCTIVITY, THERMOELECTRICITY, TURBULENCE, VISCOSITY, WALLS, ELECTRIC GUNS, ABLATION, FORTRAN.

IDENTIFIERS: (U) Railguns, VAX Computers, PE61102F,

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WUAFOSR2301A8.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 169 1/1

PURDUE UNIV LAFAYETTE IND THERMAL SCIENCES AND PROPULSION CENTER

(U) Research on Aero-Thermodynamic Distortion Induced Structural Dynamic Response of Multi-Stage Compressor Blading.

DESCRIPTIVE NOTE: Final technical rept. Apr 83-Nov 87,

JAN 88 237P

PERSONAL AUTHORS: Fleeter, Sanford

REPORT NO. ME-TSPC-TR-88-10

CONTRACT NO. F49620-83-K-0029

PROJECT NO. 2307

TASK NO. A4

MONITOR: AFOSR TR-88-0045

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall objective of this research program was to quantitatively investigate the fundamental phenomena relevant to aero-thermodynamic distortion induced structural dynamic blade responses in multi-stage gas turbine engine components. The technical approach involved both experiment and analysis. (1) The flow physics of multi-stage blade row interactions has been experimently investigated, with unique high reduced frequency unsteady aerodynamic data obtained to understand, quantify, and discriminate the fundamental flow phenomena as well as to direct the modeling of advanced analyses. (2) The development of an unsteady viscous flow analysis appropriate for aerodynamic forced response predictions was initiated. (3) A structural dynamics model based on an energy balance techniques coupled with the unsteady aerodynamic analyses under development is being utilized to investigate aerodynamically forced response of turbomachine blade rows. Keywords: Gas turbine, Aeroelasticity structural dynamics, Unsteady aerodynamics.

DESCRIPTORS: (U) *AERODYNAMICS, *AEROELASTICITY, *BLADES,

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*DYNAMICS, *PREDICTIONS, AERODYNAMIC CHARACTERISTICS, AERODYNAMIC FORCES, BALANCE, ENERGY, FLOW, GAS TURBINES, METHODOLOGY, MODELS, PHYSICS, RESPONSE, STRUCTURAL PROPERTIES, TURBOMACHINERY, UNSTEADY FLOW, VISCOUS FLOW.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A4.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 167 25/2 17/6 17/4.1

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Information and Stochastic Systems.

DESCRIPTIVE NOTE: Final rept. 1 Dec 86-30 Nov 87,

NOV 87 6P

PERSONAL AUTHORS: Baker, Charles R.

CONTRACT NO. AFOSR-87-0106

PROJECT NO. 2917

TASK NO. A5

MONITOR: AFOSR
TR-88-0051

UNCLASSIFIED REPORT

ABSTRACT: (U) Equipment was purchased to support research in two main areas: communication channels with memory and signal detection and classification problems involving non-Gaussian stochastic processes. The research on communication channels involves largely the study of channel capacity under various assumptions and constraints. The research in signal detection and classification includes modeling, data analysis, and the development and evaluation of detection algorithms.

DESCRIPTORS: (U) *CHANNELS, *COMMUNICATION EQUIPMENT, *MEMORY DEVICES, *RADIO JAMMING, ALGORITHMS, CAPACITY(QUANTITY), CLASSIFICATION, COMMUNICATION AND RADIO SYSTEMS, DATA PROCESSING, DETECTION, SIGNALS, STOCHASTIC PROCESSES, MULTIPLE ACCESS.

IDENTIFIERS: (U) Electric field detection, *Communication channels, PE61192F, WUAFOSR2917A5.

AD-A192 166 7/2

EMORY UNIV ATLANTA GA DEPT OF CHEMISTRY

(U) Kinetic Titrations.

DESCRIPTIVE NOTE: Annual rept.,

OCT 87 16P

PERSONAL AUTHORS: Kaufman, Myron

CONTRACT NO. AFOSR-84-0196

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-88-0057

UNCLASSIFIED REPORT

ABSTRACT: (U) In many reactions that generate light with high efficiency, a luminescence persisting for long times will be observed when reactants are at the stoichiometric ratio. Besides providing a means of titrating active species in gas phase systems, studies of this phenomenon permit information to be obtained about the kinetics and mechanisms of chemiluminescent reactions. Keywords: Titration, Kinetics, Chemiluminescence.

DESCRIPTORS: (U) *CHEMICAL REACTIONS, *CHEMILUMINESCENCE, *KINETICS, *VOLUMETRIC ANALYSIS, EFFICIENCY, HIGH RATE, LUMINESCENCE, RATIOS, STOICHIOMETRY, VAPOR PHASES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 165 6/11 6/5

WRIGHT STATE UNIV DAYTON OH DEPT OF PHARMACOLOGY

(U) Thyroid and Biochemical/Metabolic Effects of PFDA (Perfluoro-n-decanoic Acid).

DESCRIPTIVE NOTE: Final technical rept. 15 Aug 85-31 Aug 87,

JAN 88 48P

PERSONAL AUTHORS: Langley, Albert E.

CONTRACT NO. AFOSR-85-0338

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR TR-88-0254

UNCLASSIFIED REPORT

ABSTRACT: (U) Significantly greater weight loss was observed in PFDA-treated rats than in pair controlled rats. These data indicate that the wasting syndrome cannot be explained entirely by lack of food intake. Additionally, a precipitous fall in serum thyroxine was observed as early as 12 hours following PFDA. Early experiments indicated that a hypothyroid-like state resulted from PFDA treatment PFDA induced decreases in serum thyroid hormones, anorexia, bradycardia, hypothermia, as well as alterations in myocardial catecholamine metabolism. Liver enzymes alpha-glycerolphosphate dehydrogenase and malic enzyme were measures to evaluate tissue thyroid state, the activity of both enzymes was significantly elevated as early as 24 hours and remained so throughout the experiment. A possible conclusion based on interpretation of these data is the PFDA alters biochemical processes at the cellular level which produces confused messages concerning metabolic status, thus leading to anorexia and metabolic inefficiency which results in severe body wasting and hypothermia.

DESCRIPTORS: (U) *BIOCHEMISTRY, *FOOD CONSUMPTION, *METABOLISM, *THYROID HORMONES, *CARBOXYLIC ACIDS, *FLUORINE COMPOUNDS, ANOREXIA, BLOOD SERUM, BRADYCARDIA,

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CATECHOLAMINES, CELLS(BIOLOGY), CONTROL, ENZYMES, HIGH RATE, HYPOTHERMIA, INTENSITY, MYOCARDIUM, RATS, THYROID GLAND, THYROXINE, WEIGHT REDUCTION, RESPONSE(BIOLOGY), METABOLIC DISEASES.

IDENTIFIERS: (U) *PFDA(Perfluoro-N-Decanoic Acid), *Decanoic acid/Perfluoro-N, PE61102D, WUAFOSR2312A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A192 156 12/10

FLORIDA UNIV GAINESVILLE DEPT OF MECHANICAL ENGINEERING

(U) Pressure and Gas Flow Gradients Behind the Projectile During the Interior Ballistic Cycle,

OCT 87 10P

PERSONAL AUTHORS: Hansen, E. C.; Heiney, O. K.

CONTRACT NO. AFOSR-85-0113

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR TR-88-0105

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Rockwell International Corp., Canoga Park, CA. Rocketdyne Div.

ABSTRACT: (U) A very important factor in determining the projectile acceleration in a lumped parameter ballistic model is the relationship between the computed parameter, the space mean pressure, and the parameter defining the projectile motion, the pressure acting on the base of the projectile. The gradients of pressure and density from the breech to projectile were postulated to depend on the term, projectile acceleration times axial position. The model compared favorably with experimental measurements of downbore to chamber pressure ratios. Keywords: Interior ballistics, Gas gradients.

DESCRIPTORS: (U) *PROJECTILES, ACCELERATION, BALLISTICS, BREECH MECHANISMS, CHAMBERS, CYCLES, EXPERIMENTAL DATA, GAS FLOW, GASES, GRADIENTS, INTERIOR BALLISTICS, MEASUREMENT, MODELS, PARAMETERS, PRESSURE, RATIOS, DYNAMIC PRESSURE, KINETIC ENERGY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1.

AD-A192 155 6/5 12/4

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION AND DECISION SYSTEMS

(U) Stochastic Petri Net Modeling of Wave Sequences in Cardiac Arrhythmias.

DESCRIPTIVE NOTE: Final rept. 1 Jul 82-30 Sep 87,

NOV 87 60P

PERSONAL AUTHORS: Chin, Toshio M.; Willsky, Alan S.

REPORT NO. LIDS-P-1715

CONTRACT NO. AFOSR-82-0258

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-88-0134

UNCLASSIFIED REPORT

ABSTRACT: (U) We describe a methodology for modeling heart rhythms observed in electrocardiograms. In particular, we present a procedure to derive simple dynamic models that capture the cardiac mechanisms which control the particular timing sequences of P and R waves characteristic of different arrhythmias. Important aspects of our models are their ease of construction and conciseness. Specifically, these models consist of a structural level, representing interactions among various cardiac electrical events, and a parameter level, defining timing statistics of these events and their interactions. The modeling procedure is a two-step process: By treating the cardiac electro-physiology at an aggregate level, simple network models of the wave generating system under a variety of diseased conditions can be developed. These network models are then systematically converted to stochastic Petri nets which offer a compact mathematical framework to express the dynamics and statistical variability of the wave generating mechanisms. Models of several arrhythmias are included in order to illustrate the methodology. One potential application for these models is in the development of automatic classification schemes for

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cardiac arrhythmias, as the models can be used as the basis for hypothesis testing and parameter estimation algorithms.

DESCRIPTORS: (U) *ARRHYTHMIA, *ELECTROCARDIOGRAPHY, ALGORITHMS, AUTOMATION, CLASSIFICATION, DISEASES, DYNAMICS, ESTIMATES, HEART, HYPOTHESES, MODELS, NETWORKS, PARAMETERS, SEQUENCES, STATISTICS, STRUCTURAL PROPERTIES, TEST AND EVALUATION, TIME, VARIATIONS, WAVES, MATHEMATICAL MODELS, ALGORITHMS, HEART FUNCTION TESTS, ANATOMICAL MODELS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A192 134 8/3

FLOW RESEARCH CO KENT WA

(U) Direct Numerical Simulations of the PDF's (Probability Density Functions) of a Passive Scalar in a Forced Mixing Layer.

SEP 87 16P

PERSONAL AUTHORS: Givi, P.; McMurtry, P. A.

CONTRACT NO. F49620-85-C-0067

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-88-0268

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Washington Univ., Seattle. Dept. of Mechanical Engineering.

ABSTRACT: (U) The probability density functions of a passive scalar quantity are calculated in a perturbed mixing layer by means of direct numerical simulations. The results indicate that the two-dimensional rollup of the unsteady shear layer, and the pairing process in particular, contributes greatly to the generation of the predominant peak of the PDF's within the mixing region. Keywords: Probability density functions; Direct numerical simulation; Mixing layers; Coherent structures; Entrainment.

DESCRIPTORS: (U) *PROBABILITY DENSITY FUNCTIONS, *MIXED LAYER(MARINE), *TURBULENCE, COHERENCE, LAYERS, MATHEMATICAL MODELS, MIXING, PASSIVE SYSTEMS, PERTURBATIONS, QUANTITY, REGIONS, SCALAR FUNCTIONS, STRUCTURES, DIGITAL SIMULATION, ENTRAINMENT.

IDENTIFIERS: (U) Pseudospectral analysis, PE61102F, WUAFOSR2308A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 120 22/2 20/11 12/1

OKLAHOMA UNIV NORMAN DEPT OF MATHEMATICS

(U) Estimation and Control of Distributed Models for Certain Elastic Systems Arising in Large Space Structures.

DESCRIPTIVE NOTE: Final rept. 1 Jul 84-30 Sep 87,

SEP 87 62P

PERSONAL AUTHORS: White, Luther W.

CONTRACT NO. AFOSR-84-0271

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-88-0245

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of this research was to study estimation and control of elastic systems composed of beams and plates. Specifically, the research considered the problem of locating the optimal placement of controllers on a beam or plate and the problem of controlling general three-dimensional elastic models that incorporate nonlinear friction and contact laws on the boundary conditions. This final report summarizes those results.

DESCRIPTORS: (U) *CONTROL SYSTEMS, *SPACECRAFT, *VIBRATION ISOLATORS, *CONTROL THEORY, CONTROL, ELASTIC PROPERTIES, EMPLACEMENT, ESTIMATES, FRICTION, MODELS, NONLINEAR SYSTEMS, OPTIMIZATION, THREE DIMENSIONAL, BEAMS(STRUCTURAL), PLATES, VISCOELASTICITY, LEAST SQUARES METHOD, HILBERT SPACE.

IDENTIFIERS: (U) Large space structures, Sobolev space, PE61192F, WUAFOSR2304A1.

AD-A192 120

AD-A192 118 6/11

WRIGHT STATE UNIV DAYTON OHIO DEPT OF CHEMISTRY

(U) A Study of the Nephrotoxicity and Metabolism of Tetralin and Indan in Fischer 344 Rats.

DESCRIPTIVE NOTE: Annual rept. 1 Feb 87-31 Jan 88,

FEB 88 54P

PERSONAL AUTHORS: Serve, M. P.

REPORT NO. WSU-87-094

CONTRACT NO. AFOSR-87-0108

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-88-0264

UNCLASSIFIED REPORT

ABSTRACT: (U) A group of male and female 344 rats were dosed with tetralin over a 14 day period. Histopathology of the kidneys revealed significant damage to the renal tubules of the dosed male rats compared to control male rats dosed with water. Both groups of female rats dosed with tetralin or water showed no kidney damage. The urine metabolites of tetralin identified from both male and female rats included 1-tetralol, 2-tetralol, 2-hydroxy-1-tetralone, 4-hydroxy-1-tetralone, 1,2-tetralindiol and 1,4-tetralindiol. No metabolites of tetralin were isolated from the kidney extracts of dosed animals. Keywords: Hydrocarbon nephrotoxicity, Tetralin metabolism.

DESCRIPTORS: (U) *HYDROCARBONS, *KIDNEYS, *TOXICITY, ANIMALS, DAMAGE, FEMALES, HISTOPATHOLOGY, MALES, RATS, TUBES, WATER, KIDNEY DISEASES, METABOLISM.

IDENTIFIERS: (U) *Tetralin, PE61102F, WUAFSOR2312A5.

AD-A192 118

AD-A192 117 20/9

STUTTGART UNIV (GERMANY F R) INST FUER RAUMFAHRTSYSTEME

(U) Basic Processes of Plasma Propulsion.

DESCRIPTIVE NOTE: Annual scientific rept. 1 Aug 86-31 Jul 87,

AUG 87 78P

PERSONAL AUTHORS: Schrade, Herbert O.

CONTRACT NO. AFOSR-86-0337

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR TR-88-0135

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes the research work on cathode phenomena and presents the development work and the results of several model calculations by means of which the performance of coaxial MPD thrusters can be predicted. Electrode effects like spot formation and spot motion can cause high erosion on the cathode and backplate of an MPD thruster. These effects are qualitatively and partially quantitatively explained by means of a unique theoretical approach. By means of these performance calculations the onset conditions were calculated based on the fact that due to magnetic contraction (pinch effect) the plasma density becomes zero at the anode (onset theory of Hugel). The results of these calculations are in excellent agreement with those of the experiments. Keywords: Magnetoplasmadynamic thruster, Electrode phenomena, Flow arc discharge, Calculations, Onset.

DESCRIPTORS: (U) *MAGNETIC FIELDS, *PLASMAS(PHYSICS), *PROPULSION SYSTEMS, *THRUSTERS, CATHODES, CONTRACTION, DENSITY, ELECTRIC ARCS, ELECTRIC DISCHARGES, ELECTRODES, EROSION, FLOW, METHODOLOGY, MODELS, MOTION, PINCH EFFECT, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1.

AD-A192 117

AD-A192 104 12/2 12/1

CLARKSON UNIV POTSDAM NY DEPT OF MATHEMATICS AND COMPUTER SCIENCE

(U) Nonlinear Wave Propagation.

DESCRIPTIVE NOTE: Final technical rept. 1 Nov 86-31 Oct 87,

NOV 87 171P

PERSONAL AUTHORS: Ablowitz, Mark J.

CONTRACT NO. AFOSR-84-0005

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR TR-88-0065

UNCLASSIFIED REPORT

ABSTRACT: (U) This year has been an active and productive period for the group at Clarkson involved with nonlinear wave propagation. We have continued to make progress in the study of nonlinear evolution equations, their properties and their solutions for both one plus one and multidimensional nonlinear evolution equations. We are continuing our studies of Painleve equations and nonlinear partial difference equations which can be used as numerical approximations to various soliton equations.

DESCRIPTORS: (U) *PARTIAL DIFFERENTIAL EQUATIONS, *APPROXIMATION(MATHEMATICS), *NONLINEAR PROPAGATION ANALYSIS, *WAVE PROPAGATION, EQUATIONS, NONLINEAR ALGEBRAIC EQUATIONS, EVOLUTION(GENERAL).

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A4.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 103 7/2

ILLINOIS INST OF TECH CHICAGO

(U) Spectroscopy and Energy Transfer Kinetics of the Interhalogens.

DESCRIPTIVE NOTE: Final rept. 18 Jun 85-14 Nov 87,

FEB 88 41P

PERSONAL AUTHORS: Heaven, Michael C.

CONTRACT NO. AFOSR-85-0210

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-88-0128

UNCLASSIFIED REPORT

ABSTRACT: (U, The electronic spectra and energy transfer pathways of matrix isolated Iodine monofluride and diatomic iodine have been investigated. Laser excitation of matrix isolated IF revealed the presence of three electronic states which had not been observed previously. The lowest energy state was identified as A(3)pi(2). Determination of the position and lifetime of this state has provided a means for assessing its role in the chemical excitation of the B state. The higher energy states have been tentatively assigned to a doubly excited electronic configuration. The I2 A yields X system was studied in Argon, Krypton, and Xenon matrices. Analyses of the emission spectra showed that previous vibrational assignments were in error. The A state lifetime was found to be 50 + or - 15 microseconds in all three matrix hosts. Continuous wave excitation and wavelength-resolved flourescence techniques were used to study the self-quenching and energy transfer kinetics of diatomic bromine (B).

DESCRIPTORS: (U) *ENERGY TRANSFER, *HALOGEN COMPOUNDS, *SPECTROSCOPY, ARGON, BROMINE, DIATOMIC MOLECULES, ELECTRONIC STATES, ELECTRONICS, EMISSION SPECTRA, IODINE, KINETICS, KRYPTON, SPECTRA, VIBRATION, CHEMICAL LASERS, METASTABLE STATE.

AD-A192 103 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

AD-A192 103

AD-A192 099 20/5

JOINT INST FOR LAB ASTROPHYSICS BOULDER CO

(U) Effect of Collisions on Forbidden Lines,

NOV 87 9P

PERSONAL AUTHORS: Coutts, J.; Peck, S. K.; Stoner, R.; Cooper, R.

CONTRACT NO. AFOSR-84-0027

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-88-0106

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Applied Physics, v62 n9 p3514-3521, 1 Nov 87.

ABSTRACT: (U) Results are presented for experiments probing the effect of collisions on forbidden lines. Two contrasting lines are investigated -- a spin-forbidden dipolar transition and a spin-allowed electric quadrupole transition. The results are explained in terms of straightforward physical models. Keywords: Collision induced processes; Forbidden lines; Spectral line shapes, Reprints.

DESCRIPTORS: (U) *PARTICLE COLLISIONS, AUSTRALIA, CAPACITORS, ELECTROMAGNETISM, EXPLOSIVES, HYPERVELOCITY GUNS, LAUNCHERS, MACHINES, PARTICLE ACCELERATORS, POWER SUPPLIES, PROPULSION SYSTEM COMPONENTS, PULSE TRANSFORMERS, RAILS, REQUIREMENTS, ROTATION, SOURCES, COLLISIONS, MODELS, PHYSICAL PROPERTIES, SPECTRAL LINES, CALCIUM, ARGON, LASER APPLICATIONS, EXCITATION, ELECTRON TRANSITIONS, NUCLEAR QUADRUPOLE RESONANCE, SPIN STATES, REPRINTS.

IDENTIFIERS: (U) *Forbidden lines, *Forbidden states, Physical models, Atom atom interactions.

AD-A192 099

AD-A192 095 6/3

ROCKEFELLER UNIV NEW YORK

(U) Motor Theory of Auditory Perception.

DESCRIPTIVE NOTE: Annual technical rept. 1 Sep 86-31 Aug 87,

SEP 87 39P

PERSONAL AUTHORS: Williams, Heather

CONTRACT NO. AFOSR-86-0336

PROJECT NO. 2313

TASK NO. A6

MONITOR: AFOSR TR-87-1563

UNCLASSIFIED REPORT

ABSTRACT: (U) The behavioral and neural substrate for motor processing of vocalizations exists in an animal model (the zebra finch). What had been considered a simple vocalization, learned from one model and carrying one message, proves to consist of compound sound units (syllables) arranged in a complex structure. The syllables in each vocalization are learned from several different sources or improvised, and are assembled to form a new vocalization. The vocal motor neurons have an auditory function (the muscles of the vocal organ contract slightly when the animal is presented with an auditory stimulus), the vocal motor neurons are spatially ordered according to their target muscle (and hence their vocal function), and vocal motor neurons in different pools have different auditory responses. Behavioral experiments to test whether the vocal motor system is involved in perception have been initiated. A new method for visual analysis of sounds is being tested. Keywords: Auditory processing, Syrinx, Song, Auditory perception, Hearing.

DESCRIPTORS: (U) *AUDITORY PERCEPTION, *MOTOR NEURONS, *ANIMAL COMMUNICATION, AUDITORY SIGNALS, BEHAVIOR, FUNCTIONS, HEARING, MESSAGE PROCESSING, MODELS, MUSCLES, NERVOUS SYSTEM, OPTICAL IMAGES, PERCEPTION, RESPONSE, SIGNAL PROCESSING, SOUND, STIMULI, SUBSTRATES, THEORY,

AD-A192 095

AD-A192 095 CONTINUED

SOUND TRANSMISSION, SYLLABLES, HARMONICS, BIRDS.

IDENTIFIERS: (U) Vocalizations, Syrinx, PE61102F, WUAFOSR2313A6.

AD-A192 093 7/2

LOCKHEED MISSILES AND SPACE CO INC PALO ALTO CA RESEARCH AND DEVELOPMENT DIV

(U) Effect of Alloying, Rapid Solidification, and Surface Kinetics on the High Temperature Environmental Resistance of Niobium.

DESCRIPTIVE NOTE: Technical rept. Jan 87-Jan 88,

JAN 88 49P

PERSONAL AUTHORS: Perkins, R. A.; Meier, G. H.; Miller, R. A.; Chiang, K. T.

REPORT NO. LMSC-F24660

CONTRACT NO. F49620-86-C-0018

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR TR-88-0088

UNCLASSIFIED REPORT

ABSTRACT: (U) An improved understanding of factors governing the selective oxidation of aluminum to form continuous alumina scales on modified niobium-aluminum alloys has been established. It has been demonstrated that highly protective alumina scales can be formed on niobium-titanium-chromium-vanadium-aluminum alloys without transient oxidation products at temperatures of 1400 to 1600 C in air. Aluminum content has been identified as the critical factor controlling single layer alumina formation. It also has been shown that the N sub Al(crit) for the formation of a continuous alumina scale is 0.375 - 0.38 at 1400 C, decreasing slightly with increased Nb-Ti ratio in the alloy. A fourth element must be added to niobium-titanium-aluminum for effective alumina formation. It has been established that this element should be from a group that can reduce the solubility-diffusivity at 1400 - 1600 C. Alumina can be formed at 1400 C by substituting V or Ti but a liquid transient oxide is produced. A high rate of transient oxidation relative to alumina formation in this range accelerated transient oxidation and precluded alumina

AD-A192 093 CONTINUED

growth instead.

DESCRIPTORS: (U) *ALUMINUM OXIDES, *NIOBIUM, *QUICK REACTION, *SOLIDIFICATION, ACCELERATED TESTING, ALLOYS, ENVIRONMENTS, GROWTH(GENERAL), HIGH RATE, HIGH TEMPERATURE, KINETICS, LAYERS, LIQUIDS, OXIDATION, OXIDES, RESISTANCE, SCALE, SURFACES, TRANSIENTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A1.

AD-A192 093

AD-A192 092 11/9 11/4 7/6

MASSACHUSETTS UNIV AMHERST DEPT OF POLYMER SCIENCE AND ENGINEERING

(U) Improved Structural Polymer Alloys and Composites.

DESCRIPTIVE NOTE: Final rept. 1 May 85-30 Apr 87,

APR 87 38P

PERSONAL AUTHORS: Karasz, Frank E.

CONTRACT NO. F49820-85-C-0127

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-88-0067

UNCLASSIFIED REPORT

ABSTRACT: (U) Considerable success we achieved relative to the goals of this project. Most importantly, a new generic class of high performance polymer blends was discovered. It is believed that polybenzimidazoles and polymides are miscible over a wide range of compositions, structural variations and temperature regimes. This assertion is based on work with the blends described in this report, utilizing commercially available materials. Evidence for their miscibility was displayed in their glass transition behavior, as elucidated by DSC and DMA, and in their IR spectral properties. Their phase behavior was also examined. Several blend combinations have been scaled up for evaluation to delineate technologically useful systems. The synthesis and properties of two high performance ionomers were also investigated: sodium sulfonate (Udel) polysulfone (Na-SPSF) and sodium sulfonate poly(ether ether ketone) (Na-SPEEK). Improved and novel synthetic techniques were developed so that random, homogenous copolymers could be prepared. Their glass transition behavior and thermal stabilities were assessed. Their blend properties were also assessed and analyzed theoretically in terms of a mean-field treatment. Interaction parameters were calculated.

DESCRIPTORS: (U) *POLYMERS, *COMPOSITE MATERIALS, COPOLYMERS, GLASS, INTERACTIONS, IONOMERS, MIXING, PHASE

AD-A192 092

AD-A192 092 CONTINUED

STUDIES, POLYBENZIMIDAZOLE, SODIUM, SPECTRA, STRUCTURAL PROPERTIES, SULFONATES, SYNTHESIS, THERMAL STABILITY, SYNTHESIS(CHEMISTRY), POLYIMIDE PLASTICS, INFRARED SPECTROSCOPY, SULFONES, SULFONATES, KETONES, ETHERS.

IDENTIFIERS: (U) *Polymer alloys, Differential scanning calorimetry, PE61102F, WUAFOSR2303A3.

AD-A192 088 25/2

CITY COLL NEW YORK COMMUNICATIONS SYSTEMS LAB

(U) Communications Using Channels Formed by Meteor Bursts.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jan-31 Dec 87,

DEC 87 177P

PERSONAL AUTHORS: Schilling, Donald L.; Hibshoosh, Eliphaz

CONTRACT NO. AFOSR-85-0234

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR TR-88-0018

UNCLASSIFIED REPORT

ABSTRACT: (U) There is currently an urgent need for alternate channels for communication. The large variety and quantity of users throughout the world have caused all of the existing channels to become extremely congested. A world wide search for such alternate channels is now being conducted for both present day and future communication systems through the use of different types of channels such as optical, laser, cable, satellite, etc. The particular application of Beyond-Line-of-sight (BLOS) communications, which uses the High Frequency (HF) spectral band from 3 to 30 MHz, is very important to many current and potential users. However, HF is very sensitive to solar disturbances such as sunspot activity, solar storms and other galactic phenomena, as well as multipath returns from both ground and atmosphere, weather related attenuation, and other degrading factors. Because of these factors a channel for communication is needed which has low congestion, is robust and relatively indestructible, has very little outside interference and does not compete for bandwidth with existing communication systems.

DESCRIPTORS: (U) *CHANNELS, *COMMUNICATION AND RADIO SYSTEMS, ATTENUATION, BAND SPECTRA, CONGESTION, GALAXIES, GLOBAL, HIGH FREQUENCY, LASERS, QUANTITY, SEARCHING, SOLAR DISTURBANCES, SUNSPOTS, WEATHER.

AD-A192 092

AD-A192 088

AD-A192 088 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B4.

AD-A192 086 12/5 17/5

MASSACHUSETTS UNIV AMHERST

(U) Intermediate Level Computer Vision Processing Algorithm Development for the content Addressable Array Parallel Processor.

DESCRIPTIVE NOTE: Quarterly status rept. no. 6, 1 Sep-30 Nov 87,

NOV 87

PERSONAL AUTHORS: Riseman, Edward

CONTRACT NO. F49620-86-C-0041

MONITOR: AFOSR TR-88-0090

UNCLASSIFIED REPORT

ABSTRACT: (U) From September through November the author concentrated on the development of an Integrated Image Understanding Benchmark for computer vision architectures. Unlike previous vision benchmarks, this new benchmark is designed to test machine performance on a complete interpretation task. The task chosen will require not only that common low-level vision operations be performed, but that intermediate-level operations and interactions between operations be tested as well. In fact, the emphasis of the benchmark is on intermediate - or high-level processes controlling lower level processing in a top-down manner. The goal of the interpretation task is to recognize a modeled object in a cluttered environment. The input to the system is a set of models, any one of which may be present in the scene, and a pair of registered images. One of the images is from a black and white 8-bit intensity sensor, and the other is from a 32-bit floating-point range sensor. For the purposes of the benchmark, the images are artificially created.

DESCRIPTORS: (U) *IMAGE PROCESSING, *PARALLEL PROCESSING, *PARALLEL PROCESSORS, COMPUTER ARCHITECTURE, IMAGES, INPUT, LOW LEVEL, LOW LIGHT LEVELS, MODELS, PROCESSING, TEST METHODS.

IDENTIFIERS: (U) *Benchmark computer programs, Content addressable arrays, Computer generated images, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 077 17/9 20/9

UTAH STATE UNIV LOGAN

(U) Comparison of Simultaneous MST Radar and Electron Density Probe Measurements in the Polar Mesosphere,

AUG 87 7P

PERSONAL AUTHORS: Ulwock, J.; Baker, K.; Kelley, M.

CONTRACT NO. AFOSR-85-0163

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR TR-88-0103

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of the ESA Symposium on European Rocket and Balloons Programmes and related Research (8th), p169-174 Aug 87.

ABSTRACT: (U) Two rockets containing dc probes were launched at Poker Flat, Alaska to measure electron density irregularities with high spatial resolution. They were launched at times when the MST radar showed regions of intense backscatter in the mesosphere. Large changes and strong gradients in the electron density are observed in the region of mos. intense backscatter. The electron density profiles show different characteristics in the peak scattering region. Spectra of the spatial density fluctuations are derived. In the region of most intense backscatter, the power is up over the whole frequency range by almost 5 orders of magnitude. A detailed intercomparison of the probe data is given, followed by a comparison between the measured radar echo power and calculated echo power based on the in situ rocket measurements.

DESCRIPTORS: (U) *ELECTRON DENSITY, *RADAR REFLECTIONS, ALASKA, BACKSCATTERING, DENSITY, DIRECT CURRENT, ECHOES, ELECTRON PROBES, FREQUENCY, HIGH RESOLUTION, INTENSITY, LAUNCHING, MEASUREMENT, MESOSPHERE, PEAK VALUES, POLAR REGIONS, POWER, PROBES, PROFILES, RADAR, REGIONS, ROCKETS, SCATTERING, SPATIAL DISTRIBUTION, VARIATIONS, REPRINTS.

AD-A192 077 CONTINUED

IDENTIFIERS: (U) WUAFOSR2310A2, PE61102F.

AD-A192 077

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 076 9/1

TEXAS UNIV AT AUSTIN ELECTRONICS RESEARCH CENTER

(U) Joint Services Electronics Program.

DESCRIPTIVE NOTE: Annual rept. 1 Jan-31 Dec 87,

DEC 87 59P

PERSONAL AUTHORS: Powers, Edward J.

CONTRACT NO. F49620-86-C-0045

PROJECT NO. 2305

TASK NO. A9

MONITOR: AFOSR
TR-88-0184

UNCLASSIFIED REPORT

ABSTRACT: (U) This Annual Report covers the twelve month period ranging from January 1, 1987 through December 31, 1987. The progress reported herein was accomplished during the second year of our current triennial technical program. Ten faculty members and approximately twenty graduate students from the Department of Electrical and Computer Engineering and the Department of Physics are conducting the research described in this report. The University of Texas DoD JSEP program is a broad-based program with four research units in Solid State Electronics, two in Electromagnetics, two in Quantum Electronics, and two in Information Electronics. The Solid State Electronics program involves the fundamental issues in semiconductor physics and technology and is designed to address basic problems which must be solved for the development of the next generation of electronic and optical devices. In the following significant accomplishments section, we summarize recent advances in molecular beam epitaxy for ultra-high speed device applications and ion implantation of InP. In the Electromagnetics area several novel monolithic millimeter-wave integrated circuit structures are being investigated for use as quasi-optical array elements.

DESCRIPTORS: (U) *ELECTRONIC EQUIPMENT, *ELECTRONICS, *SOLID STATE ELECTRONICS, COMPUTERS, ELECTROMAGNETIC FIELDS, ENGINEERING, EPITAXIAL GROWTH, INSTRUCTORS, ION

AD-A192 076 CONTINUED

IMPLANTATION, MOLECULAR BEAMS, OPTICAL EQUIPMENT, PHYSICS, QUANTUM ELECTRONICS, STUDENTS.

IDENTIFIERS: (U) WUAFOSR2305A9, PE61102F.

AD-A192 076

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A192 075 20/8

NEW YORK UNIV NY COURANT INST OF MATHEMATICAL SCIENCES

(U) Theoretical Plasma Physics Research of Active Space Experiments.

DESCRIPTIVE NOTE: Final rept. 1 Jul-31 Dec 86,

87 8P

PERSONAL AUTHORS: Grossman,

CONTRACT NO. F49620-86-C-0086

PROJECT NO. 5812

TASK NO. G1

MONITOR: AFOSR TR-88-0191

UNCLASSIFIED REPORT

ABSTRACT: (U) The following report describes our present understanding and recent results from an analysis of the effects of elastic scattering on neutral beam penetration. The important factors affecting neutral beam propagation in the upper atmosphere at altitudes of 200-250 km are discussed. Two primary factors affecting the beam quality are the accuracy of beam collimation and the effect of collisions between the beam particles and the background atmospheric particles. A further factor is ionization of the beam particles in terms of radiation or waves and instabilities that may result from the collective interaction between the ionized beam particles and the charged particles in the background atmosphere.

DESCRIPTORS: (U) *ELASTIC SCATTERING, *PARTICLE BEAMS, ACCURACY, ATMOSPHERES, BACKGROUND, COLLIMATORS, ELECTROMAGNETIC WAVE PROPAGATION, INTERACTIONS, IONIZATION, NEUTRAL, PENETRATION, PLASMAS(PHYSICS), RADIATION, UPPER ATMOSPHERE, ATMOSPHERIC PHYSICS, BEAM FORMING, BOLTZMANN EQUATION.

IDENTIFIERS: (U) Neutral particle beams, Rarefied gas dynamics, PE63221C, WUAFOSR5812G1.

AD-A192 075

AD-A192 073 20/4 13/7

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF AERONAUTICS AND ASTRONAUTICS

(U) Fluid Dynamics of High Performance Turbomachines.

DESCRIPTIVE NOTE: Annual rept. 19 Oct 86-18 Oct 87,

DEC 87 131P

PERSONAL AUTHORS: Greitzer, Edward M.; Epstein, Alan H.; Giles, Michael B.; McCune, James E.; Tan, Choon S.

CONTRACT NO. F49620-85-C-0018

PROJECT NO. 2307

TASK NO. A4

MONITOR: AFOSR TR-88-0183

UNCLASSIFIED REPORT

ABSTRACT: (U) Within the general topic, four separate tasks are specified. These are, in brief: I. Loss mechanisms and loss migration in transonic compressors, including development of advanced instrumentation for measurements of wake radial transport and analysis of unsteady vortical wake structures. II. Experimental and theoretical study of flows in casing and hub treatment, including mechanisms for stability enhancement in compressors and unsteady fluid dynamic interactions between passage and groove flows. III. Computational techniques for turbomachinery, including inverse (design) calculation procedures for transonic turbomachine blades accounting for viscid/inviscid interaction. IV. Theoretical modelling of stability and unsteadiness in transonic compressor flow fields, including analyses of unsteady fluctuations due to vortex shedding.

DESCRIPTORS: (U) *COMPRESSORS, *FLUID DYNAMICS, *TURBOMACHINERY, COMPUTATIONS, FLOW, GROOVING, HUBS, INSTRUMENTATION, INTERACTIONS, INVISCID FLOW, LOSSES, MIGRATION, OPTIMIZATION, STABILITY, TRANSPORT, VISCOUS FLOW, VORTEX SHEDDING, WAKE, TRANSONIC FLOW, UNSTEADY FLOW.

IDENTIFIERS: (U) Passage flow, Groove slow, PE61102F,

AD-A192 073

AD-A192 073 CONTINUED

WUAFOSR2307A4.

AD-A192 071 6/6 6/3

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG CENTER FOR ENVIRONMENTAL STUDIES

(U) Structural and Functional Responses to Perturbation in Aquatic Ecosystems.

DESCRIPTIVE NOTE: Final rept. 1 Sep 85-31 Nov 87,

JAN 88 215P

PERSONAL AUTHORS: Cairns, John, Jr.; Pratt, James R.; Niederlehner, B. R.; Bowers, Nancy J.

CONTRACT NO. AFOSR-85-0324

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR TR-88-0223

UNCLASSIFIED REPORT

ABSTRACT: (U) Naturally-derived microbial microcosms were used to evaluate general responses of aquatic communities to stress. Laboratory toxicity tests examined structural and functional responses of microbial communities to six pure compounds (chlorine, zinc, phenol, ammonia, Atrazine, and sulfuric acid), mixtures of ammonia and chlorine, and two complex effluents. In addition, field validation studies compared laboratory responses of microbial communities to effects in the receiving system. For all six pure compound studies, estimates of permissible concentrations from microcosm tests were similar to more expensive conventional estimates. Changes in species composition, species loss, and changes in dissolved oxygen concentrations were the most consistent indicators of system stress, responding across types of toxicants. Structural measures were more sensitive than most functional measures. Early field validation studies indicated the degradation of effluent was an important factor in predictive success. In situ toxicity test results corresponded well to effects on native macroinvertebrates and later, modified laboratory tests successfully predicted some in-stream environmental effects within 15%.

AD-A192 071 CONTINUED

DESCRIPTORS: (U) *AQUATIC BIOLOGY, *ECOSYSTEMS, *ENVIRONMENTAL IMPACT, AMMONIA, CHLORINE, ESTIMATES, CONCENTRATION(CHEMISTRY), DISSOLVING, OXYGEN, FIELD TESTS, LABORATORIES, CONSISTENCY, INDICATORS, DEGRADATION, EFFLUENTS, LABORATORY TESTS, HERBICIDES, TOXICITY, TEST METHODS, PHENOLS, STRUCTURAL RESPONSE, SULFURIC ACID, TOXIC AGENTS, ZINC, MICROORGANISMS, INVERTEBRATES, LOSSES, STRUCTURAL PROPERTIES.

IDENTIFIERS: (U) Atrazine, WUAFOSR2312A5, PE61102F.

AD-A192 065 14/2 20/1

COMPUTER SCIENCES CORP NSTL STATION MS

(U) Characterization of Rigid-Rod Molecular Composites by Photothermal and Ultrasonic Imaging.

DEC 87 9P

PERSONAL AUTHORS: Maclachlan, J. W.; Madey, M.; Eby, R. K. ; Adams, W. W.

CONTRACT NO. AFOSR-87-0320

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-88-0138

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Polymer Communications, v28 p325-330 Dec 87.

ABSTRACT: (U) Data are presented which demonstrate that photothermal and ultrasonic imaging can resolve the components of a phase-separated molecular composite with a 55% poly(p-phenylene benzohisthiazole) (PBT) and 45% nylon 66. PBT-rich particles in the 10-50 micrometer size range are present after heating above the melting temperature of nylon. Other types of morphological, thermal and elastic information about the composite could be obtained by both techniques for a variety of samples. Keywords: Molecular composite, Photothermal, Ultra-sonic, Imaging, Scanning, Rigid rod, Material characterization.

DESCRIPTORS: (U) *IMAGES, *PHOTOTHERMAL PROPERTIES, *RODS, *ULTRASONICS, ELASTIC PROPERTIES, MELTING POINT, MOLECULES, NYLON, REPRINTS, RIGIDITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A192 048 6/12 6/5

ARIZONA UNIV TUCSON

(U) Pet Data Analysis Satellite System.

DESCRIPTIVE NOTE: Final rept. 1 Oct 86-30 Sep 87,

JAN 88 7P

PERSONAL AUTHORS: Lauter, Judith

CONTRACT NO. AFOSR-87-0003

PROJECT NO. 2313

TASK NO. A6

MONITOR: AFOSR
TR-88-0190

UNCLASSIFIED REPORT

ABSTRACT: (U) This system was requested to duplicate hardware used in analyzing data collected at the Positron Emission Tomography (PET) Laboratory. The following items comprising the satellite system have been purchased: 1. Perkin-Elmer 3205 minicomputer; 2. Ramtek MC68000 Display Controller; and 3. Matrix 3000 Colorgraphic film recorder.

DESCRIPTORS: (U) *TOMOGRAPHY, *MEDICAL EQUIPMENT, EMISSION, POSITRONS, DIAGNOSIS(MEDICINE), AUDITORY PERCEPTION, VISUAL PERCEPTION.

IDENTIFIERS: (U) Positron emission tomography, PE61102F, WUAFOSR2313A6.

AD-A192 045 7/3

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF CHEMISTRY

(U) Preparation of the First Stable Formylsilane, (Me3Si) 3SiCHO, from a Zirconium eta 2-Silaacyl Complex.

88 3P

PERSONAL AUTHORS: Elsner, Frederick H.; Woo, Hee-Gweon; Tilley, T. D.

CONTRACT NO. AFOSR-85-0228

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0078

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical Society, v110 p313-314 1988.

ABSTRACT: (U) Despite intent interest in the chemistry and properties of acylsilane derivatives (RCOSiR3), little has been reported regarding formylsilanes (R3SiCHO) . Early attempts to prepare formylsilanes led to the conclusion that they were unstable under a variety of reaction conditions. Hydrolysis of the ozonide adduct of vinyltrimethylsilane with zinc dust gave trimethylsilanol and formaldehyde, possibly via Me3SiCHO. The pink silaacyl complex obtained by carbonylation reacts with anhydrous HCl in toluene at -78 C to afford the first stable formylsilane, (Me3Si)3SiCHO. The compound is a colorless oil, characterized by 1H NMR, 13C NMR, 29Si NMR, IR, and mass spectroscopy. It is reduced by NaBH4 to the alcohol (Me3Si)3 Si CH2OH, by (Cp2ZrHCl)n to the zirconium alkoxide Cp2Zr(OCH2Si(SiMe3)3Cl, and by MeMgBr to (Me3Si)3 SiCH(Me)OH.

DESCRIPTORS: (U) *FORMALDEHYDE, *SILANES, *SYNTHESIS(CHEMISTRY), CHEMISTRY, DUST, MASS SPECTROSCOPY, RESPONSE, REPRINTS, ZINC, ZIRCONIUM.

IDENTIFIERS: (U) *Silane/formyl,PE61102F, WUAFOSR2303B2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 044 20/4

DAYTON UNIV OH RESEARCH INST

(U) Fast Algorithm Development for Large-Eddy Simulation of Circular-Jet Turbulence.

DESCRIPTIVE NOTE: Final technical rept. 15 Sep 85-14 Oct 87,

DEC 87 30P

PERSONAL AUTHORS: Krishnamurthy, L.; Hall, C. A.; Porsching, T. A.

REPORT NO. UDR-TR-87-150

CONTRACT NO. F49620-85-C-0137

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-88-0091

UNCLASSIFIED REPORT

ABSTRACT: (U) The research addresses a single, free, round turbulent jet expanding into a quiescent environment, and deals with the large scale motions through large eddy simulation and the small scale motions through subgrid-scale turbulence modeling. The computational fluid dynamic investigation of the nearfield downstream of an axisymmetric nozzle is based on a two dimensional procedure involving a variable reduction method, with the farfield fully developed flow structure analyzed by matched asymptotic expansions for large Reynolds numbers. The numerical algorithm development examines vectorization, three dimensional flowfield, and the construction of weakly dissipative difference methods. Keywords: Asymptotic structure, Circular jet; Fair field development; Fast algorithm; Free jet; Large eddy simulation.

DESCRIPTORS: (U) *ALGORITHMS, *EDDIES(FLUID MECHANICS), *FLUID DYNAMICS, ASYMPTOTIC SERIES, AXISYMMETRIC, COMPUTATIONS, DISSIPATION, EXPANSION, FINITE DIFFERENCE THEORY, FLOW, FLOW FIELDS, MATCHING, MOTION, NEAR FIELD, NOZZLES, NUMERICAL METHODS AND PROCEDURES, REDUCTION,

AD-A192 044 CONTINUED

REYNOLDS NUMBER, SCALE, SIMULATION, THREE DIMENSIONAL, TWO DIMENSIONAL, VARIABLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 043 21/3

R AND D ASSOCIATES ALEXANDRIA VA

(U) Unified Study of Plasma-Surface Interactions for Space Power and Propulsion.

DESCRIPTIVE NOTE: Final rept. 1 May 83-31 Aug 84.

APR 88 39P

REPORT NO. RDA-TR-126600-001

CONTRACT NO. F49620-83-C-0105

PROJECT NO. 2308

TASK NO. K1

MONITOR: AFOSR
TR-88-0098

UNCLASSIFIED REPORT

ABSTRACT: (U) A study is made of interaction between plasmas, whose parameters are typical of high specific power, high specific impulse devices, and various conducting and insulating surfaces. This study is carried out using metallic and dielectric surfaces arranged perpendicular (facing upstream and downstream) and parallel to phenomena, when they have been investigated at all, have been studied under the parameter constraints of particular devices, usually under conditions of poor diagnostic accessibility. The present study is carried out under conditions that allow better diagnostic examination of the plasma-surface region with the ability to vary plasma parameters, flow relative to the samples, electrical conduction to the (metal) samples, etc. The aim is to delineate the basic physics of plasma-surface interaction under conditions applicable to the design of space power and propulsion systems. The arcjet will be installed and tested; the downstream plasma flow will be examined and its parameters (temperature, composition, density, flow velocity, etc.) will be correlated with the variation in the discharge energy and other parameter of the thruster.

DESCRIPTORS: (U) *PLASMA ENGINES, *SPACE PROPULSION, *ELECTRIC PROPULSION, DIAGNOSIS(GENERAL), DIELECTRIC PROPERTIES, DOWNSTREAM FLOW, ELECTRICAL CONDUCTIVITY,

AD-A192 043 CONTINUED

FLOW RATE, HIGH POWER, INSULATION, METALS, PARALLEL ORIENTATION, PARAMETERS, PLASMAS(PHYSICS), PROPULSION SYSTEMS, SPACE SYSTEMS, SPECIFIC IMPULSE, SURFACES, THRUSTERS, PLASMA DIAGNOSTICS, PLASMA JETS.

IDENTIFIERS: (U) Magneto gas dynamics, PE61102F, WUAFOSR2308K1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 042 8/8

BRIGHAM YOUNG UNIV PROVO UT DEPT OF CIVIL ENGINEERING

(U) Evaluating Evaporation with Satellite Thermal Data.

DESCRIPTIVE NOTE: Final rept. 1 Apr-1 Oct 87,

NOV 87 116P

PERSONAL AUTHORS: Miller, A. W.; Mills, Eric L.

CONTRACT NO. AFOSR-87-0177

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR
TR-88-0131

UNCLASSIFIED REPORT

ABSTRACT: (U) Water surface temperatures can be obtained from satellite thermal remote sensing. Landsat and other satellites sense emitted thermal infrared radiation on a regular basis over much of the earth's surface. Evaporation is accomplished by the net transport of mass from the water surface to the atmosphere. Energy for the change of state in part comes from the subsurface and passes through the surface conduction layer. The latent transfer (evaporation) predominantly determines the water surface temperature. There should be good correlations between evaporation and surface temperatures. Satellite thermal data and evaporation data from four different years were obtained for the Great Salt Lake and surrounding region. More than 350 correlation and linear regression analyses were performed on the temperature and evaporation data. These included daily, multiple-day, and monthly values from measurements and modeling for the whole lake and areas within the lake using both day and night observations. The lake salt concentrations were also factored into the analyses in several different ways. The correlation results were generally very good and a methodology for using satellite-derived water surface temperatures along with salt concentrations were developed to estimate evaporation. Continuing efforts now include acquiring thermal data at less cost, more frequently and more quickly in order to apply the temperature evaporation models in near real time to lakes

AD-A192 042

AD-A192 042 CONTINUED

and the ocean.

DESCRIPTORS: (U) *EVAPORATION, *LAKES, *REMOTE DETECTORS, *SURFACE TEMPERATURE, *AIR WATER INTERACTIONS, CONCENTRATION(COMPOSITION), CONDUCTIVITY, CORRELATION, EARTH(PLANET), LAYERS, LINEAR REGRESSION ANALYSIS, MODELS, NIGHT, OCEANS, REAL TIME, SURFACES, TELEMETERING DATA, TEMPERATURE, THERMAL PROPERTIES, WATER, SCIENTIFIC SATELLITES, MASS TRANSFER.

IDENTIFIERS: (U) Great Salt lake, LANDSAT satellites.

AD-A192 042

AD-A192 041 12/1

AMERICAN MATHEMATICAL SOCIETY NEW YORK

(U) Infinite Dimensional Dynamical Systems and their Finite Dimensional Analogues.

DESCRIPTIVE NOTE: Final rept. 15 Jul-14 Sep 87,

87 34P

PERSONAL AUTHORS: Maxwell,

CONTRACT NO. AFOSR-87-0279

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR
TR-88-0186

UNCLASSIFIED REPORT

ABSTRACT: (U) The speakers gave reports on their research to-date concerning nonlinear Partial Differential Equations and possible systems of Ordinary Differential Equations which faithfully capture their essential behavior, particularly in terms of chaotic behavior.

DESCRIPTORS: (U) *NONLINEAR DIFFERENTIAL EQUATIONS, *PARTIAL DIFFERENTIAL EQUATIONS, DIFFERENTIAL EQUATIONS, DYNAMICS, ABSTRACTS, SYMPOSIA, EIGENVALUES, VISCOELASTICITY, MATRICES(MATHEMATICS).

IDENTIFIERS: (U) Chaos, Sine Gordon equations, Finite modal equations, Manifolds(Mathematics), Ergodic theory, Separatrices, PE61192F, WUAFOSR2304A4.

AD-A192 040 12/5 20/4

PEDA CORP PALO ALTO CA

(U) Accurate, Productive Aerodynamic Simulation on Patched Mesh Systems.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 86-30 Sep 87,

NOV 87 64P

PERSONAL AUTHORS: Lombard, Charles K.; Oliger, Joseph; Bardina, Jorge; Venkatapathy, Ethiraj; Yang, J. Y.

CONTRACT NO. F49620-85-C-0081

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-88-0185

UNCLASSIFIED REPORT

ABSTRACT: (U) The research has aimed at defining data structures and completing tools for a new flexible approach to scientific programming and problem solving. Both problems of program complexity associated with changing models and physics as well as joined and disjoint multiple independent patched domain decompositions for treating complex geometries can be systematically organized within the context of the directed graph programming concept being explored. Problems and parts of problems having geometric connectivity or its analogs such as precedence relationships are naturally exhibited and easily debugged or modified in the graph. The solution of problems is literally to traverse the graph. For the planned prototype aerodynamic simulation facility the graphs which are to embody grid generation and Navier Stokes solution procedures are to be constructed with a graphical editor hosted in a high performance graphics workstation. Keywords: Adaptive gridding; Navier stokes; Patched grids, Upwind methods.

DESCRIPTORS: (U) *COMPUTER PROGRAMMING, *NAVIER STOKES EQUATIONS, AERODYNAMICS, DATA BASES, DECOMPOSITION, FACILITIES, GRAPHICS, GRAPHS, GRIDS, MESH, PROBLEM SOLVING, PROTOTYPES, SIMULATION, SOLUTIONS(GENERAL),

AD-A192 040 CONTINUED

TAYLORS SERIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

AD-A192 027 11/6.1 20/11

RHODE ISLAND UNIV KINGSTON DEPT OF MECHANICAL ENGINEERING AND APPLIED MECHANI CS

(U) Study of Probabilistic Fatigue Crack Growth and Associated Scatter Under Constant-and-Variable Amplitude Loading Spectrum.

DESCRIPTIVE NOTE: Annual rept. 15 Jul 86-15 Jul 87,

SEP 87 60P

PERSONAL AUTHORS: Ghonem, Hamouda

CONTRACT NO. AFOSR-85-0382

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFOSR TR-88-0216

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of the program's second year research work was to examine the validity of the constant probability crack growth model while refining the transition intensity parameter. This work has been completed, thus leading to a crack growth rate equation with an explicit probability term. Furthermore, work extending the applicability of the model to variable loading required the determination of the delay-time associated with a single overload. An experimental test program was carried out on a titanium alloy using a potential drop technique to record crack length increments as function of overload characteristics. This program has been completed and results will be incorporated into the basic stochastic model.

DESCRIPTORS: (U) *CRACK PROPAGATION, *TITANIUM ALLOYS, *LOADS(FORCES), CRACKS, EQUATIONS, EXPERIMENTAL DESIGN, FATIGUE(MECHANICS), MATHEMATICAL MODELS, PROBABILITY, STOCHASTIC PROCESSES, TEST AND EVALUATION, MATHEMATICAL MODELS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO, EVI12B

AD-A192 026 17/11

CALIFORNIA UNIV BERKELEY DEPT OF PSYCHOLOGY

(U) Visual Information Processing in the Perception of Features and Objects.

DESCRIPTIVE NOTE: Annual technical rept. no. 1, 1 Jan-31 Dec 87,

JAN 88 23P

PERSONAL AUTHORS: Treisman, Anne

CONTRACT NO. AFOSR-87-0125

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR
TR-88-0215

UNCLASSIFIED REPORT

ABSTRACT: (U) The first year of the grant was spent in setting up the laboratory, and in starting research on a number of different projects. All are concerned with the visual processing of information in the perception of objects. A series of experiments has explored the perception of conjunctions of features, attempting to determine what makes this difficult or easy. A new method (detection of apparent motion) was tested and a modification of feature-integration theory was developed to accommodate the new results. Other projects have been concerned with coding of features, finding evidence for modularity, testing the level of abstraction at which features (such as orientation) are coded, the different media which support the coding of shape, and the space in which they are represented (retinal or three-dimensional). Another project has probed the effects of perceptual learning with extended practice at detecting particular sets of targets; the results suggest that automatization in search is highly specific to the practiced task and has little effect on other perceptual tests. Six graduate students are at present, working on projects wholly or partly supported by the grant.

DESCRIPTORS: (U) *IMAGE PROCESSING, *INFORMATION PROCESSING, *LEARNING, *PERCEPTION, CODING, DETECTION,

AD-A192 026

AD-A192 026 CONTINUED

MODULAR CONSTRUCTION, MOTION, RETINA, SHAPE, STARTING, STUDENTS, TARGETS, THREE DIMENSIONAL, VISUAL PERCEPTION, VISUAL SIGNALS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 025 12/3

MISSOURI UNIV-ROLLA DEPT OF MATHEMATICS AND STATISTICS

(U) Statistical Analysis of a Compound Power-Law Model for Repairable Systems,

OCT 87 7P

PERSONAL AUTHORS: Engelhardt, Max; Bain, Lee J.

CONTRACT NO. AFOSR-84-0164

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-0205

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Reliability, vR-36 n4 p392-396 Oct 87.

ABSTRACT: (U) A compound (mixed Poisson distribution is sometimes used as an alternative to the Poisson distribution for count data. Such a compound distribution, which has a negative binomial form, occurs when the population consists of Poisson distributed individuals, but with intensities of of each system are different. A sore general situation is considered where the system failures are distributed according to nonhomogeneous Poisson processes having Power Law intensity functions with gamma distributed intensity parameter. If the failures of each system in a population of repairable systems are distributed according to a Power Law process, but with different intensities, then a compound Power Law process provides a suitable model. A test which is based on the ratio of the sample variance to the sample mean of count data from s-independent systems provides a convenient way to determine if a compound model is appropriate. When a compound Power Law model is indicated, the maximum likelihood estimates of the shape parameters of the individual systems can be computed and a test for homogeneity can be conducted. If equality of the shape parameters is indicated, the it is possible to test whether the systems are homogeneous Poisson processes versus a nonhomogenous alternative.

AD-A192 025 CONTINUED

DESCRIPTORS: (U) *POISSON DENSITY FUNCTIONS, COUNTING METHODS, DISTRIBUTION, FUNCTIONS, HOMOGENEITY, INTENSITY, MAXIMUM LIKELIHOOD ESTIMATION, MEAN, MIXING, PARAMETERS, RATIOS, REPAIR, SHAPE, STATISTICAL ANALYSIS, POPULATION(MATHEMATICS), MATHEMATICAL MODELS, REPRINTS.

IDENTIFIERS: (U) Power law processes, PE61102F, WUAFOSR.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 021 11/4

TEXAS A AND M UNIV COLLEGE STATION MECHANICS AND MATERIALS CENTER

(U) Fracture Physics of Delamination of Composite Materials.

DESCRIPTIVE NOTE: Final technical rept. 1 Feb 84-30 Jun 87,

OCT 87 267P

PERSONAL AUTHORS: Bradley, W. L.; Corleto, C. R.; Goetz, D. P.

REPORT NO. MM-5021-87-12

CONTRACT NO. AFOSR-84-0064

PROJECT NO. 2301

TASK NO. B2

MONITOR: AFOSR TR-88-0020

UNCLASSIFIED REPORT

ABSTRACT: (U) Real time observations in the scanning electron microscope have delineated the details of the fracture processes that result in mode I and mode II delamination of composite materials. These observations give clear explanation of why GII/GIC ratio for brittle materials is three times that for ductile materials. These in situ observations of fracture also indicate that distinctively different damage zone develops ahead of growing cracks for mode I and mode II delamination. Two techniques have been developed to measure the strain field around a crack tip. Stero imaging and direct measurement of distortion of a fine array of dots placed on the surface. Both are effective in measuring the strain field around a crack tip. A surprising result which emerged from these measurements is that the local strain to failure at the crack tip is much greater than the elongation measured in a tensile test (up to six times as high). A linear, orthotropic finite element code has been used to calculate the stress fields around the crack tip for mode I and mode II loading. A J-integral approach for mode I has been used to investigate the

AD-A192 021

AD-A192 021 CONTINUED

delamination of multi directional composites. Initial results using this approach look very promising for charzcterizing systems which can not be characterized with conventional analysis.

DESCRIPTORS: (U) *FRACTURE(MECHANICS), *BONDING, *LAMINATES, BRITTLENESS, COMPOSITE MATERIALS, CRACKS, DAMAGE, DUCTILITY, ELECTRONIC SCANNERS, ELONGATION, J INTEGRALS, MATERIALS, MEASUREMENT, PHYSICS, TENSILE TESTERS, COMPUTER AIDED DIAGNOSIS, STEREOMAPPING, REPRINTS, NOTCH SENSITIVITY.

IDENTIFIERS: (U) *Delamination, Debonding, PE61102F, WUAFOSR230182.

AD-A192 021

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 016 12/3

TENNESSEE UNIV KNOXVILLE DEPT OF MATHEMATICS

(U) On Path Properties of Certain Infinitely Divisible Processes.

DESCRIPTIVE NOTE: Rept. for Apr-Nov 87,

NOV 87 19P

PERSONAL AUTHORS: Rosinski, Jan

CONTRACT NO. F49620-85-C-0144, $AFOSR-87-0136

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-0203

UNCLASSIFIED REPORT

ABSTRACT: (U) Sample path properties of Poissonian type stochastic integral processes are studied. It is proven that various properties of the sections of the deterministic kernel (as, for example, unboundedness, discontinuity, etc.) are inherited by the sample paths of the corresponding stochastic integral process. An analogous statement for Gaussian processes is false. As a main tool, a series representation of stochastic integral processes is fully developed and this may be of independent interest. Keywords: Infinitely divisible processes; Symmetry.

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, DETERMINANTS(MATHEMATICS), PATHS, STATISTICAL PROCESSES, POISSON DENSITY FUNCTIONS, SYMMETRY, KERNEL FUNCTIONS.

IDENTIFIERS: (U) Gaussian processes, PE61102F, WUAFOSR2304A5.

AD-A192 013 17/9

ROSENSTIEL SCHOOL OF MARINE AND ATMOSPHERIC SCIENCE MIAMI FL DIV OF METEOROL OGY AND PHYSICAL OCEANOGRAPHY

(U) Observation of Stratiform Rain with 94 GHz and S-Band Doppler Radar.

DESCRIPTIVE NOTE: Scientific rept. no. 1,

SEP 87 23P

PERSONAL AUTHORS: Lhermitte, Roger M.

CONTRACT NO. F19628-87-C-0108

PROJECT NO. 2310

TASK NO. G8

MONITOR: AFOSR
TR-87-0268

UNCLASSIFIED REPORT

ABSTRACT: (U) This is a report of a pilot experiment, which took place at the AFGL site in Sudbury, MA. This experiment was concerned with the testing and operation of a 94 GHz radar to be used in a project devoted to the study of stratiform rain characteristics and evolution. Some of the data collected during the test are presented. The main experiment involving several radars operating at different wavelengths is scheduled to take place in November 1987 at the same site.

DESCRIPTORS: (U) *DOPPLER RADAR, S BAND, RADAR REFLECTIONS, RAIN, STRATIFICATION.

IDENTIFIERS: (U) PE61102F, WUAFGL2310G8CA.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 005 20/6 12/6

HONEYWELL INC BLOOMINGTON MN PHYSICAL SCIENCES CENTER

(U) Optical Symbolic Processor for Expert System Execution.

DESCRIPTIVE NOTE: Quarterly technical rept. 1 Sep-30 Nov 87,

NOV 87 13P

PERSONAL AUTHORS: Guha, Aloke

CONTRACT NO. F49620-86-C-0082, $$ARPA Order-5794

PROJECT NO. 5794

TASK NO. 00

MONITOR: AFOSR TR-88-0022

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of this program is to develop a concept for an optical computer architecture for symbolic computing by defining a computation model of a high level language, examining the possible devices for the ultimate construction of a processor, and by defining required optical operations. This quarter we investigated the implementation alternatives for an optical shuffle exchange network (SEN). Work in previous quarter had led to the conclusion that the SEN was most appropriate optical interconnection network topology for the symbolic processing architecture (SPARO). A more detailed analysis was therefore conducted to examine implementation possibilities. It was determined that while the shuffle connection of the SEN was very feasible in optics using passive devices, a full-scale exchange switch which handles conflict resolution among competing messages is much more difficult. More emphasis was therefore given to the exchange switch design. The functionalities required for the exchange switch and its controls were analyzed. These functionalities were then assessed for optical implementation. It is clear that even the basic exchange switch, that is, an exchange without the controls for conflict resolution, delivery, etc..., is quite a difficult problem in optics. We have proposed a number of optical techniques that appear to be good candidates for realizing the basic exchange switch. A reasonable

AD-A192 005

AD-A192 005 CONTINUED

approach appears to be to evaluate these techniques. and then incrementally add the necessary functionalities.

DESCRIPTORS: (U) *COMPUTER ARCHITECTURE, *OPTICAL EQUIPMENT, *OPTICAL PROCESSING, *SWITCHES, *SYMBOLS, COMPUTATIONS, COMPUTERS, CONFLICT, EXCHANGE, HIGH LEVEL LANGUAGES, METHODOLOGY, MODELS, NETWORK FLOWS, NETWORKS, OPTICAL PROPERTIES, OPTICS, PASSIVE SYSTEMS, RESOLUTION, TOPOLOGY.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A192 002 20/11

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Fracture Mechanics Analysis for Short Cracks.

DESCRIPTIVE NOTE: Annual rept. 1 Aug 86-31 Jul 87,

AUG 87 22P

PERSONAL AUTHORS: Annigeri, B. S.

REPORT NO. UTRC/R87-957565-1

CONTRACT NO. F49620-86-C-0095

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFOSR
TR-88-0195

UNCLASSIFIED REPORT

ABSTRACT: (U) This study addresses the development of the Surface-Integral and Finite Element ((SAFE) hybrid method for the analysis of short or physically small cracks. In this report, a brief review of representative research papers on fracture mechanics of short cracks is provided. The development of the SAFE hybrid method for materially nonlinear analysis is discussed. Motivation for the use of lumped plasticity models via modelling shear bands at the crack tip is given. Work in progress and future research tasks to be performed under this contract are outlined. Keywords: Fracture; Short cracks, Finite element; Integral equation; Fatigue(Mechanics).

DESCRIPTORS: (U) *CRACKS, *FINITE ELEMENT ANALYSIS, *INTEGRAL EQUATIONS, *MODELS, FRACTURE(MECHANICS), HYBRID SYSTEMS, MOTIVATION, NONLINEAR ANALYSIS, PLASTIC PROPERTIES, SAFETY, MATHEMATICAL MODELS, CRACK PROPAGATION, SHORT RANGE(DISTANCE).

IDENTIFIERS: (U) WUAFOSR2302B2, PE61102F.

AD-A192 002

AD-A192 000 12/3

SOUTH CAROLINA UNIV COLUMBIA DEPT OF STATISTICS

(U) Modeling Discrete Bathtub and Upside Down Bathtub Mean Residual Life Functions.

DESCRIPTIVE NOTE: Technical rept.,

OCT 87 20P

PERSONAL AUTHORS: Guess, Frank M.; Park, Dong H.

CONTRACT NO. AFOSR-84-0156

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-0198

UNCLASSIFIED REPORT

ABSTRACT: (U) A useful function for analyzing burn-in, residual life function. Other functions, such as the reliability or the failure rate functions, are of course important also. Discrete data arises naturally in various ways: from discretizing or grouping continuous data, devices operate by cycles (e.g., a copier's cycle is a copy, its lifelength the total number of copies), etc. This paper develops a general approach to modeling discrete bathtub and upside down bathtub mean residual life functions. Because the approach allows parametric modeling of the mean residual life, parametric models for complete discrete data, as well as right censored discrete data. A simple, perhaps surprising, example is presented where the mean residual life increases, then decreases; however, the hazard rate also increases, drops suddenly at one cycle, then increases again. The authors discuss two reasonable industrial explanations of such unusual behavior.

DESCRIPTORS: (U) *FAILURE, *LIFE EXPECTANCY(SERVICE LIFE), *STATISTICAL PROCESSES, CYCLES, FUNCTIONS, HAZARDS, MATHEMATICAL MODELS, PARAMETRIC ANALYSIS, RATES, RELIABILITY, LIFE TESTS.

IDENTIFIERS: (U) Bathtub curves, Inverted bathtub curves, PE61102F, WUAFOSR2304A5.

AD-A192 000

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 999 21/3 20/13

GT-DEVICES INC ALEXANDRIA VA

(U) Performance of a Hydrogen Pulsed Electrothermal Thruster. Strategic Defense Initiative Organization Innovative Science and Technology. SBIR. Phase 1.

DESCRIPTIVE NOTE: Final rept. 12 Jan-12 Jul 87,

SEP 87 47P

PERSONAL AUTHORS: Burton, Rodney L.; Goldstein, Shyke A.; Wang, Shih-Ying

CONTRACT NO. F49620-87-C-0028

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR TR-88-0196

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes effort to determine the technical feasibility of measuring the performance of a pulsed electrothermal thruster on liquid hydrogen propellant. The design of a 5 kW thruster is presented, including the capacitive pulse forming network, arc discharge characteristics, nozzle performance and predicted specific impulse and thrust. A thermal model is discussed which treats and solves the problem of liquid hydrogen it is concluded that a Phase II test should concentrate on water and/or hydrazine, and liquid hydrogen testing should be postponed to Phase III. Keywords: Electric propulsion, Pulsed electrothermal propulsion; Liquid hydrogen propellant.

DESCRIPTORS: (U) *ANTIMISSILE DEFENSE SYSTEMS, *LIQUID HYDROGEN, *STRATEGIC WARFARE, *THERMOELECTRIC POWER GENERATION, *THRUSTERS, ELECTRIC ARCS, ELECTRIC DISCHARGES, ELECTRIC PROPULSION, FEASIBILITY STUDIES, HYDRAZINES, HYDROGEN, LIQUID PROPELLANTS, MODELS, NETWORKS, NOZZLES, PERFORMANCE(ENGINEERING), PULSES, SPECIFIC IMPULSE, TEST AND EVALUATION, THERMAL PROPERTIES, WATER.

IDENTIFIERS: (U) WUAFOSR2308A1, PE61102F.

AD-A191 999

AD-A191 998 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Symmetrized Nearest Neighbor Regression Estimates.

DESCRIPTIVE NOTE: Technical rept.,

DEC 87 9P

PERSONAL AUTHORS: Carroll, R. J.; Hardle, W.

REPORT NO. MMS-1742

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-88-0201

UNCLASSIFIED REPORT

ABSTRACT: (U) The authors consider univariate nonparametric regression. Two standard nonparametric regression function estimates are kernel estimates and nearest neighbor estimates. Mack noted that both methods can be defined with respect to a kernel or weighting function, and that for a given kernel and a suitable choice of bandwidth, the optimal mean squared error is the same asymptotically for kernel and nearest neighbor estimates. Yang defined a new type of nearest neighbor regression estimate using the empirical distribution function of the predictors to define the window over which to average. This has the effect of forcing the number of neighbors to be the same both above and below the value of the predictor of interest; we call these symmetrized nearest neighbor estimates. The estimate is a kernel regression estimate with predictors given by the empirical distribution function of the true predictors. We show that for estimating the regression function at a point, the optimum mean squared error of this estimate differs from that of the optimum mean squared error for kernel and ordinary nearest neighbor estimates. No estimate dominates the others. They are asymptotically equivalent with respect to mean squared error if one is estimating the regression function at a mode of the predictor.

AD-A191 998

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 998 CONTINUED

DESCRIPTORS: (U) *DISTRIBUTION FUNCTIONS, *ESTIMATES, *PREDICTIONS, *REGRESSION ANALYSIS, BANDWIDTH, FUNCTIONS, NONPARAMETRIC STATISTICS, VARIATIONS, WEIGHTING FUNCTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A191 998

AD-A191 996 20/12

ARIZONA UNIV TUCSON OPTICAL SCIENCES CENTER

(U) Center for Thin Film Studies.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 86-1 Oct 87,

NOV 87 136P

PERSONAL AUTHORS: Shannon, Robert P.; Gibson, Ursula J.

CONTRACT NO. F49620-86-C-0123

PROJECT NO. 3484

TASK NO. A3

MONITOR: AFOSR
TR-88-0136

UNCLASSIFIED REPORT

ABSTRACT: (U) This report covers the first year of operation of the URI Thin Film Center (TFC), and describes a diverse array of studies on thin-film materials, substrates, and their processing and analysis. Individual efforts are highlighted in sections on nucleation studies, ion-assisted deposition, Rutherford backscattering spectrometry, Brillouin scattering, a continuum theory of the evolution of structure in thin films, a study of polishing parameters relevant to the preparation of substrates, and the setup of a characterization facility for the Center.

DESCRIPTORS: (U) *LIGHT SCATTERING, *THIN FILMS, ARRAYS, BACKSCATTERING, BRILLOUIN ZONES, DEPOSITION, MATERIALS, NUCLEATION, PARAMETERS, POLISHING, PREPARATION, SPECTROMETRY, SUBSTRATES, THEORY, TITANIUM DIOXIDE, ZINC SELENIDES, GERMANIUM COMPOUNDS, ARSENIDES, SPIN STATES, ION BEAMS, ULTRAHIGH VACUUM, VACUUM APPARATUS, EPITAXIAL GROWTH, MOLECULAR BEAMS, NITRIDES.

IDENTIFIERS: (U) Aluminum nitride, Spin waves, Brillouin scattering, ALE(Atomic Layer Evaporation), IAD(Ion Assisted Deposition), WUAFOSR3484A3, PE61102F.

AD-A191 996

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A191 991 21/2 21/5

PURDUE UNIV LAFAYETTE IN GAS TURBINE COMBUSTION LAB

(U) Soot and Radiation in a Gas Turbine Combustor.

DESCRIPTIVE NOTE: Final technical rept. 30 Sep 83-29 Sep 86,

JUL 87 135P

PERSONAL AUTHORS: Lefebvre, A. H.; Sojka, P. E., Cummings, W. G., III

CONTRACT NO. AFOSR-83-0374

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-88-0097

UNCLASSIFIED REPORT

ABSTRACT: (U) The effects of pressure, inlet air temperature, and fuel type on the soot threshold or critical equivalence ratio, are presented. Higher pressures yield lower soot thresholds, while no dependence on fuel type, as described by either the fuel hydrogen-to-carbon ratio, fuel molecular weight, number of carbon atoms, or number of carbon-carbon bonds, is observed. Variations in inlet air temperature have a complex effect; however, the results clearly show that the experimentally measured flame temperature is central to a description of the incipient soot formation process. The critical equivalence ratio dependence on pressure and temperature is shown to agree with a two-step semi-global model for soot precursor evolution for pressures form 0.1 to 0.8 MPa, and measured flame temperatures between 1600 and 2400K. The effects of equivalence ratio, pressure, and fuel chemistry on total non-luminous flame radiation were also studied. Radiant intensity was highest for an equivalence ratio of unity and increased linearly with pressure from 0.4 to 0.8 MPa. Keywords: Incipient soot formation, Flame radiation and emissivity, Premixed flames, Pressure dependence.

DESCRIPTORS: (U) *COMBUSTORS, *FLAMES, *GAS TURBINES, *RADIATION, *SOOT, ATMOSPHERIC TEMPERATURE, ATOMS, BONDED

AD-A191 991 CONTINUED

JOINTS, CARBON, CARBON CARBON COMPOSITES, CHEMISTRY, EMISSIVITY, EVOLUTION(GENERAL), FUELS, INLETS, MIXING, MOLECULAR WEIGHT, PRECURSORS, PRESSURE, RADIANT INTENSITY, RATIOS, TEMPERATURE, THRESHOLD EFFECTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A191 969 9/1

BROWN UNIV PROVIDENCE RI DIV OF ENGINEERING

(U) A PI-Controller for Distributed Delay Systems.

87 5P

PERSONAL AUTHORS: Fiagbedzi, Y. A.; Pearson, A. E.

CONTRACT NO. AFOSR-85-0300, $NSF-ECS85-05799

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-88-0099

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Automatica, v23 n6 p759-762 1987.

ABSTRACT: (U) A finite dimensional control theory is developed for the design of a proportional plus integral control law for tracking step command inputs in general autonomous time-lag systems with distributed heredity in state, control and output variables. With respect to an ordinary differential equation describing the delay system unstable modes, an auxiliary tracking problem is posed. This auxiliary problem derives its importance from the fact that its solution directly yields a solution to the original tracking problem. This point of contact with a finite dimensional system permits the application of well-tested ordinary systems tracking theory to the tracking problem in time-lag systems.

DESCRIPTORS: (U) *CONTROL THEORY, *TRACKING, AUXILIARY, DELAY, DIFFERENTIAL EQUATIONS, DISTRIBUTION, GENETICS, OUTPUT, SIZES(DIMENSIONS), THEORY, TIME LAG THEORY, VARIABLES, REPRINTS.

IDENTIFIERS: (U) PE61192F, WUAFOSR2304A1.

AD-A191 967 21/2 20/4

GEORGIA INST OF TECH ATLANTA SCHOOL OF AEROSPACE ENGINEERING

(U) Heterogeneous Diffusion Flame Stabilization.

DESCRIPTIVE NOTE: Final rept. Oct 83-Sep 87,

NOV 87 13P

PERSONAL AUTHORS: Strahle, Warren C.; Jagoda, Jechiel I.

CONTRACT NO. AFOSR-83-0356

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR TR-88-0123

UNCLASSIFIED REPORT

ABSTRACT: (U) Analytical modelling and several experimental diagnostics were applied to an experimental flow in a two-dimensional subsonic windtunnel with a backward facing step and provision for injection of inerts and combustibles through the porous floor behind the step. The analytical techniques were based on a two equation modeling of turbulence with several variants of near wall models and numerical approaches. Conventional experimental techniques, where applicable in the cold flow, included hot film and pitot and anemometry. Laser - based diagnostics in the cold and hot flows for velocity and species concentration measurements (both mean and instantaneous) included laser velocimetry in two components and Rayleigh molecular scattering. Major findings in this complex turbulent flow with chemical reactions were a) there was a general agreement between analysis and experiment in cold flow both with and without wall injection, b) this agreement occurred at the the most detailed level of turbulent shear stress and mass transport, c) in hot flow there was acceptable agreement as to the gross features of the mean flow field, but some theoretical details, such as reattachment length, went counter to experimental results.

DESCRIPTORS: (U) *TURBULENT FLOW, *FLAME PROPAGATION, *COMBUSTION STABILITY, ANEMOMETERS, CHEMICAL REACTIONS,

AD-A191 967 CONTINUED

COLD FLOW, DIAGNOSIS(GENERAL), DIFFUSION, EQUATIONS, EXPERIMENTAL DESIGN, FILMS, FLAMES, FLAMMABILITY, FLOORS, FLOW, FLOW FIELDS, HETEROGENEITY, HIGH TEMPERATURE, INJECTION, LASER VELOCIMETERS, LASERS, MASS TRANSFER, MEAN, METHODOLOGY, MODELS, MOLECULES, NUMERICAL METHODS AND PROCEDURES, PITOT TUBES, POROUS MATERIALS, RAYLEIGH SCATTERING, SHEAR STRESSES, STABILIZATION, TURBULENCE, VARIATIONS, WALLS, RAMJET ENGINES, SOLID JET ENGINE FUELS, SIMULATION, TWO DIMENSIONAL FLOW, LASER VELOCIMETERS, SUBSONIC WIND TUNNELS.

IDENTIFIERS: (U) Diffusion flames, PE61102F, WUAFOSR2308A1.

AD-A191 966 12/3 25/3

GEORGIA INST OF TECH ATLANTA SCHOOL OF INDUSTRIAL AND SYSTEMS ENGINEERING

(U) Stochastic Flows in Networks.

DESCRIPTIVE NOTE: Final technical rept. 30 Sep 84-29 Sep 87,

DEC 87 11P

PERSONAL AUTHORS: Serfozo, Richard F.

CONTRACT NO. AFOSR-84-0367

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-88-0187

UNCLASSIFIED REPORT

ABSTRACT: (U) The author studied conditions in which a point process of certain jump times of a Markov process is a Poisson process; a multi-administration telecommunications network; and a system in which customers arrive singly or in batches of a group of service stations. Keywords: Stochastic processes; Optimal control; Queueing theory.

DESCRIPTORS: (U) *MARKOV PROCESSES, *POISSON EQUATION, *QUEUEING THEORY, *COMMUNICATIONS NETWORKS, CONTROL, FLOW, OPTIMIZATION, STOCHASTIC PROCESSES, TIMING DEVICES, TELECOMMUNICATIONS, STOCHASTIC CONTROL.

IDENTIFIERS: (U) Point processes, PE61102F, WUAFOSR2304A5.

AD-A191 949 12/4 13/8

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION AND DECISION SYSTEMS

(U) Time Scale Analysis Techniques for Flexible Manufacturing Systems.

DESCRIPTIVE NOTE: Doctoral thesis,

DEC 87 198P

PERSONAL AUTHORS: Caromicoli, Carl A.

REPORT NO. LIDS-TH-1725

CONTRACT NO. DAAL03-86-K-0171, $AFOSR-88-0032

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-88-0239

UNCLASSIFIED REPORT

ABSTRACT: (U) This thesis uses results on the aggregation of singularly perturbed Markov chains to analyze manufacturing systems. The basis for this analysis is the presence in the system of events and processes that occur at markedly different rates - operations on machines, set-ups, failures and repairs, etc. The result of the analysis is a set of models, each far simpler than the full model, describing system behavior over different time horizons. In addition, a new theoretical result is presented on the computation of asymptotic rates of particular events in perturbed Markov processes, where an event may correspond to the occurrence of one of several transitions in the process. This result is used to compute effective production rates at different time scales, taking into account the occurrence of set-ups and failures.

DESCRIPTORS: (U) *MANUFACTURING, *INDUSTRIAL ENGINEERING, MACHINES, MARKOV PROCESSES, MODELS, PERTURBATIONS, PRODUCTION RATE, REPAIR, SCALE, TIME, THESES, ADAPTIVE SYSTEMS.

IDENTIFIERS: (U) Markov chains. PE61192F, WUAFOSR2304A1.

AD-A191 949

AD-A191 927 8/10 20/11

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF CIVIL ENGINEERING

(U) Micromechanical Modeling of Granular Soil at Small Strain by Arrays of Elastic Spheres.

DESCRIPTIVE NOTE: Interim rept. 6 May 86-5 May 87,

SEP 87 300P

PERSONAL AUTHORS: Petrakis, Emmanuel; Dobry, Ricardo

REPORT NO. RPI-CE-87-02

CONTRACT NO. AFOSR-86-0135

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR TR-88-0137

UNCLASSIFIED REPORT

ABSTRACT: (U) The need for a micromechanical approach to modeling the stress-strain response of granular soil is discussed and justified. This work focuses on the small shear strain behavior, and investigates the validity of modeling analytically uniform, rounded-grained quartz and by arrays of identical elastic, rough, quartz spheres. As a first step, the stress-strain properties of six regular arrays of spheres are studied in some detail, with focus on isotropic and biaxial boundary loading. Keywords: Particular mechanics; Regular arrays of spheres; Self consistent method; Stress-strain relationships; Isotropy, Transverse isotropy; Small strains; Threshold strain/P-waves; Shear modulus.

DESCRIPTORS: (U) *SPHERES, *STRESS STRAIN RELATIONS, *SOILS, ARRAYS, BEHAVIOR, BIAXIAL STRESSES, BOUNDARIES, CONSISTENCY, ELASTIC PROPERTIES, MODELS, QUARTZ, RESPONSE, SHEAR STRENGTH, STRAIN(MECHANICS), VALIDATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302C1.

AD-A191 927

AD-A191 926 20/12

ARMY LAB COMMAND WATERTOWN MA MATERIAL TECHNOLOGY LAB

(U) Nonlinear Optical Properties and Subpicosecond Dynamics of Excitons and Electron-Hole Plasmas in Multiple Quantum Well Structures.

DESCRIPTIVE NOTE: Final rept. Jul 84-Oct 87,

DEC 87 209P

PERSONAL AUTHORS: Boggess, T. F.; Smirl, A. L.; MacFarlene, R. A.; Lam, J. F.

REPORT NO. HAC-REF-F4787

CONTRACT NO. F49620-84-C-0083

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR TR-88-0012

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes progress in measuring and modeling the nonlinear optical properties of and picosecond carrier dynamics in bulk ternary alloys and multiple quantum wells (MQWs). Studies of the bulk alloy Al(x)Ga(1-x)As have been produced the first experimental isolation of the electron exchange energy in a dense electron-hole plasma, and the observation of enhanced band-gap renormalization as a consequence of alloy disorder, stimulated emission from the indirect gap for x-values as large as 0.52, and large optical nonlinearities from band filling, band-gap renormalization, and screening of the excitonic continuum states. The latter appear promising for room temperature absorptive and dispersive optical bistability. An exact theory of the influence of an intense radiation field on the excitonic energy levels of a MQW has been developed and has led to the prediction of two-wave mixing gain. Keywords: Nonlinear optics; Ultrafast phenomena; Multiple quantum wells; Band gap renormalization; Alloy disorder; Optical bistability.

DESCRIPTORS: (U) *OPTICAL PROPERTIES, *QUANTUM ELECTRONICS, *ALUMINUM GALLIUM ARSENIDE, *ELECTRON MOBILITY, DENSE GASES, DYNAMICS, ELECTRON ENERGY, ELECTRONS, EMISSION, ENERGY LEVELS, EXCHANGE, EXCITONS, GAIN, HIGH RATE, HOLES(ELECTRON DEFICIENCIES), INTENSITY, ISOLATION, MEASUREMENT, MIXING, MODELS, NONLINEAR SYSTEMS, OPTICS, ORDER DISORDER TRANSFORMATIONS, PLASMAS(PHYSICS), RADIATION, STIMULATION(GENERAL), TERNARY COMPOUNDS, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B4.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 924 8/10

WISCONSIN UNIV-MADISON

(U) Undrained Stress-Strain Behavior of Unsaturated Sands. Volume 1.

DESCRIPTIVE NOTE: Final rept.,

JAN 88 102P

PERSONAL AUTHORS: Boehm, Rolland G.; Jeyapalan, Jey K.

CONTRACT NO. AFOSR-84-0090

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR TR-88-0155

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report provides the details of an investigation on the undrained stress strain behavior of partly saturated sands under controlled laboratory conditions. A new triaxial test setup was developed during the previous years of this research study. Thus, the two purposes of the investigation reported in this report were a) to evaluate the usefulness of the new soil test procedure, and b) to determine the behavior of the unsaturated sand samples. An axis translation technique was used to monitor pore water pressure changes during the tests and this appeared to work well. A special ceramic porous stone was used to be able to measure pore water and air pressures separately. The conclusions drawn from this research are that the stress-strain behavior changes little with respect to saturation level until the level approaches about 95%. The initial tangent modulus decreased with an increase in saturation. For lower saturated samples, there seems to be no difference between an undrained and a drained test. The dilation potential of the sand increased with strain rate. The strain rate had some effect on the initial modulus of only the dense samples of sand.

DESCRIPTORS: (U) *SAND, *STRESS STRAIN RELATIONS, AIR, DENSITY, DRAINAGE, PRESSURE, SAMPLING, SATURATION, SOIL TESTS, STRAIN RATE, TEST METHODS, SOIL TESTS.

AD-A191 924

AD-A191 924 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2302C1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A191 886 21/2

CALIFORNIA UNIV IRVINE DEPT OF MECHANICAL ENGINEERING

(U) Unsteady Flame Propagation in a Two-Dimensional Spray with Transient Droplet Vaporization,

JAN 88 10P

PERSONAL AUTHORS: Rangel, R. H.; Sirignano, W. A.

CONTRACT NO. AFOSR-86-0016

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-88-0217

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in AIAA Aerospace Sciences Meeting (26th), p1-8, 11-14 Jan 88.

ABSTRACT: (U) A finite-difference solution of the problem of unsteady droplet vaporization and spray combustion in an idealized configuration consisting of parallel droplet streams is presented. A simplified flow field of uniform velocity is assumed in order to place particular attention on the mass and energy interactions between the fuel droplets and the gas flow. One-step finite-rate kinetics are employed so that an adequate description of the reaction zones and the mechanism of flame propagation can be obtained. Transient heating and drag acceleration of the droplets are taken into account. The transition from the initial conditions to the formation of the reaction zones is investigated as well as the effect of the intermittency effect caused by the discrete injection frequency of the droplets. Individual envelope flames or group combustion can be observed depending on the flow parameters, mainly the separation between droplets. In general, a premixed reaction zone is formed which then acts as the ignition source for the droplets.Keywords: Spray combustion; Ignition; Sprays; Flame propagation.

DESCRIPTORS: (U) *FLAME PROPAGATION, *SPRAYS, *COMBUSTION STABILITY, ACCELERATION, COMBUSTION, DRAG, DROPS, ENERGY, ENVELOPE(SPACE), FINITE DIFFERENCE THEORY,

AD-A191 886

AD-A191 886 CONTINUED

FLAMES, FLOW FIELDS, FREQUENCY, FUELS, GAS FLOW, HEATING, IGNITION, INJECTION, INTERACTIONS, MASS, MIXING, PARALLEL ORIENTATION, PARAMETERS, RESPONSE, SIMPLIFICATION, SOLUTIONS(GENERAL), SOURCES, STREAMS, TRANSIENTS, TWO DIMENSIONAL, VAPORIZATION, VELOCITY, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 879 11/4

CINCINNATI UNIV OH DEPT OF AEROSPACE ENGINEERING AND ENGINEERING MECHANICS

(U) Interaction of Ultrasonic Waves with Composite Plates.

DESCRIPTIVE NOTE: Annual technical rept. 15 Dec 86-15 Dec 87,

DEC 87 41P

PERSONAL AUTHORS: Nayfeh, Adnan H.

CONTRACT NO. AFOSR-86-0052

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR TR-88-0259

UNCLASSIFIED REPORT

ABSTRACT: (U) During the second year of our reporting period we continued our close cooperation with the NDE Branch on the Material's Lab at Wright-Patterson Air Force Base. For our part, we continued developing analytical and computational methods on the modeling of the mechanical behavior of fibrous composites for applications in the NDE field. Specifically, we extended our theoretical models which were developed to describe the behavior of single unidirectional fiber-reinforced plates, to more general plates. These included single and multilayered plates. For the single laminated plate the solutions are extended for arbitrary azimuthal angles and hence resulted in three dimensional analysis.

DESCRIPTORS: (U) *COMPOSITE STRUCTURES, *PLATES, *ULTRASONICS, *FIBER REINFORCED COMPOSITES, COMPOSITE MATERIALS, FIBER REINFORCEMENT, LAMINATES, MECHANICAL PROPERTIES, NUMERICAL METHODS AND PROCEDURES, THREE DIMENSIONAL, UNIDIRECTIONAL, MATHEMATICAL MODELS, ISOTROPISM, ULTRASONIC TESTS.

IDENTIFIERS: (U) Laminated plates, *Composite plates, PE61102F.

AD-A191 879

AD-A191 878 12/3

ILLINOIS UNIV AT URBANA

(U) Effects of Statistical Dependence in Reliability and Maintainability of Degradable Systems.

DESCRIPTIVE NOTE: Final technical rept. 1 Jul 84-30 Sep 87,

SEP 87 4P

PERSONAL AUTHORS: Joag-dev, Kumar

CONTRACT NO. AFOSR-84-0208

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-88-0035

UNCLASSIFIED REPORT

ABSTRACT: (U) A monograph entitled, Unimodality, Convexity and Applications was written. It provides a systematics approach to important tools in reliability. Other results include a sharpening of Ichebyshev inequality and development of dependence concepts for reliability.

DESCRIPTORS: (U) *RELIABILITY, *INEQUALITIES, *ORDER STATISTICS, DEGRADATION, MAINTAINABILITY, STATISTICS.

IDENTIFIERS: (U) Chebyshev functions, Gauss Chebyshev inequalities, Ising models. WUAFOSR2304A5, PE61102F.

AD-A191 878

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 859 7/6

DAYTON UNIV OH DEPT OF CHEMISTRY

(U) Structure and Refinement of Ordered Aromatic Heterocyclic Polymers by Diffraction Methods: Application of Results to Electro-Optic Phenomena.

DESCRIPTIVE NOTE: Final rept. 30 Sep 84-31 Oct 87,

FEB 88 62P

PERSONAL AUTHORS: Fratini, Albert V.

CONTRACT NO. AFOSR-84-0364

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-88-0049

UNCLASSIFIED REPORT

ABSTRACT: (U) The polymer structure determination and refinement of flexible coil poly-2,5-benzoxazole (ABPBO) and poly-2,6-benzothiazole (ABPBT) were performed. Refinement of the unit cell structure of poly(p-phenylene benzobisthiazole) (PBO) and poly(p-phenylene benzobisthiazole) (PBT) in a nonprimitive monoclinic unit cell was carried out in a similar fashion. Initial structural models were derived from x-ray studies of model compounds. Experimental structure factors were incorporated into the Linked-Atom Least-Squares (LALS) refinement method. The structure of the benzimidazo-isoquinoline ladder polymer (BBL) was also investigated. BBL shows potential as an organic conducting polymer. The feasibility of BBL and similar systems to act as conducting polymers requires accurate molecular structure and crystallographic data for an understanding of the mechanical, optical and electro-optic properties. Keywords: Order polymers, Rigid rod polymers, Ladder polymer, Fiber structure, Polybenzothiazoles, Polybenzoxazoles.

DESCRIPTORS: (U) *AROMATIC COMPOUNDS, *ELECTROOPTICS, *HETEROCYCLIC COMPOUNDS, *ORDER DISORDER TRANSFORMATIONS, *POLYMERS, CELL STRUCTURE, CELLS, CRYSTALS, DETERMINATION, DIFFRACTION, FIBERS, MODELS, MOLECULAR STRUCTURE,

AD-A191 859 CONTINUED

REFINING, RIGIDITY, RODS, STRUCTURAL PROPERTIES, X RAYS.

IDENTIFIERS: (U) WUAFOSR2303A3, PE61102F.

AD-A191 858 12/1

SCIENTIFIC SYSTEMS INC CAMBRIDGE MA

(U) Adaptive Time Series Analysis Using Predictive Inference and Entropy.

DESCRIPTIVE NOTE: Annual rept. Dec 86-Dec 87,

DEC 87 85P

PERSONAL AUTHORS: Dustafson, Donald E.

CONTRACT NO. F49620-87-C-0026

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR
TR-88-0032

UNCLASSIFIED REPORT

ABSTRACT: (U) Research is being conducted on adaptive time series methods for detecting and tracking both abrupt and slow changes in both structure and parameters. The methods are based on a unified statistical frame work which is motivated by statistical inference and entropy arguments. The method yields estimates of input/output dynamics and noise statistics. An integrated approach which combines canonical variates analysis and maximum likelihood estimation has been developed and tested. Specific attention is given to the problem of parameter truncation in both a linear predictor and Kalman filter framework.

DESCRIPTORS: (U) *ADAPTIVE SYSTEMS, *MAXIMUM LIKELIHOOD ESTIMATION, *STATISTICS, *TIME SERIES ANALYSIS, ADAPTATION, DYNAMICS, ENTROPY, FRAMES, INPUT OUTPUT PROCESSING, KALMAN FILTERING, LINEAR SYSTEMS, MATHEMATICAL PREDICTION, NOISE, PARAMETERS, TRACKING, TRUNCATION.

IDENTIFIERS: (U) WUAFOSR3005A1, PE61102F.

AD-A191 858

AD-A191 857 20/5 4/1

SMITHSONIAN ASTROPHYSICAL OBSERVATORY CAMBRIDGE MA

(U) Molecular Sources of Ionospheric Holes.

DESCRIPTIVE NOTE: Final rept. 1 Apr 84-30 Sep 87,

NOV 87 50P

PERSONAL AUTHORS: Guberman, Steven L.

CONTRACT NO. AFOSR-84-0109

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-88-0064

UNCLASSIFIED REPORT

ABSTRACT: (U) The dissociative recombination of molecular ions with electrons determines many of the properties of the Earth's ionosphere under both quiescent and disturbed conditions. However, in spite of its importance, there has never been an experimental measurement of dissociative recombination rates from individual excited ion vibrational levels. Completed are large scale ab initio calculations of cross sections and rates for the dissociative recombination of the molecular oxygen ion leading to excited oxygen atoms in the 1S and 1D states, the upper states of the well known green and red lines, respectively. A new method for calculating electronic autoionization widths using high Rydberg state wave functions to represent the inner part of the free electron wave function has been used and tested on the NO molecule where the widths can be calculated to an expected accuracy of about 15%. THe widths have been used to determine dissociative recombination cross sections as a function of electron energy. Large windows have been discovered in the cross sections from excited vibrational levels. The windows, at which the cross sections drop precipitously, are due to the overlap of the peak in the continuum vibrational wave functions.

DESCRIPTORS: (U) *IONOSPHERE, *MOLECULAR IONS, *RECOMBINATION REACTIONS, *EMISSION SPECTRA, *MOLECULAR VIBRATION, ACCURACY, ATOMS, CROSS SECTIONS, DISSOCIATION,

AD-A191 857

AD-A191 857 CONTINUED

EARTH(PLANET), ELECTRON ENERGY, ELECTRONICS, ELECTRONS, FREE ELECTRONS, HOLES(OPENINGS), IONIZATION, IONS, MEASUREMENT, MOLECULAR PROPERTIES, MOLECULES, OVERLAP, OXYGEN, PEAK VALUES, RATES, SOURCES, WAVE FUNCTIONS, WIDTH.

IDENTIFIERS: (U) AB initio calculations, WUAFOSR2303B1, PE61102F.

AD-A191 821 6/4 6/1

AT AND T BELL LABS MURRAY HILL NJ

(U) Expression of Membrane Currents in Rat Diencephalic Neurons in Serum-Free Culture,

86 12P

PERSONAL AUTHORS: Ahmed, Z.; Connor, J. A.; Tank, D. W.; Fellows, R. E.

CONTRACT NO. F49620-85-C-0009

PROJECT NO. 2312

TASK NO. K2

MONITOR: AFOSR TR-88-0281

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Developmental Brain Research, v28 p221-231 1986.

ABSTRACT: (U) The whole-cell gigaseal voltage clamp technique has been used to investigate the timing of expression and type of voltage-dependent ionic currents in dissociated primary cultures of fetal rat (E17) diencephalic neurons grown in a serum-free defined medium. The expression of membrane currents varied among cells at any particular time in culture. Despite this variability, certain characteristics of the appearance of ionic currents emerge from this study. These are: (i) The earliest appearing membrane current is a voltage-dependent outward current carried by potassium K+. In some cells, it is the classical delayed rectifier current, whereas in others it is the transient outward current (IA). (ii) The earliest appearing inward current is carried by Sodium Na+. In some cells the channels are first expressed in the neutrites and then in or near the cell body. The early neuritic Na+ channels are blocked by cobalt or cadmium as well as by tetrodotoxin (TTX). In others, the early Na+ channels appear in or near the cell body and are only blocked by TTX. (iii) With additional time in culture, a majority of cells exhibit a Ca2+ current at the time of Na+ channel appearance in or near the cell body as well as a transient calcium Ca2+-dependent outward current. The Ca2+ current is only a

AD-A191 821 CONTINUED

small fraction of the total inward current. These inward currents show the classical pharmacologic profile. The complex pattern of expression of ionic current may reflect multiple populations of neurons with different developmental sequences resulting from differences in cell age and lineage. Reprints.

DESCRIPTORS: (U) *NERVE CELLS, *MEMBRANES(BIOLOGY), *BIOELECTRICITY, AGING(PHYSIOLOGY), CELLS(BIOLOGY), CURRENTS, FETUS, IONIC CURRENT, PATTERNS, POPULATION, RATS, REPRINTS, SODIUM, TIME, TOXINS AND ANTITOXINS, VOLTAGE.

IDENTIFIERS: (U) Ion channels, Sodium channels, Calcium channels, Potassium channels, Voltage clamp technique, PE61102F, WUAFOSR231K2.

AD-A191 820 20/5

FLORIDA STATE UNIV TALLAHASSEE DEPT OF PHYSICS

(U) An Analytic Method for Three-Center Nuclear Attraction Integrals: A Generalization of the Gegenbauer Addition Theorem,

88 8P

PERSONAL AUTHORS: Weatherford, Charles A.

CONTRACT NO. AFOSR-86-0149

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-88-0107

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in International Jnl. of Quantum Chemistry, v33 p19-26 1988.

ABSTRACT: (U) A completely analytic method for evaluating three-center nuclear attraction integrals for STOS is presented. The method exploits a separation of the STO into an evenly loaded solid harmonic and a OS STO. The harmonics are translated to the molecular center of mass in closed finite terms. The OS STO is translated using the Gegenbauer addition theorem; Is STOS are translated using a single parametric differentiation of the OS formula. Explicit formulas for the integrals are presented for arbitrarily located atoms. A numerical example is given to illustrate the method. Keywords: Slater, Type orbitals, Reprints.

DESCRIPTORS: (U) *MOLECULAR ORBITALS, ADDITION, HARMONICS, INTEGRALS, MASS, MATHEMATICAL ANALYSIS, MOLECULAR PROPERTIES, REPRINTS, THEOREMS.

IDENTIFIERS: (U) Gegenbauer addition theorem, *Slater type orbitals, Zeta functions, Clebsch Gordon coefficients, PE61102F, WUAFOSR2303B3.

AD-A191 816 7/4

FLORIDA STATE UNIV TALLAHASSEE DEPT OF PHYSICS

(U) An 'E Matrix' for the Loewdin Alpha Function, Expanded in a Taylor Series: An Analytic Treatment of Molecular Charge Density Near the Origin.

87 8P

PERSONAL AUTHORS: Jones, H. W.; Bussery, B.; Weatherford, C. A.

CONTRACT NO. AFOSR-86-0149

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-88-0116

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in International Jnl. of Quantum Chemistry: Quantum Symposium 21, p693-698 1987.

ABSTRACT: (U) A displaced STO can be expanded in spherical harmonics with the coefficient function or Loewdin or functions characterized by a C matrix. These or functions themselves may be expanded in a Taylor series that is characterized by its own E Matrix. This expansion is necessary for the representation of the or function by a power series and for its evaluation about the origin. As an application, we find the power series for the molecular charge density in the vicinity of the center of a model diatomic molecule. Our analytic approach is general and yields excellent results.

DESCRIPTORS: (U) *CHARGE DENSITY, *MOLECULES, *TAYLORS SERIES, COEFFICIENTS, DIATOMIC MOLECULES, FUNCTIONS, MODELS, POWER SERIES, YIELD.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

AD-A191 816

AD-A191 815 9/1 20/12

MINNESOTA UNIV MINNEAPOLIS

(U) Epitaxial Iron Films.

DESCRIPTIVE NOTE: Annual rept. 15 Jun 86-14 Dec 87,

JAN 88 13P

PERSONAL AUTHORS: Dahlberg, E. D.; Cohen, P. I.

CONTRACT NO. AFOSR-86-0201

PROJECT NO. 2306

TASK NO. C1

MONITOR: AFOSR
TR-88-0043

UNCLASSIFIED REPORT

ABSTRACT: (U) The growth properties and magnetic properties of iron films grown by molecular beam epitaxy were studied. The iron film growth was first studied by growing iron on iron whiskers. This work and previous work determined the growth parameters for nearly dislocation free growth. This information was then used to grow iron films on Gallium Arsenide/Indium Arsenide alloy substrates. As determined by electron diffraction, layer by layer growth was observed when the iron films were grown. The magnetic properties of the iron films were found to be dependent up on the substrate surface morphology and lattice constant. In particular the coercivity of epitaxed iron film was found to vary by roughly a factor of four when grown on different surface morphologies and substrate lattice spacings. Other research focused on the magnetotransport and magnetooptic properties of the iron film and the effects of the substrate lattice properties on them.

DESCRIPTORS: (U) *EPITAXIAL GROWTH, *SEMICONDUCTING FILMS, *SEMICONDUCTOR DEVICES, *GALLIUM ALLOYS, COERCIVE FORCE, CRYSTAL LATTICES, ELECTRON DIFFRACTION, FILMS, IRON, MAGNETIC PROPERTIES, MOLECULAR BEAMS, SUBSTRATES, SURFACE PROPERTIES, GALLIUM ARSENIDES, INDIUM COMPOUNDS.

IDENTIFIERS: (U) *Epitaxial iron films, Semiconductor alloys, PE61102F, WUAFOSR2306C1.

AD-A191 815

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 814 12/6

MINNESOTA UNIV MINNEAPOLIS DEPT OF COMPUTER SCIENCE

(U) Instrumentation Request for Research in Fault-Tolerant Distributed Operating Systems and Distributed Programming Environments.

DESCRIPTIVE NOTE: Final status rept.,

87 43P

PERSONAL AUTHORS: Tripathi, Anand

CONTRACT NO. AFOSR-87-0035

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-0150

UNCLASSIFIED REPORT

ABSTRACT: (U) This is the final status report on the DoD-URIP grant for instrumentation to support research in distributed operating systems, fault-tolerant distributed computing, object-oriented computing and other related facets of distributed computing. The Distributed Systems Laboratory was established in the Computer Science Department of the University of Minnesota for this purpose. Currently this laboratory is supporting experimental research in the area fault-tolerant distributed operating systems, specifically to support development of the NEXUS distributed operating system. Currently this laboratory has a total of 12 workstations and 2 file servers with total storage capacity of 2 gigabytes. All these workstations are connected by an ethernet local area network that supports the Computer Science Department.

DESCRIPTORS: (U) *COMPUTERS, *FAULT TOLERANT COMPUTING, COMPUTER PROGRAMMING, DISTRIBUTION, ENVIRONMENTS, INSTRUMENTATION, LABORATORIES, MINNESOTA, DISTRIBUTED DATA PROCESSING, NETWORKS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A191 814

AD-A191 813 7/3 7/4

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Photoelectron Spectra and Electronic Structures of Substituted Pentacyclo(5.4.0.0(2,8).0(3,10).0(5.9)) undecanes,

87 8P

PERSONAL AUTHORS: Marchand, Alan P.; Huang, Chunmin; Kaya, Riza; Baker, A. D.; Jemmis, Eluvathingal D.

CONTRACT NO. AFOSR-84-0085

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0082

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Americal Chemical Society, v109 n23 p7095-7099 1987.

ABSTRACT: (U) Syntheses of several new substituted pentacyclo undecanes are described. Photoelectron (PE) spectra have been obtained for compounds 1-10. Molecular orbital calculations on systems 1-3 were performed by using a minimum STO-3G basis set. Infrared vibrational frequencies and absorption intensities were calculated for 1-3. Extended Huckel theory (EHT) calculations were performed on a model geometry derived from that of 1-methylpentacyclo undecane-8,11-dione. The PE spectroscopic results, together with the results of ab initio and EHT calculations, support the following conclusions: (i) oxygen lone pair interactions in 1 are mainly through-bond, where pi and pi* C=O bond interactions in 1 occur via a mixture of through-space and through-bond mechanisms; (ii) mixing with the sigma-framework orbitals plays an important role in delocalizing the oxygen lone pair in 2; (iii) lone pair delocalization in 1 and 2 occurs primarily via 1,3- rather than 1.2-interactions, and (iv) both through-bond and through-space mechanisms play a role in 3. Keywords: Electronic structures.

DESCRIPTORS: (U) *PHOTOELECTRON SPECTRA, *DECANES,

AD-A191 813

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 813 CONTINUED

*PENTANES, *CYCLIC COMPOUNDS, ABSORPTION, COMPUTATIONS, ELECTRONIC EQUIPMENT, FREQUENCY, GEOMETRY, INFRARED RADIATION, INTENSITY, INTERACTIONS, MODELS, MOLECULAR ORBITALS, OXYGEN, PHOTOELECTRONS, REPRINTS, SPECTROSCOPY, STRUCTURAL PROPERTIES, VIBRATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A191 812 7/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) 1,6-Dimethyl-1(alpha),4a(alpha),5(alpha),8(beta), 8a(alpha)-hexahydro-1,4-methanonaphthalene-5,8-diol,

87 4P

PERSONAL AUTHORS: Flippen-Anderson, Judith L.; Gilardi, Richard; George, Clifford; Marchand, Alan P.; Jin, Pei-wen

CONTRACT NO. AFOSR-84-0085

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-88-0083

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Acta Crystallographica, Section C, v43 p2151-2153 1987.

ABSTRACT: (U) The structure of the 1,6-Dimethyl-1 alpha, 4 alpha-4a alpha, 5 alpha, 8 beta, 8a alpha-hexahydro-1,4-methano-naphthalene-5,8-diol has been determined via single crystal X-ray crystallography. The X-ray study showed that the hydroxyl groups are on the same side of the six-membered ring and also showed the relative positions of the two methyl groups. There is a cis junction between the two six-membered rings, both of which are in a boat conformation. There is one intramolecular OH...O hydrogen bond (O...O= 2.82 A) and one intermolecular OH...O hydrogen bond (O...O = 2.80 A). Keywords: Naphthalenes, Diels Alder reaction.

DESCRIPTORS: (U) *HYDROXYL RADICALS, *NAPHTHALENES, BOATS, CONFORMITY, CRYSTALLOGRAPHY, METHYL RADICALS, REPRINTS, SINGLE CRYSTALS, X RAYS.

IDENTIFIERS: (U) *A Alpha-Lexahydro-1,4-Methano-Naphthalene, PE61102F, WUAFOSR2303A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 811 7/3

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Phonon Spectroscopy of Organic Solid State Reactions.

87 38P

PERSONAL AUTHORS: Prasad, P. N.

REPORT NO. SUNY/AB/TR-14

CONTRACT NO. F49620-85-C-0052

TASK NO. A3

MONITOR: AFOSR
TR-88-0073

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Organic Solid State Chemistry, p117-151 1987.

ABSTRACT: (U) Technological applications of solid state reactions are more recognized now than ever before. A recent symposium on the solid state polymerization was a witness of the growing importance of reactions in condensed phase whereby novel products of potential application could be synthesized. One example is a group of polymers called polydiacetylenes which can only be synthesized by reactions in the solid state. Proposed applications of this group of polymers range from temperature indicators and lithography to nonlinear optical devices. The term crystal engineering has been introduced to emphasize the importance of the highly selective reaction pathway which solid state chemistry offers. An exciting prospect has been the introduction of chirality by using solid state chemistry. Solid state reactions are also significant to pharmaceutical industries. Since most drugs are marketed in the solid dosage form, environmental effect on the chemical stability of solid materials are of significant consequence.

DESCRIPTORS: (U) *PHONONS, *POLYMERS, *REACTION KINETICS, *SOLID STATE PHYSICS, *SPECTROSCOPY, CHEMICALS, CRYSTALS, DOSAGE, DRUGS, ENGINEERING, ENVIRONMENTS, INDICATORS, INDUSTRIES, LITHOGRAPHY, NONLINEAR SYSTEMS, OPTICAL EQUIPMENT, POLYMERIZATION, REPRINTS, SOLID STATE

AD-A191 811

AD-A191 811 CONTINUED

CHEMISTRY, SOLIDS, STABILITY, SYMPOSIA, SYNTHESIS, TEMPERATURE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A191 811

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 810 7/6

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Organic Polymers as Nonlinear Optical Materials.

DEC 87 3P

PERSONAL AUTHORS: Prasad, Paras N.

REPORT NO. SUNY/AB/TR-12

CONTRACT NO. F49620-87-C-0042

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-88-0071

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Optics News, p34-35 Dec 87.

ABSTRACT: (U) Defying the traditional perception of plastics as structural materials, organic polymeric systems containing conjugated structures have emerged as exciting nonlinear optical materials. The reason lies in their highly polarizable pi-electron clouds, which yield the largest observed nonresonant third-order optical susceptibility and the fastest (femtoseconds) response times. High non-resonant optical nonlinearity is desirable for wave building in integrated optics applications. Polymeric systems also offer the flexibility of tailoring the structure by molecular engineering whereby a rich variety of nonlinear polymeric systems can be synthesized and fabricated in various shapes such as films, fibers, slabs, etc. In addition, polymer films with monolayer thickness (approximately 12 angstroms) can be prepared and transferred by the Langmuir-Blodgett technique. *Keywords: Polydiacetylene* polymer, Reprints.

DESCRIPTORS: (U) *NONLINEAR SYSTEMS, *OPTICAL MATERIALS, *OPTICAL PROPERTIES, *POLYMERS, *RESONANCE, CONSTRUCTION MATERIALS, ENGINEERING, INTEGRATED SYSTEMS, LAYERS, MOLECULES, OPTICS, ORGANIC COMPOUNDS, ORGANIC MATERIALS, PERCEPTION, PLASTICS, POLYMERIC FILMS, REPRINTS, RESPONSE, STRUCTURES, THICKNESS.

AD-A191 810 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 788 9/3 20/5

OKLAHOMA STATE UNIV STILLWATER COLL OF ARTS AND SCIENCES

(U) Optical Science and Engineering Series 8. Advanced in Laser Science-II: Proceedings of the International Laser Science Conference (2nd) Held in Seattle, Washington on 20-24 October 1986.

DESCRIPTIVE NOTE: Final rept.1 Oct 86-31 May 87,

MAY 87 755P

PERSONAL AUTHORS: Lapp, Marshall; Stwalley, William C.; Kennedy-Wallace, Geraldine A.

CONTRACT NO. AFOSR-87-0024

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR TR-88-0004

UNCLASSIFIED REPORT

Availability: American Inst. of Physics, 500 Sunnyside Blvd., Woodbury, NY 11797, HC $73.00. (No copies furnished by DTIC/NTIS).

ABSTRACT: (U) Contents: Limits to Laser Advancements; Advanced Lasers and Coherent Sources; Nonlinear Optical Phenomena and Applications; Atomic, Molecular, and Ionic Spectroscopy; Condensed Matter, Surface, and Particle Spectroscopy; Laser Photochemistry and Photophysics; Diagnostic and Analytical Applications of Lasers; Laser Research and Techniques in Medicine and Biology.

DESCRIPTORS: (U) *LASER APPLICATIONS, *ATOMIC SPECTROSCOPY, *MOLECULAR SPECTROSCOPY, BIOLOGY, COHERENCE, DIAGNOSIS(GENERAL), LASERS, NONLINEAR SYSTEMS, OPTICAL PHENOMENA, OPTICS, PARTICLES, PHOTOCHEMICAL REACTIONS, SOURCES, SPECTROSCOPY, SYMPOSIA, PULSED LASERS, LIGHT PULSES, MEDICAL RESEARCH, LASER MEDICAL DIAGNOSIS, EXCIMERS, CHEMICAL LASERS, CARBON DIOXIDE LASERS, FREE ELECTRON LASERS, RAMAN SPECTRA, SOLID STATE LASERS, LITHIUM NIOBATES.

AD-A191 788 CONTINUED

IDENTIFIERS: (U) Picosecond time, Femtosecond time, Nonlinear optics, Gamma ray lasers, Four wave mixing, PE61102F, WUAFOSR2301A1.

AD-A191 788

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 738 7/6

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Non-Linear Optical Effects in Thin Organic Polymeric Films,

87 21P

PERSONAL AUTHORS: Prasad, Paras N.

CONTRACT NO. F49620-85-C-0052

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-88-0078

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Thin Solid Films, v152 p275-294 1987. Presented at the Workshop on the Molecular Engineering of Ultrathin Polymeric Films, Davis, CA, 18-20 Feb 87.

ABSTRACT: (U) In this paper a comprehensive account is presented of research work carried out in the author's laboratory in the areas of design of polymeric thin films, investigation of their ultrastructure and studies of non-linear optical effects. Thin film design and fabrication involve two approaches: electrochemical polymerization and the Langmuir-Blodgett technique. Application of laser Raman optical wave-guides, inelastic electron tunneling, picosecond transient gratings and surface plasmon coupling techniques for the study of ultrastructure is discussed. Results are presented from picosecond and subpicosecond degenerate four-wave mixing, time-resolved coherent Raman spectroscopy, surface plasmon non-linear optical and bistability behavior at a non-linear interface to ellucidate the nature of third-order non-linear optical effects in thin films of Pi electron conjugated polymeric systems.

DESCRIPTORS: (U) *OPTICAL PROPERTIES, *POLYMERIC FILMS, *THIN FILMS, COHERENCE, COUPLING(INTERACTION), ELECTROCHEMISTRY, ELECTRONS, GRATINGS(SPECTRA), INELASTIC SCATTERING, INTERFACES, LABORATORIES, LASERS, NONLINEAR SYSTEMS, ORGANIC MATERIALS, PLASMONS, POLYMERIZATION,

AD-A191 738

AD-A191 738 CONTINUED

POLYMERS, PYRROLES, RAMAN SPECTRA, RAMAN SPECTROSCOPY, SURFACES, TIME, TRANSIENTS, TUNNELING(ELECTRONICS), WAVEGUIDES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 737 7/3

AD-A191 737 CONTINUED

BRISTOL UNIV (ENGLAND) DEPT OF INORGANIC CHEMISTRY

PE61102F, WUAFOSR2303B2.

(U) Chemistry of Polynuclear Metal Complexes with Bridging Carbene or Carbyne Ligands. Part 66. Carbaboranetungsten-Platinum Complexes. Polyhedral Rear-Rangements of a 12-Vertex Cage System.

87 18P

PERSONAL AUTHORS: Attfield, Michael J.; Howard, Judith A.; Jelfs, Alasdair N.; Nunn, Christine M.; Stone, F. G.

CONTRACT NO. AFOSR-86-0125

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-88-0118

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Chemical Society: Dalton Transactions, p2219-2233 1987.

ABSTRACT: (U) In acetone the salts N(PPh3)2W(Triple bond CC6H4Me-4)(CO)2 etas-C2B9HgMe2) and PtH(Me2CO) (PEt3)2-8F4 yield the novel dimetal compund PtW(CO)2(PEt3)2eta 6-C2B9H8(CH2C6H4Me-4)Me2 , the structure of which has been established by X-ray diffraction. With electron pair donor molecules(PMe3, CO, CNBut) the Pt-W compund forms compound PtW mu-H) (sigma eta 5 - C2 B9 H7(CH2 C6 H4 Me-4) Me2(CO)2(1)(PEt3)2 containing a B-Pt sigma bond. The properties of the compounds are reported. Keywords: Paltinum; Tungsten; Carbaborane; Metal complexes, Carbenes; Carbynes; Ligands; Organometallic compounds; Cyclic compounds; Crystal structure.

DESCRIPTORS: (U) *CARBENES, *LIGANDS, *METAL COMPLEXES, *ORGANOMETALLIC COMPOUNDS, *TUNGSTEN, *PLATINUM, ACETONES, BORANES, CRYSTAL STRUCTURE, CYCLIC COMPOUNDS, REPRINTS, X RAY DIFFRACTION, SYNTHESIS(CHEMISTRY), CHEMICAL SHIFTS, CARBON, METHYL RADICALS, MOLECULAR COMPLEXES.

IDENTIFIERS: (U) Carbyne ligands, *Polynuclear metal complexes, Chemical bridges, *Carbaborane tungsten platinum complexes , Cage structures, Carbaboranes,

AD-A191 737

AD-A191 737

OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A191 738 7/3

BRISTOL UNIV (ENGLAND) DEPT OF INORGANIC CHEMISTRY

(U) Chemistry of Polynuclear Metal Complexes with Bridging Carbene or Carbyne Ligands. Part 62. Synthesis of Penta-, Hexa-, and Hepta-Heteronuclear Metal Cluster Compounds Involving Tungsten or Molybdenum with Platinum or Nickel,

87 12P

PERSONAL AUTHORS: Davies, Simon J.; Elliott, Gregory P.; Howard, Judith A.; Nunn, Christine M.; Stone, F. G.

CONTRACT NO. AFOSR-88-0125

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-88-0117

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Chemical Society: Dalton Transactions, p2177-2187 1987.

ABSTRACT: (U) Addition of Platinum (cod)2 (cod = cyclo-octa-1, 5-diene) to the compound Pt2W3(mu-CMe(2)(mu 3-CMe)-(CO)6(eta-C5Me5)3 affords the hexanuclear metal complex PtW3(mu-CMe)(mu 3-CMe)2(CO)6(cod)-(eta-C5Me5)3. A related compound Pt3Mo2(mu 3-CMe)(mu 3-CC6H4Me-4)2(CO)6(cod)(eta-C5H5)3 can be prepared by displacing a cod ligand from Pt3Mo2(mu 3-CC6H4Me-4)2(CO)4(cod)2(eta-C5H5)2 with W triple bond CMe)(CO)2(eta-C5H5). Several heptanuclear mixed-metal compounds have been prepared. Thus the hexanuclear metal compound Pt3W3(mu-CMe)(mu3-CMe)2(CO)6(cod)(eta-C5Me5)3 reacts with W(triple bond CMe)(CO)2(eta-C5H5) to afford Pt3W4(mu-CMe)2(mu3-CMe)2(CO)8(eta-C5H5)(eta-C5Me5)3. Complexes containing chains of seven metal atoms incorporating nickel in place of platinum, or molybdenum for site which could be occupied by tungsten, have also been prepared. Keywords: Carbenes; Carbynes; Organo-Metallic compounds; Cyclic compounds; Crystal structure.

DESCRIPTORS: (U) *CARBENES, *CYCLIC COMPOUNDS, *LIGANDS, *METAL COMPLEXES, *ORGANOMETALLIC COMPOUNDS, *PLATINUM,

AD-A191 738

AD-A191 738 CONTINUED

ADDITION, ATOMS, BONDING, BRIDGES, CHAINS, CHEMISTRY, CRYSTAL STRUCTURE, FISHES, METALS, MOLYBDENUM, NICKEL, REPRINTS, TUNGSTEN.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A191 736

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 735 7/2 7/3

BRISTOL UNIV (ENGLAND) DEPT OF INORGANIC CHEMISTRY

(U) Chemistry of Polynuclear Metal Complexes with Bridging Carbene or Carbyne Ligands. Part 63. Synthesis of Eight-Membered-Ring Metallacycles: X-Ray Crystal Structures,

87 13P

PERSONAL AUTHORS: Elliott, Gregory P.; Howard, Judith A.; Mise, Takaya; Nunn, Christine M.; Stone, F. G.

CONTRACT NO. AFOSR-88-0125

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-88-0119

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Chemical Society: Dalton Transactions, p2189-2200 1987.

ABSTRACT: (U) In preceding papers we have described methods for synthesizing polynuclear metal complexes containing up to seven metal atoms in a chain. In these compounds platinum-tungsten, Pt-molybdenum, or nickel-W bonds are held together by bridging alkylidyne groups. The syntheses depend on a stepwise combination of the reagents (M(cod)2) (M = Ni or Pt, cod = cyclo-octa-1,5-diene) with molecules containing reactive C=W(Mo) or C triple bond W(Mo) sites. The methodology employed is based on the isolobal model, leading in specific instances to carbon-metal double or triple bonds displaying ligating properties towards metal centres similar to those of alkenes or alkynes. Thus the compounds (W (triple bondCR) (CO)2L) (R = Me, Ph, or C6H4Me-4; L = eta-C5H5 or eta-C5Me5) will displace the cod ligands from (Pt(cod)2) to give trimetal complexes (PtW2(mu-CR)2(CO)4L2). Keywords: Metal complexes, Clustering, Carbenes, Carbynes, Organometallic compounds, Cyclic compounds.

DESCRIPTORS: (U) *ALKENES, *ALKYNES, *CARBENES, *CYCLIC COMPOUNDS, *METAL COMPLEXES, ATOMS, BRIDGES, CHEMICAL

AD-A191 735 CONTINUED

AGENTS, CHEMISTRY, CRYSTAL STRUCTURE, FISHES, LIGANDS, METALS, MOLECULES, ORGANOMETALLIC COMPOUNDS, REPRINTS, X RAYS.

IDENTIFIERS: (U) PE61102F, WUAFOSR230382.

AD-A191 735

DTIC REPORT BIBLIOGRAPHY

AD-A191 734 7/2 7/3

BRISTOL UNIV (ENGLAND) DEPT OF INORGANIC CHEMISTRY

(U) Chemistry of Polynuclear Metal Complexes with Bridging Carbene or Carbyne Ligands. Part 68. Reactions between Nonacarbonyldi-Iron and the Salts.

87 10P

PERSONAL AUTHORS: Baumann, Franz-Erich; Howard, Judith A.; Johnson, Owen; Nunn, Christine M.; Stone, F. G.

CONTRACT NO. AFOSR-86-0125

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-88-0077

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Chemical Society: Dalton Transactions, p2917-2925 1987.

ABSTRACT: (U) The salts (X)(W(triple bond CR)(CO)2(eta5-C2B9H9Me2) (1, R = Me, Ph, or C6H4Me-4; X = NEt4, N(PPh3)2, P(CH2Ph)Ph3, or PPh4) are becoming useful reagents for preparing dimetal compounds with bridging alkylidyne groups. Treatment of the compound (NEt4) (W triple bond CME) (CO)2 (eta5 - C2B9H9Me2) with (Fe2(Monocarbonyldi-iron)9) in tetrahydrofuran at room temperature affords the trimethal compound (NEt4) (Fe2W (mu3 - CMe) (mu sigma: sigma, eta5 - C2B9H7Me2) (CO)8). Similar reactions between (Fe2 (CO)9) and the salts (NEt4) (W (triple bond CR) (CO)2(eta5 - C2B9H9Me2)) (R = Ph or C6H4Me-4) afford mixtures of the di- and tri-metal compounds (NEt4) (FeW(mu-CH(R)) (mu-sigma.eta5-C2B9H8Me2) (mu-CO) (CO)5) and (Net4) (Fe2W-(mu3-CR) (mu-sigma:sigma', eta5-C2B9H7Me2) (CO)8). Keywords: Tungsten compounds, Metal complexes, Carbenes, Carbynes, Ligands.

DESCRIPTORS: (U) *CARBENES, *LIGANDS, *METAL COMPLEXES, *TUNGSTEN COMPOUNDS, BONDING, BRIDGES, CHEMISTRY, FURANS, HYDROXYL RADICALS, METAL DETECTORS, REPRINTS, ROOM TEMPERATURE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A191 734

SEARCH CONTROL NO. EVI12B

AD-A191 732 7/2

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Production of Si(1D2) from Electronically Excited SiH2.

88 5P

PERSONAL AUTHORS: Van Zoeren, C. M.; Thoman, J. W., Jr.; Steinfeld, J. I.

CONTRACT NO. F49620-86-C-0139

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-88-0180

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v92 n1 p9-11 1988.

ABSTRACT: (U) Silicon (1D2) has been detected by atomic laser-induced fluorescence following photoexcitation of cyclosilane into high bending vibrational levels of the A1B1 state. The Si(1D2) into high bending vibrational levels of the A1B1 state. The Si(1D2) + diatomic hydrogen channel appears to open between v2' = 6 and 7, establishing heat of formation (SiH2) = 65.4 + or - 1.6 kcal/mol. SiH2 appears to dissociate preferentially from high rotational levels of the A, v2' > 6 states. Keywords: Photodissociation.

DESCRIPTORS: (U) *PHOTODISSOCIATION, *SILICON, BENDING, HEAT OF FORMATION, REPRINTS, ROTATION, VIBRATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

AD-A191 732

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 730 11/2.1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Effect of Uniaxial Stress on the Raman Spectra of Graphite Fibers.

DESCRIPTIVE NOTE: Rept. for 1 Sep 86-31 Aug 87,

OCT 87 16P

PERSONAL AUTHORS: Sakata, H.; Dresselhaus, G.; Dresselhaus, M. S.; Endo, M.

CONTRACT NO. F49629-85-C-0147

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-88-0226

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Shinshu Univ., Nagano-shi (Japan).

ABSTRACT: (U) Measurements of the effect of uniaxial stress on the frequency of the zone center optical phonons in heat-treated benzene-derived graphite fibers have been performed using first-order Raman scattering. Application of uniaxial stress along the fiber axis was found to cause polarization-dependent splittings and shifts of the Raman peaks of the zone center doubly degenerate optical phonons. From these observed splittings and shifts, experimental values for the phenomenological coefficients which describe the changes in the elastic constant of these phonons with strain were determined. It is concluded that Raman spectroscopy can be used to characterize the local stress or strain conditions of graphite fibers nondestructively. Keywords: Effect of uniaxial stress, Raman spectra of carbon fibers, Raman microprobe spectroscopy, Single carbon fibers.

DESCRIPTORS: (U) *CARBON FIBERS, *PHONONS, *RAMAN SPECTRA, *STRESS ANALYSIS, ELASTIC PROPERTIES, FIBERS, GRAPHITE, LIGHT SCATTERING, OPTICS, POLARIZATION, RAMAN SPECTROSCOPY, STRESSES, NONDESTRUCTIVE TESTING, JAPAN.

AD-A191 730

AD-A191 730 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A191 730

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A191 729 11/4

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF PHYSICS

(U) Electronic and Structural Studies of Carbon/Carbon Composites,

DESCRIPTIVE NOTE: Rept. for 1 Sep 86-31 Aug 87,

OCT 87 7P

PERSONAL AUTHORS: Doll, G. L.; Sakya, R. M.; Nicholls, J. T.; Speck, J. S.; Dresselhaus, M.S.

CONTRACT NO. F49629-85-C-0147

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-88-0227

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Nuclear Aerospace Materials Corp., Poway, CA.

ABSTRACT: (U) Room temperature Raman microprobe x-ray diffraction and electrical resistivity measurements have been performed on carbon/carbon composites made from mesophase pitch which were heat treated at temperatures above 2680 Celsius. Results of these measurements indicate that both the ex-pitch carbon fiber and mesophase pitch matrix constituents of the composites were highly graphitic, exhibiting in-plane crystallite dimensions greater than 1000 Angstroms. The c-axis crystallite dimensions were determined by analysis of x ray diffraction peak widths to be approximately 150 Angstroms. Copper chloride was successfully reacted with these carbon-carbon composites forming a stage three graphite intercalation compound in both the fibers and the matrix, as determined by their Raman spectra. Keywords: Carbon carbon composites, Raman characterization carbon carbon composites, Electronic and Structural characterization of carbon carbon composites.

DESCRIPTORS: (U) *CARBON CARBON COMPOSITES, *STRUCTURAL PROPERTIES, CHLORIDES, COPPER, ELECTRICAL MEASUREMENT, ELECTRICAL RESISTANCE, HEAT TREATMENT, MATRIX MATERIALS,

AD-A191 729

AD-A191 729 CONTINUED

PITCH(MATERIAL), RAMAN SPECTRA, CARBON FIBERS, GRAPHITED MATERIALS, REPRINTS.

IDENTIFIERS: (U) Mesophrase pitch, PE61102F, WUAFOSR2303A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 728 11/2.1 20/3

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Photoconductivity in Carbon Fibers.

DESCRIPTIVE NOTE: Rept. for 1 Sep 86-31 Aug 87,

OCT 87 13P

PERSONAL AUTHORS: Steinbeck, J.; Yu, F.; Braunstein, G.; Desselhaus, G.; Dresselhaus, M.S.

CONTRACT NO. F49629-85-C-0147

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-88-0228

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Bell Communications Research, Murray Hill, NJ.

ABSTRACT: (U) Photoconductivity has been observed in vapor grown graphite fibers with a high quantum efficiency of carriers generated by photons. The photocurrent varies approximately as the square root of the intensity of illumination. No change in the growth or decay time of the photocurrent is observed as a function of illumination intensity or of the temperature. The photocurrent observed in semi-metallic graphite fibers is attributed to transitions between localized defect states which act as traps for photo-exited carriers. As the heat treatment temperature is raised above 1500 Kelvin, vapor grown graphite fibers show a decrease in the photocurrent due to the annealing of defects and an increase in the electron-hole recombination time. Keywords: Photoconductivity, graphite fibers, Effect of heat treatment temperature.

DESCRIPTORS: (U) *CARBON FIBERS, *HEAT TREATMENT, *PHOTOCONDUCTIVITY, ANNEALING, DECAY, DEFECTS(MATERIALS), ELECTRONS, GRAPHITE, HIGH RATE, HOLES(ELECTRON DEFICIENCIES), ILLUMINATION, INTENSITY, METALLOIDS, PHOTONS, QUANTUM EFFICIENCY, RECOMBINATION REACTIONS, SQUARE ROOTS, TEMPERATURE, TIME, VAPORS, THERMAL

AD-A191 728 CONTINUED

PROPERTIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 727 7/2

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Electron-Rayleigh Wave Interaction in Thin Film Carbons.

DESCRIPTIVE NOTE: Rept. for 1 Sep 86-31 Aug 87,

OCT 87 4P

PERSONAL AUTHORS: Sugihara, K.

CONTRACT NO. F49629-85-C-0147

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-88-022P

UNCLASSIFIED REPORT

ABSTRACT: (U) Sound wave propagation in thin film carbon is investigated in the long wavelength approximation. Strain-free and stress-free boundary conditions lead to the same solution. The Rayleigh wave, with a small damping constant and with polarization perpendicular to the layer planes, has a small sound velocity. Since the long wavelength phonon energies associated with this wave are very small, these phonon are readily excited even at very low temperatures. Furthermore, those phonons strongly scatter carriers at low temperatures. Of particular interest for transport properties is the determination of the carrier relaxation time for very thin film thicknesses. These phonons are also responsible for the temperature dependence of the negative magnetoresistance of pregraphitic carbons at low temperatures. Keywords: Interaction of electrons, Rayleigh waves graphite films, Electron scattering.

DESCRIPTORS: (U) *CARBON, *RAYLEIGH WAVES, *THIN FILMS, ACOUSTIC VELOCITY, BOUNDARIES, DAMPING, ELECTRON SCATTERING, ELECTRONS, ENERGY, FILMS, GRAPHITE, INTERACTIONS, LONG WAVELENGTHS, LOW TEMPERATURE, MAGNETORESISTANCE, PHONONS, RELAXATION TIME, SOUND TRANSMISSION, SOUND WAVES, STRESSES, TEMPERATURE, THICKNESS, TRANSPORT PROPERTIES.

AD-A191 727 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A191 726 7/2

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Electrical Conduction in Thin Film Carbons.

DESCRIPTIVE NOTE: Rept. for 1 Sep 86-31 Aug 87,

OCT 87 3P

PERSONAL AUTHORS: Sugihara, K.; Dresselhaus, M. S.

CONTRACT NO. F49629-85-C-0147

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-88-0230

UNCLASSIFIED REPORT

ABSTRACT: (U) The interaction between electrons and phonons in a thin carbon film is investigated. Sound wave propagation in a thin carbon film has a small sound velocity and small damping. The scattering of electrons by phonons associated with the Rayleigh wave is found to be responsible for the anomalous temperature dependence of the resistivity and for the negative magnetoresistance of pregraphitic carbons at low temperatures. Keywords: Low temperature conduction pregraphitic films, Rayleigh waves thin carbon film, Negative magnetoresistance pregraphitic carbons.

DESCRIPTORS: (U) *CARBON, *CONDUCTIVITY, *THIN FILMS, ACOUSTIC VELOCITY, ANOMALIES, DAMPING, ELECTRICAL CONDUCTIVITY, ELECTRONS, LOW TEMPERATURE, MAGNETORESISTANCE, PHONONS, RAYLEIGH WAVES, RESISTANCE, SCATTERING, SOUND TRANSMISSION, SOUND WAVES, TEMPERATURE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A191 726

AD-A191 725 11/7 7/4

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Anomalous Temperature-Dependent Negative Magnetoresistance in Pregraphitic Carbons.

DESCRIPTIVE NOTE: Rept. for 1 Sep 86-31 Aug 87,

CCT 87 4P

PERSONAL AUTHORS: Sugihara, K.; Dresselhaus, M. S.

CONTRACT NO. F49629-85-C-0147

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-88-0235

UNCLASSIFIED REPORT

ABSTRACT: (U) Some kinds of pregraphitic carbons exhibit temperature-dependent negative magnetoresistance even at helium temperatures. To account for this anomalous behavior, two assumptions have been introduced. First the sample is composed of an assembly of many thin films which are nearly independent of each other elastically. Secondly, ionized impurity scattering makes an important contribution to the resistivity. Rayleigh waves with small damping and small sound velocity propagate through each film and the scattering due to the Rayleigh wave phonons gives rise to a carrier relaxation rate which decreases as the square of the thin film thickness. Since the screening length of an ionized impurity potential decreases with magnetic field, this process leads to a negative magnetoresistance. Combining these two effects, the qualitative features of the temperature dependent negative magnetoresistance can be explained within the framework of Bright's Theory. Keywords: Negative magnetoresistance, Pregraphitic carbons, Effect of Rayleigh waves, Negative magnetoresistance.

DESCRIPTORS: (U) *MAGNETORESISTANCE, *RAYLEIGH WAVES, *TEMPERATURE, *GRAPHITED MATERIALS, ACOUSTIC VELOCITY, ANOMALIES, BEHAVIOR, DAMPING, HELIUM, IMPURITIES, IONIZATION, MAGNETIC FIELDS, RATES, RELAXATION, RESISTANCE, SCATTERING, THICKNESS, THIN FILMS.

AD-A191 725

AD-A191 725 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A191 724 11/2.1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Microstructure of Thin Intercalated Benezene Derived Graphite Fibers.

DESCRIPTIVE NOTE: Rept. for 1 Sep 86-31 Aug 87,

OCT 87 4P

PERSONAL AUTHORS: Minami, E.; Dresselhaus, M. S.; Hao, X.; Speck, J. S.; Endo, M.

CONTRACT NO. F49629-85-C-0147

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-88-0231

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Shinshu Univ., Nagano-shi (Japan).

ABSTRACT: (U) A brief study has been carried out to investigate the structure of pristine and intercalated thin benzene derived graphite fibers. High resolution transmission electron microscopy techniques were used. The fibers used for this study were prepared by thermal decomposition of benzene onto a substrate seeded with metal particles. The unique feature of the fibers used in this study is that their diameter is only 170 manometers. Fibers used in earlier studies and for most technological applications have generally had diameters more than an order of magnitude larger. Study of the physics of size effects in carbon fibers was a prime motivating force for the current investigation. Keywords: Ultra thin carbon fibers, High resolution electron microscopy, Studies of thin carbon fibers.

DESCRIPTORS: (U) *CARBON FIBERS, *MICROSTRUCTURE, BENZENE, ELECTRON MICROSCOPY, GRAPHITE, METALS, PYROLYSIS, COMPOSITE MATERIALS, CRYSTAL STRUCTURE, GRAIN SIZE, REPRINTS, COPPER COMPOUNDS, IRON COMPOUNDS, MANGANESE COMPOUNDS, COBALT COMPOUNDS.

AD-A191 724 CONTINUED

IDENTIFIERS: (U) *Intercalated graphite fibers, Intercalation compounds, PE61102F, WUAFOSR2303A3.

AD-A191 723 7/2

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Observation of Metallic Conductivity in Liquid Carbon.

DESCRIPTIVE NOTE: Rept. for 1 Sep 86-31 Aug 87,

OCT 87 16P

PERSONAL AUTHORS: Heremans, J.; Olk, C. H.; Eesley, G. L.; Steinbeck, J.; Dresselhaus, G.

CONTRACT NO. F49629-85-C-0147

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-88-0225

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with General Motors Research Lab., Warren, MI. Dept. of Physics.

ABSTRACT: (U) The temperature dependence of the electrical resistivity of carbon fibers has been measured at atmospheric pressure and for temperatures up to and above the melting point at 4450 Kelvin. Vapor-grown graphite fibers of different crystalline perfection were heated with electrical pulses 28 microseconds in duration. The transient reflectivity of graphite irradiated with picosecond laser pulses was also measured and the results show evidence for nonequilibrium heating. From this work, it is concluded that liquids carbon is metallic with a nearly temperature independent electrical resistivity of 30 micro-ohm centimeters. Keywords: Liquids carbon, High temperature resistivity of carbon fibers, Transient reflectivity of carbon fibers.

DESCRIPTORS: (U) *CARBON, *CONDUCTIVITY, *LIQUIDS, BAROMETRIC PRESSURE, CARBON FIBERS, ELECTRICAL RESISTANCE, GRAPHITE, HEATING, HIGH TEMPERATURE, LIGHT PULSES, METALS, NONEQUILIBRIUM FLOW, OBSERVATION, REFLECTIVITY, RESISTANCE, TEMPERATURE, TRANSIENTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A191 724

AD-A191 723

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 710 11/2.1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Stress Measurements in Graphite Fibers by Laser Raman Spectroscopy.

DESCRIPTIVE NOTE: Rept. for 1 Sep 86-31 Aug 87,

OCT 87 3P

PERSONAL AUTHORS: Sakata, H.; Dresselhaus, G.; Endo, M.

CONTRACT NO. F49620-85-C-0147

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-88-0234

UNCLASSIFIED REPORT

ABSTRACT: (U) Heat treated benzene derived graphite fibers have been characterized by Raman spectroscopy as a function of applied uniaxial tensile stress. Linear shifts are observed in the frequency of the Raman lines as a function of the applied stress. Thus it is shown that laser Raman spectroscopy provides a powerful nondestructive technique for monitoring the local stress variations near the surface of carbon fibers. The Raman microprobe used in this experiment provides approximately two micrometers spatial resolution within the optical skin depth. This spatial resolution is much higher than conventional techniques such as x-ray analysis which typically has a spatial resolution of several millimeters. Stress measurements in semiconductors such as Silicon, Germanium and Gallium Arsenide by Raman spectroscopy have been previously reported. Since benzene-derived graphite fibers are typically between ten and 20 micrometers in diameter, Raman spectroscopy has been used to examine the stress variation within the optical skin depth (approximately 800 Angstroms for light scattering at 4880 Angstroms) of single carbon fibers. Keywords: Stress, Strain, Characterization, Carbon fibers, Raman microprobe studies, Stressed carbon fibers.

DESCRIPTORS: (U) *CARBON FIBERS, *STRESS TESTING, GALLIUM ARSENIDES, GERMANIUM, GRAPHITE, LIGHT SCATTERING,

AD-A191 710 CONTINUED

NONDESTRUCTIVE TESTING, OPTICAL PROPERTIES, RAMAN SPECTRA, RAMAN SPECTROSCOPY, SEMICONDUCTORS, SILICON, SURFACES, TENSILE STRESS, X RAYS, STRENGTH WEIGHT RATIO, HEAT TREATMENT, REPRINTS.

IDENTIFIERS: (U) *Laser raman spectroscopy, *Graphite fibers, PE61102F, WUAFOSR2303A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A191 709 11/2.1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Raman Characterization of AsF5-Intercalated Vapor Grown Graphite Fibers.

DESCRIPTIVE NOTE: Rept. for 1 Sep 86-31 Aug 87,

OCT 87 2P

PERSONAL AUTHORS: Ohana, I.; Dresselhaus, M. S.; Endo, M.; Liu, Y. C.

CONTRACT NO. F49629-85-C-0147

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-88-0233

UNCLASSIFIED REPORT

ABSTRACT: (U) A great deal of attention has recently been focussed on the very high electrical conductivity reported in arsenic penta fluoride intercalated vapor grown graphite fibers, previously heat treated to high temperatures. To characterize individual arsenic penta fluoride intercalated vapor grown fibers for stage index and staging fidelity along the fiber length, Raman scattering measurements have been carried out. These results are discussed in terms of their high electrical conductivity and structural features. Keywords: Carbon fibers, Raman characterization of carbon fibers, Arsenic pentafluoride intercalated carbon fibers, Raman spectra arsenic pentafluoride intercalated carbon fibers.

DESCRIPTORS: (U) *ARSENIC, *CARBON FIBERS, *FLUORIDES, ELECTRICAL CONDUCTIVITY, FIBERS, GRAPHITE, LENGTH, LIGHT SCATTERING, RAMAN SPECTRA, CRYSTAL STRUCTURE, VAPOR PHASES, REPRINTS.

IDENTIFIERS: (U) *Arsenic pentafluorides, PE61102F, WUAFOSR2303A3.

AD-A191 709

AD-A191 708 11/2.1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Size Effects in the Electrical Resistivity of Benzene-Derived Carbon Fibers.

DESCRIPTIVE NOTE: Rept. for 1 Sep 86-31 Aug 87,

OCT 87 2P

PERSONAL AUTHORS: Dresselhaus, M. S.; Sugihara, K.

CONTRACT NO. F49629-85-C-0147

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-88-0232

UNCLASSIFIED REPORT

ABSTRACT: (U) Tahar and others in the Dresselhaus group previously reported a size effect in the electrical resistivity of benzene-derived carbon fibers with small diameters. A simple theory indicates that the resistivity has a linear dependence on the reciprocal diameter associated with boundary scattering together with a constant term due to a size-independent scattering process. The observed results are well represented by this relation if the diameter is large enough, while for samples with small diameter, the observed resistivity data are considerably smaller than the theoretical expectation. This discrepancy is removed by considering the correct boundary conditions and by solving the Boltzmann equation. Keywords: Carbon fibers, Size effect of carbon fibers, Electrical resistivity of carbon fibers.

DESCRIPTORS: (U) *CARBON FIBERS, *BENZENE, BOLTZMANN EQUATION, ELECTRICAL RESISTANCE, FABRICATION, REPRINTS.

IDENTIFIERS: (U) *Benzene Derived Carbon Fibers, PE61102F, WUAFOSR2303A3.

AD-A191 708

AD-A191 707 7/2

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Liquid Carbon.

DESCRIPTIVE NOTE: Rept. for 1 Sep 86-31 Aug 87,

OCT 87 31P

PERSONAL AUTHORS: Dresselhaus, M. S.; Steinbeck, J.

CONTRACT NO. F49629-85-C-0147

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-88-0224

UNCLASSIFIED REPORT

ABSTRACT: (U) In this brief review article on liquid carbon, the following topics are considered: the phase diagram of carbon, methods for preparing and characterizing liquid carbon, a survey of what is known about the properties of liquid carbon, and models that have been used to account for the properties of liquids carbon. Special emphasis is given to experiments on carbon fibers relevant to determination of the electrical resistivity of liquids carbon. Liquid carbon, High temperature resistivity of carbon fibers, Photoconductivity of carbon fibers.

DESCRIPTORS: (U) *CARBON, CARBON FIBERS, ELECTRICAL RESISTANCE, PHASE DIAGRAMS, PHOTOCONDUCTIVITY, MELTS, CRYSTAL STRUCTURE, CHEMICAL BONDS, HEAT TRANSFER, LASER APPLICATIONS, THERMAL CONDUCTIVITY.

IDENTIFIERS: (U) *Liquid carbon, PE61102F, WUAFOSR2303A3.

AD-A191 698 20/4

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Study of the Structure of Turbulence in Accelerating Transitional Boundary Layers.

DESCRIPTIVE NOTE: Final technical rept. 5 Oct 84-22 Sep 87,

DEC 87 219P

PERSONAL AUTHORS: Blair, Michael F.; Anderson, Olof L.

REPORT NO. UTRC/R87-956900-1

CONTRACT NO. F49620-84-C-0050

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR
TR-88-0017

UNCLASSIFIED REPORT

ABSTRACT: (U) A combined experimental and analytical program has been conducted to examine transitional, accelerating boundary layer flows with high levels of freestream turbulence. An earlier program focused on measurement of transitional heat transfer distributions for four combinations of streamwise acceleration and freestream turbulence. The present program was designed to document the boundary layer turbulence structure and spectral distributions for the same four test conditions. The results from the present program have shown that transition in accelerating flows consists of an acceleration dominated stage of slowly developing intermittency followed by a second stage with the same general characteristics as zero-pressure-gradient transition. Conditionally sampled fluctuating velocity profile measurements indicated that the boundary layer turbulence was highly anisotropic in the early stages of transition. Conditionally sampled mean velocity measurements showed that within the intermittent turbulent patches the mean velocity profiles were very similar to those of an equilibrium turbulent boundary layer. Spectral distribution data indicated that preferred amplification of the most unstable (as

AD-A191 698 CONTINUED

predicted by linear stability theory) frequencies occurred upstream of the onset of transitional bursting. In addition to the experimental portion of this investigation, numerical experiments were undertaken to assess the ability of currently existing methods to predict heat transfer during transition in accelerating flows.

DESCRIPTORS: (U) *TRANSITIONS, *TURBULENCE, *TURBULENT BOUNDARY LAYER, ACCELERATION, BOUNDARY LAYER TRANSITION, DISTRIBUTION, EQUILIBRIUM(GENERAL), FLOW, FREE STREAM, HEAT TRANSFER, LAYERS, LINEARITY, MATHEMATICAL ANALYSIS, MEAN, MEASUREMENT, NUMERICAL METHODS AND PROCEDURES, PROFILES, SAMPLING, SPECTRAL ENERGY DISTRIBUTION, STABILITY, THEORY, VELOCITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A2.

AD-A191 673 12/9 3/1

CALIFORNIA INST OF TECH PASADENA

(U) An Image Processing System for Research in Solar Physics.

DESCRIPTIVE NOTE: Final technical rept. 15 Aug 86-14 Aug 87,

DEC 87 3P

PERSONAL AUTHORS: Zirin, Harold

CONTRACT NO. AFOSR-86-0300

PROJECT NO. 2917

TASK NO. A6

MONITOR: AFOSR TR-88-0188

UNCLASSIFIED REPORT

ABSTRACT: (U) A powerful new image processing system consisting of a MicroVAX II and a Megavision image processor was purchased by the Big Bear Solar Observatory. The system has been immensely successful, and a number of important research projects have already been carried out with it.

DESCRIPTORS: (U) *IMAGE PROCESSING, *ASTRONOMY, PROCESSING EQUIPMENT, SOLAR PHYSICS, ASTRONOMICAL OBSERVATORIES, RADIO ASTRONOMY.

IDENTIFIERS: (U) Big bear solar observatory, Radio mapping, PE61102, WUAFOSR2917A6.

AD-A191 671 14/2 20/4

CALIFORNIA INST OF TECH PASADENA GRADUATE AERONAUTICAL LABS

(U) Instrumentation for Turbulent Reacting Flows.

DESCRIPTIVE NOTE: Final rept. 1 Feb 85-30 Jun 87,

APR 87 22P

PERSONAL AUTHORS: Dimotakis, P. E.; Lang, D. B.; Miake-Lye, R. C.

CONTRACT NO. AFOSR-85-0153

PROJECT NO. 2917

TASK NO. A1

MONITOR: AFOSR TR-88-0041

UNCLASSIFIED REPORT

ABSTRACT: (U) The design and technical capabilities of the following systems are described: (1) Copper Vapor Laser pulsed light source with spatial filter and collimator.(2) Proximity focussed diode intensified linear CCD camera. (3) High speed multiplexed Analog to Digital Conversion system. (4) Monochromator system for point or line imaging of chemiluminescence. This instrumentation has been assembled to exploit several nonintrusive optical techniques to make measurements in a wide range of turbulent flows. The primary, but not exclusive, measurement technique to be implemented was Rayleigh scattering, imaged along a line as a function of time. A slightly modified version of the same apparatus was to be used in performing scattering measurements or (liquid-phase) laser-induced fluorescence measurements with the same temporal and spatial resolution capabilities. A second technique was to make use of a monochromator to analyze, and possibly image, chemiluminescence in a reacting flow in a wavelength-specific fashion, either at a point or along a line. The light source, the detection systems, and the data acquisition systems assembled under this funding will each be described.

DESCRIPTORS: (U) *LASER INDUCED FLUORESCENCE,

AD-A191 671

AD-A191 671 CONTINUED

*MEASUREMENT, *TURBULENT FLOW, CHEMILUMINESCENCE, CONVERSION, DATA ACQUISITION, DETECTORS, DIGITAL COMPUTERS, DIGITAL SYSTEMS, IMAGES, LIGHT SOURCES, METHODOLOGY, MONOCHROMATORS, OPTICS, RANGE(EXTREMES), RAYLEIGH SCATTERING, RESOLUTION, SCATTERING, SPATIAL DISTRIBUTION, SPATIAL FILTERING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 670 7/3 7/4

CALIFORNIA INST OF TECH PASADENA ARTHUR AMOS NOYES LAB OF CHEMICAL PHYSICS

(U) Stepwise Solvation of the Intramolecular-Charge-Transfer Molecule p-(Dimethylamino)benzonitrile,

87 8P

PERSONAL AUTHORS: Peng, Lawrence W.; Dantus, Marcos; Zewail, Ahmed H.; Kemnitz, Klaus; Hicks, Janice M.

CONTRACT NO. AFOSR-87-0071

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-88-0179

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v91 n24 p6162-6167 1987.

ABSTRACT: (U) This paper presents a systematic study of p-(N, N-dimethylamino)benzonitrile (DMABN) both in a supersonic jet expansion and in a thermalized vapor. From the jet studies, the excited- and ground-state vibrational spectra of the isolated molecule ar resolved, and the spectroscopy of the stoichiometric complex with water, methanol, ammonia, and acetonitrile in the beam is reported. It is concluded that 1:1 complexes are not sufficient for the local perturbation to cause charge separation. At higher temperatures in the jet, we observe emission that we attribute to DMABN self-complexes. Under high pressure and temperature vapor conditions (> 30 m Torr, 60 C), red-shifted fluorescence from DMABN is observed. This is attributed to the charge-transfer state of DMABN in self-complexes.

DESCRIPTORS: (U) *BENZONITRILES, *CHARGE TRANSFER, ACETONITRILE, AMMONIA, CARBINOLS, EXPANSION, GROUND STATE, HIGH PRESSURE, HIGH TEMPERATURE, ISOLATION, MOLECULES, PERTURBATIONS, SOLVATION, SPECTROSCOPY, STOICHIOMETRY, SUPERSONIC AIRCRAFT, TEMPERATURE, VAPORS, VIBRATIONAL SPECTRA, WATER, REPRINTS.

AD-A191 670 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

AD-A191 670

AD-A191 669 20/4 20/13

JET PROPULSION LAB PASADENA CA

(U) The Behavior of Drop-Containing Turbulent Eddies.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 86-30 Sep 87,

NOV 87 5P

PERSONAL AUTHORS: Bellan, Josette

CONTRACT NO. AFOSR-ISSA-87-0025

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-88-0252

UNCLASSIFIED REPORT

ABSTRACT: (U) The effect of turbulent entrainment and mixing at the boundary of a cluster of evaporating drops has been studied. The results obtained by solving the model equations show that for dense clusters turbulence exchange processes are crucial in determining the lifetime of the drops clusters of drops. The results also show that turbulence helps evaporate larger clusters of drops faster when the clusters are dense. Keywords: Dense sprays; Eddies(Fluid Mechanics); Turbulent boundary layer.

DESCRIPTORS: (U) *EDDIES(FLUID MECHANICS), *TURBULENT BOUNDARY LAYER, *TWO PHASE FLOW, *EVAPORATION, BOUNDARIES, CLUSTERING, DROPS, ENTRAINMENT, EQUATIONS, HIGH DENSITY, MATHEMATICAL MODELS, MIXING, SPRAYS, TURBULENCE, MIXING, MASS TRANSFER, HEAT TRANSFER.

AD-A191 668 23/3 12/9 12/5 14/1

CALIFORNIA INST OF TECH PASADENA DEPT OF ELECTRICAL ENGINEERING

(U) Theoretical Investigation of Optical Computing Based on Neural Network Models.

DESCRIPTIVE NOTE: Annual rept. 30 Sep 86-29 Sep 87,

SEP 87 84P

PERSONAL AUTHORS: Abu-Mostafa, Yaser; Psaltis, Demetri

CONTRACT NO. AFOSR-86-0296

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR
TR-88-0025

UNCLASSIFIED REPORT

ABSTRACT: (U) It is difficult to find good mathematical models for many natural problems such as pattern recognition. Not only does this difficulty preclude finding good solutions for these problems, but it also precludes estimating their complexity using the standard tools of the theory oc computational complexity (Traub, 1985). Part of the difficulty can be traced to symptoms such as ill-definition, fuzziness, and inexactness. However, the difficulty of modeling these problems may be inherent in some cases. Keywords: Photorefractive crystals; Adaptive optical networks; Connectivity; Entropy; Holograms.

DESCRIPTORS: (U) *HOLOGRAMS, *OPTICAL PROPERTIES, *PATTERN RECOGNITION, ADAPTIVE SYSTEMS, COMPUTATIONS, MATHEMATICAL MODELS, NETWORKS, NEURAL NETS, OPTICAL PROCESSING, THEORY, BOOLEAN ALGEBRA, ENTROPY.

IDENTIFIERS: (U) Photorefraction, PE61102F, WUAFOSR2305B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A191 648 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF OPERATIONS RESEARCH

(U) Sensitivity Analysis for the System Reliability Function.

DESCRIPTIVE NOTE: Technical rept. Dec 86-Dec 87,

DEC 87 50P

PERSONAL AUTHORS: Fishman, George S.

REPORT NO. UNC/OR/TR-87-6

CONTRACT NO. AFOSR-84-0140

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-88-0383

UNCLASSIFIED REPORT

ABSTRACT: (U) Sensitivity analysis, which represents an integral part of virtually every study of system reliability, measures variation in this quantity in response to changes in component reliabilities or in system design. Replacing old components with new ones with higher reliabilities affects system reliability. As time elapses, system reliability deteriorates when a non replacement policy for components all affect system reliability. Sampling variation in component reliability estimates induce sampling variation in the corresponding system reliability estimate. Having access to a model that accurately predicts these changes in system behavior allows one to make considerably more well informed decisions for maintaining or enhancing performance. This paper presents a method for estimating variation in system reliability in response to variation in component reliabilities. It describes a Monte Carlo sampling plan that on each of w sets of distinct component reliabilities. It describes a Monte Carlo sampling plan that on each replication provides sample data that contribute to the estimation of system reliability for each w sets of distinct component reliabilities. The sets may represent alternative component replacement plans, deteriorating component reliabilities at a succession of time points or extremal points of simultaneous component reliability interval estimates (Fishman 1987). For purposes of exposition, we focus on s-t reliability but emphasize that the concepts discussed here also apply to other definitions of system reliability. Keywords: Coefficients; Polynomials; Confidence intervals.

DESCRIPTORS: (U) *MONTE CARLO METHOD, *RELIABILITY, COEFFICIENTS, CONFIDENCE LIMITS, ESTIMATES, INTERVALS, PLANNING, POLICIES, POLYNOMIALS, REPLACEMENT, RESPONSE, SAMPLING, VARIATIONS, CONTROL SYSTEMS.

IDENTIFIERS: (U) Importance functions, PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A191 635 20/6

ROCKWELL INTERNATIONAL THOUSAND OAKS CA SCIENCE CENTER

(U) Studies of Optical Matrix Multiplication and Reconfigurable Optical Interconnect Concepts.

DESCRIPTIVE NOTE: Annual rept. no. 1, 1 Nov 86-31 Oct 87,

JAN 88 37P

PERSONAL AUTHORS: Yeh, Pochi

REPORT NO. SC5502.AR

CONTRACT NO. F49620-87-C-0015, $$ARPA Order-5884

MONITOR: AFOSR TR-88-0094

UNCLASSIFIED REPORT

ABSTRACT: (U) In the first year of the program, we studied a number of concepts on matrix multiplication and reconfigurable optical interconnection using photorefractive materials such as BaTiO3. We have conceived several new concepts in the same area. The results are documented in three technical paper/ presentations and four patent disclosures.

DESCRIPTORS: (U) *CIRCUIT INTERCONNECTIONS, OPTICAL PROPERTIES.

IDENTIFIERS: (U) PE61102F.

AD-A191 610 20/4

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF RATIONAL MECHANICS

(U) Applications of Some New Ideas on Irreversible Processes to Particular Fluids.

DESCRIPTIVE NOTE: Final rept.,

SEP 87 2P

PERSONAL AUTHORS: Truesdell, Clifford A.

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR TR-87-2035

UNCLASSIFIED REPORT

ABSTRACT: (U) The proposal for the grant set forth a program of research for three years, the first of which was to survey available literature, methods, and results concerning flow of fluids of grade 2. This activity was completed for the first year.

DESCRIPTORS: (U) *FLUIDS, *IRREVERSIBLE PROCESSES, .

IDENTIFIERS: (U) Nonnewtonian fluids.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 600 7/4

CALIFORNIA UNIV IRVINE DEPT OF MECHANICAL ENGINEERING

(U) Analysis of Molecular Mixing and Chemical Reaction in Mixing Layer.

JAN 88 9P

PERSONAL AUTHORS: Cetegen, B. M.; Sirignano, W. A.

CONTRACT NO. AFOSR-86-0016

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-88-0242

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper concerns an analytical study of molecular mixing and finite rate chemical reactions in an infinite row of vortices representing a mixing layer. Diffusion equations for reacting and non-reacting species are solved locally in the Lagrangian frame of reference following material elements. The flowfield is a given for the problem. The concentration distributions in the vortex structure are composed from these analytical solutions and presented for several cases. The probability density functions constructed from these distributions are compared with the mixing layer experiments. For the cases studied, the comparisons indicate encouraging agreement for the reacting flow case. However, some differences are present for the non-reacting flows. Keywords: Turbulent reacting flows; Molecular mixing, Reaction in vortical structures.

DESCRIPTORS: (U) *CHEMICAL REACTIONS, *FLOW FIELDS, *LAYERS, *MIXING, DIFFUSION, EQUATIONS, FLOW, FRAMES, LAGRANGIAN FUNCTIONS, MOLECULES, PROBABILITY DENSITY FUNCTIONS, RATES, SOLUTIONS(GENERAL), STRUCTURES, VORTICES.

AD-A191 600

AD-A191 599 20/7 20/9

CALIFORNIA UNIV IRVINE DEPT OF PHYSICS

(U) Propagation of Neutralized Ion Beams.

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 85-31 Dec 87,

DEC 87 13P

PERSONAL AUTHORS: Fisher, Amnon; Rostoker, Norman

CONTRACT NO. F49620-86-K-0004

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR TR-88-0053

UNCLASSIFIED REPORT

ABSTRACT: (U) The propagation of plasmoids (neutralized beams) in a vacuum transverse magnetic field has been studied in the UCI laboratory for several years. The most recent experiments are aimed at studying the plasmoid propagation dynamics and losses in the presence of a background, magnetized plasma which is intended to short the induced polarization electric field and stop the beam. Preliminary results indicate that the beam propagation losses increase with the background plasma density. Principal diagnostics include: magnetically insulated Faraday cups, floating potential probes, calorimeters, microwave interferometer, and thermal-witness paper. Experiments in the near future will use an improved accelerator and transverse-field coil system which allows higher energy, 500 keV, higher current density plasmoids to be studied; this generator will improve the beam uniformity and angular divergence to allow beam propagation for up to five meters and permit study of losses from surface erosion. Keywords: Plasmoids; Propagation; Magnetic field.

DESCRIPTORS: (U) *PARTICLE BEAMS, CALORIMETERS, ELECTRIC FIELDS, ELECTROMAGNETIC WAVE PROPAGATION, ENERGY, EROSION, ION BEAMS, LOSSES, MAGNETIC FIELDS, MAGNETIZATION, MICROWAVE INTERFEROMETRY, PLASMAS(PHYSICS), POLARIZATION, PROBES, SURFACES, TRANSVERSE, VACUUM, NEUTRAL, CROSSED

AD-A191 599

AD-A191 599 CONTINUED

FIELD DEVICES.

IDENTIFIERS: (U) Plasmoids, Faraday cups, Drift tubes, Electron cyclotron frequency, *Plasmas, PE61102F, WUAFOSR2301A7.

AD-A191 599

AD-A191 593 9/1 12/5

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF ELECTRICAL ENGINEERING AND COMPUTE R SCIENCES

(U) Computer Aided Design of Monolithic Microwave and Millimeter Wave Integrated Circuits and Subsystems.

DESCRIPTIVE NOTE: Annual technical rept. 1 Sep 86-31 Aug 87,

AUG 87 54P

PERSONAL AUTHORS: Ku, Walter H.

CONTRACT NO. AFOSR-86-0339

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR TR-88-0023

UNCLASSIFIED REPORT

ABSTRACT: (U) This interim technical report presents results of research on the computer aided design of monolithic microwave and millimeter wave integrated circuits and subsystems. A specific objective is to extend the state-of-the-art of the computer aided design (CAD) of the monolithic microwave and millimeter wave integrated circuits (MIMIC). In this reporting period, we have derived a new model for the high electron mobility transistor (HEMT) based on a nonlinear charge control formulation which takes into consideration the variation of the 2DEG distance offset from the heterointerface as a function of bias. Pseudomorphic InGaAs/GaAs HEMT devices have been successfully fabricated at UCSD. For a 1 micron gate length, a maximum transconductance of 320 mS/mm was obtained. In cooperation with TRW, devices with 0.15 micron and 0.25 micron gate lengths have been successfully fabricated and tested. New results on the design of ultra-wideband distributed amplifiers using 0.15 micron pseudomorphic InGaAs/GaAs HEMT's have also been obtained. In addition, two-dimensional models of the submicron MESFET's, HEMT's and HBT's are currently being developed for the CRAY X-MP/48 supercomputer. Preliminary results obtained are also presented in this report.

AD-A191 593

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 593 CONTINUED

DESCRIPTORS: (U) *COMPUTER AIDED DESIGN, *GATES(CIRCUITS) , *INTEGRATED CIRCUITS, *TRANSISTORS, BROADBAND, DISTRIBUTED AMPLIFIERS, ELECTRON MOBILITY, HIGH RATE, LENGTH, MILLIMETER WAVES, MODELS, TWO DIMENSIONAL.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305C1.

AD-A191 565 21/2 20/4

CALIFORNIA UNIV BERKELEY DEPT OF ENGINEERING

(U) Application of Rayleigh Scattering to Turbulent Flow with Heat Transfer and Combustion.

DESCRIPTIVE NOTE: Final rept. 1 Apr 84-30 Sep 87,

DEC 87 10P

PERSONAL AUTHORS: Talbot, L.

CONTRACT NO. AFOSR-84-0124

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-88-0270

UNCLASSIFIED REPORT

ABSTRACT: (U) A comprehensive investigation has been carried out of the structure and statistical properties of unconfined turbulent flames, both V-shaped and conical. Measurement techniques included conditioned velocity measurements using two component LDV, flow visualization techniques, and Rayleigh scattering. Additionally, a new time resolved technique, LARS(Linear Array for Rayleigh Scattering) was developed which makes possible the determination of the instantaneous location of the flame sheet within the turbulent flame brush. A major objective of these flame studies was to access the appropriateness of models such as the Bray-Moss-Libby (BLM) model for describing the structure of planar turbulent combustion zones. The results of these investigation have revealed that many of the predictions of the BML model accord reasonably well with experimental observations, although some of the constants chosen in the theory are not verified experimentally. Agreement is better for the V-shaped planar flame than for the conical flame, particularly in the vicinity of the flame tip. Studies of the flame stabilization region in the wake of flameholders showed evidence of vortex shedding in the wake and of diminished fluctuation intensity with increased heat release. It was also observed that reaction in the shear layer bounding the recirculating products does not occur until a finite distance

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AD-A191 565

AD-A191 565 CONTINUED

downstream of the flameholder. This observation is confirmed by CH fluorescence imaging of the flame region.

DESCRIPTORS: (U) *COMBUSTION, *FLOW VISUALIZATION, *HEAT TRANSFER, *TURBULENCE, BOUNDARIES, BRUSHES, CONICAL BODIES, FLAME HOLDERS, FLAMES, FLUORESCENCE, HEAT, IMAGES, INTENSITY, LAYERS, MEASUREMENT, METHODOLOGY, PLANAR STRUCTURES, RANGE(DISTANCE), RAYLEIGH SCATTERING, REGIONS, RELEASE, SHEAR PROPERTIES, STABILIZATION, STATISTICS, TIME, TURBULENT FLOW, VARIATIONS, VELOCITY, VORTEX SHEDDING, WAKE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A191 560 12/1 9/3

CALIFORNIA UNIV LOS ANGELES DEPT OF ELECTRICAL ENGINEERING

(U) A Random Schroedinger Equation: White Noise Model.

DESCRIPTIVE NOTE: Journal article,

JAN 88 23P

PERSONAL AUTHORS: Balakrishnan, A. V.

REPORT NO. UCLA-ENG-0675

CONTRACT NO. AFOSR-85-0318

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-88-0010

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Differential and Integral Equations, v1 n1 p49-70 Jan 88.

ABSTRACT: (U) This paper is essentially an application of the author's theory of abstract stochastic bilinear equations to the problem of laser beam propagation in a turbulent medium, and the associated random Schroedinger equation. The white noise theory is shown to provide a consistent self-contained model for the Markov approximation of the refractive index field, and in particular avoids invoking ad hoc Stratanovich correction terms. Keywords: Reprints; Polynomials.

DESCRIPTORS: (U) *SCHRODINGER EQUATION, *WHITE NOISE, THEORY, CONSISTENCY, MODELS, SELF CONTAINED, LASER BEAMS, LIGHT TRANSMISSION, POLYNOMIALS, REFRACTIVE INDEX, TURBULENCE, THEORY, WHITE NOISE, APPROXIMATION(MATHEMATICS), MARKOV PROCESSES, REPRINTS, MATHEMATICAL MODELS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 558 20/12

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF ELECTRICAL ENGINEERING

(U) Optical Nonlinearities in GaAs/GaAlAs Multiple Quantum Wells Fabricated by Metalorganic Chemical Vapor Deposition for Use in Optical Signal Processing.

DESCRIPTIVE NOTE: Final rept. 8 Jan 85-6 Jan 87,

DEC 87 75P

PERSONAL AUTHORS: Gamire, E.; Dapkus, P. D.

CONTRACT NO. AFOSR-85-0297

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR TR-88-0130

UNCLASSIFIED REPORT

ABSTRACT: (U) Preparation of high quality GaAs/GaAlAs Multiple quantum wells (MQW) grown by Metalorganic Chemical Vapor Deposition on GaAs substrates and measurement of nonlinear saturation has been completed in this 18 month contract. The results show materials which rivals the highest quality MQW's grown by any technique. Preparation of GaAs/GaAlAs MQW's on GaP substrates and measurement of nonlinear saturation has been completed. It was shown that this material has high cw saturation intensity and, if used in a nonlinear Fabry-Perot, would be useful only in pulsed experiments. The material looks ideal for hybrid devices.

DESCRIPTORS: (U) *ORGANOMETALLIC COMPOUNDS, *QUANTUM ELECTRONICS, *HETEROJUNCTIONS, CHEMICAL REACTIONS, FABRY PEROT INTERFEROMETERS, GALLIUM ARSENIDES, HYBRID SYSTEMS, MEASUREMENT, NONLINEAR SYSTEMS, OPTICAL PROCESSING, OPTICAL PROPERTIES, PULSES, QUALITY, SATURATION, SIGNAL PROCESSING, SUBSTRATES, VAPOR DEPOSITION, ALUMINUM GALLIUM ARSENIDE, GALLIUM PHOSPHIDES.

IDENTIFIERS: (U) Quantum wells, Multiple quantum wells, PE61102F, WUAFOSR2305B1.

AD-A191 558

AD-A191 557 8/11 8/2 8/1

CALIFORNIA UNIV SAN FRANCISCO CARDIOVASCULAR RESEARCH INST

(U) Molecular Toxicology of Chromatin.

DESCRIPTIVE NOTE: Annual progress rept. 1 Jan-31 Dec 87,

DEC 87 149P

PERSONAL AUTHORS: Kun, Ernest

CONTRACT NO. AFOSR-86-0064

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR TR-88-0009

UNCLASSIFIED REPORT

ABSTRACT: (U) Part I. Benzamide-DNA Interactions; Deductions from Binding, Enzyme-Kinetics and from X-ray Structural Analysis of a 9-Ethyladenine-Benzamide Adduct: The interaction of benzamide with the isolated components of calf thymus poly(ADP-ribose) polymerase and with liver nuclei has been investigated. Part II. Molecular Interactions Between DNA, Poly(ADP-Ribose) Polymerase and Histones: Molecular interactions between purified poly(ADP-ribose) polymerase, whole thymus histones, histone H1, rat fibroblast genomic DNA, and closed circular and linearized SV40 DNA were determined by the nitrocellulose filter binding technique. Binding of the polymerase protein, or histones, to DNA was greatly augmented when both enzyme protein and histones were present simultaneously. Part III. Analysis of the Molecular Contacts Between Poly(ADP-ribose) Polymerase and DNA: The interaction between poly (ADP-ribose) polymerase and various uniquely end labeled restriction fragments from SV40 an pBR322 DNAs was studied employing nuclease protection experiments. DNaseI footprinting indicated that approximately 66-85 bp of DNA was protected by poly (ADP-ribose) polymerase from DNaseI attack, and that a segment of DNA probably lies outside on the surface of the polymerase protein in the polymerase-DNA complex.

AD-A191 557

AD-A191 557 CONTINUED

DESCRIPTORS: (U) *CHROMATIN, *ENZYMES, *TOXICOLOGY, *MOLECULAR BIOLOGY, ADHESION, AMIDES, BENZENE, DEOXYRIBONUCLEIC ACIDS, FILTERS, FRAGMENTS, HISTONES, INTERACTIONS, ISOLATION, LIVER, MOLECULE MOLECULE INTERACTIONS, MOLECULES, NITROCELLULOSE, NUCLEASE, NUCLEI, PROTECTION, PROTEINS, THYMUS, X RAYS, MOLECULAR STRUCTURE, ADENOSINE PHOSPHATES.

IDENTIFIERS: (U) Polymerases, ADP(Adenosine Diphosphate), ADP Ribose polymerase, PE61102F, WUAFOSR2312A5.

AD-A191 556 19/1 21/2 21/9.2

COLORADO UNIV AT BOULDER DEPT OF MECHANICAL ENGINEERING

(U) Chemical Kinetics of Nitramine Propellant Combustion.

DESCRIPTIVE NOTE: Interim technical rept. 1, Oct 86-30 Sep 87,

NOV 87 14P

PERSONAL AUTHORS: Branch, Melvyn C.

CONTRACT NO. AFOSR-84-0008

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR TR-88-0044

UNCLASSIFIED REPORT

ABSTRACT: (U) The decomposition of many solid reactants during combustion leads to the formation of gaseous hydrocarbons and oxides of nitrogen which can react to support a flame above the surface of the solid. These flames can provide heat which is fed back to the propellant surface and thereby influence the burning rate of the solid. In the case of nitramine based solid rocket propellants, the gas phase decomposition products include significant amounts of Formaldehyde. Nitrogen dioxide, Hydrogen Cyanide, Nitric oxide, Nitrous oxide, oxygen. This study is intended to provide experimental data on the structure of hydrocarbon flames supported by oxides of nitrogen in order to establish the reaction mechanism for such flames. Laminar, premixed, flat flames of methane/NO2/O2 and CH2O/NO2/O2 have been investigated and a reaction mechanism is suggested which accounts for all of the major observations in the data.

DESCRIPTORS: (U) *COMBUSTION, *NITRAMINES, *PROPELLANTS, *SOLID ROCKET PROPELLANTS, *COMBUSTION PRODUCTS, DECOMPOSITION, DIOXIDES, EXPERIMENTAL DATA, FLAMES, FORMALDEHYDE, HYDROCARBONS, HYDROGEN CYANIDE, LAMINAR FLOW, NITROGEN OXIDES, NITROUS OXIDE, OXIDES, OXYGEN, REACTION KINETICS, VAPOR PHASES, REACTION KINETICS, LASER INDUCED FLUORESCENCE.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 549 7/2 20/12 20/6.1

BROWN UNIV PROVIDENCE RI DIV OF ENGINEERING

(U) Novel Fiber Preforms: Rare Earth Doping.

DESCRIPTIVE NOTE: Final technical rept. 1 Nov 86-30 Nov 87,

JAN 88 43P

PERSONAL AUTHORS: Morse, T. F.

CONTRACT NO. AFOSR-87-0058

PROJECT NO. 2305

TASK NO. B2

MONITOR: AFOSR TR-88-0221

UNCLASSIFIED REPORT

ABSTRACT: (U) Rare earth glasses have been studied with emphasis on those characteristics related to rare earth doping of optical fiber preforms for fiber sensor applications. Progress has been made in the following areas: further experience with the Modified Chemical Vapor Deposition (MCVD) preform facility, and the establishment of an optical draw tower provides the ability to create state-of-the-art fibers with a host of novel dopants. We will continue to concentrate on fibers doped with rare earth elements by several techniques, and to continue studies of bulk formation of rare earth glasses, and to study certain aspects of second harmonic generation in rare earth doped silica based fibers.

DESCRIPTORS: (U) *DOPING, *FIBER OPTICS, *RARE EARTH ELEMENTS, *GLASS, *SILICATES, *SILICA GLASS, *X RAY DIFFRACTION, DETECTORS, FIBERS, GLASS, HARMONIC GENERATORS, RARE EARTH COMPOUNDS, STATE OF THE ART, NUCLEAR MAGNETIC RESONANCE, AMORPHOUS MATERIALS, REPRINTS, PRASEODYMIUM, ERBIUM, DYSPROSIUM, ACTINIDE SERIES.

IDENTIFIERS: (U) Fiber preforms, Rare earth glasses, Optical fiber preforms, PE61102F, WUAFOSR230582.

AD-A191 549

AD-A191 548 11/6.1

CALIFORNIA UNIV DAVIS DEPT OF MECHANICAL ENGINEERING

(U) Superplasticity - A Fundamental Investigation on Deformation Mechanism and Cavitation Phenomena.

DESCRIPTIVE NOTE: Annual technical rept. 1 Feb 87-31 Jan 88,

FEB 88 32P

PERSONAL AUTHORS: Chokshi, A. H.; Bieler, T.; Mukherjee, A. K.

CONTRACT NO. AFOSR-86-00575

PROJECT NO. 2306

TASK NO. AL

MONITOR: AFOSR TR-88-0220

UNCLASSIFIED REPORT

ABSTRACT: (U) Al-Li alloy and the mechanically alloyed IN 9121l were investigated for superplasticity and enhanced plasticity. The deformation behavior of fine and coarse grains (coexisting in the same microstructure) was a function of strain rate. Both type of grains deformed in an intercrystalline manner in region II. In region III, only the fine grains deformed in this mode. The mechanically alloyed specimens revealed the high ductility of 500% elongation at the uncommonly high strain rate of 10 per sec. The stress exponent of strain rate for this alloy does not correlate with existing models for superplasticity. Additional mechanical and microstructural work underway are expected to shed more light on the micromechanism of deformation for this alloy. Keywords: Superplasticity, Aluminum Lithium alloys; Mechanically alloyed systems; Whisker reinforced matrix; Deformation mechanism; Silicon carbide whiskers.

DESCRIPTORS: (U) *ALUMINUM ALLOYS, *LITHIUM ALLOYS, *GRAIN STRUCTURES(METALLURGY), CAVITATION, DEFORMATION, DUCTILITY, HIGH RATE, MECHANICAL WORKING, MICROSTRUCTURE, PLASTIC PROPERTIES, SILICON CARBIDES, STRAIN RATE, STRESSES, WHISKERS(CRYSTALS), FIBER REINFORCED COMPOSITES, GRAIN SIZE, ALUMINUM ALLOYS, BEHAVIOR, CAVITATION,

AD-A191 548

AD-A191 548 CONTINUED

DEFORMATION, DUCTILITY, HIGH RATE, LITHIUM ALLOYS, MECHANICAL WORKING, MICROSTRUCTURE, PLASTIC PROPERTIES, SILICON CARBIDES, STRAIN RATE, STRESSES, WHISKERS(CRYSTALS).

IDENTIFIERS: (U) Superplasticity, PE61102F, WUAFOSR2306AL.

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AD-A191 547 7/2 20/2

JET PROPULSION LAB PASADENA CA

(U) An Investigation of II-VI Superlattice Deposition by Laser Photochemical Techniques.

DESCRIPTIVE NOTE: Annual rept. 28 Nov 86-24 Nov 87,

JAN 88 34P

PERSONAL AUTHORS: Stirn, Richard J.; Nouhi, Akbar; Radhakrishnan, Gouri

CONTRACT NO. AFOSR-ISSA-87-0032

PROJECT NO. 2305

TASK NO. K4

MONITOR: AFOSR TR-88-0222

UNCLASSIFIED REPORT

ABSTRACT: (U) The objectives of this research program are to develop metalorganic chemical vapor deposition (MOCVD) techniques for Manganese-bearing II-VI ternary compounds epitaxially grown on Gallium Arsenide substrates, and to explore the usefulness of UV laser assist for deposition for superlattice structures of wider bandgap II-VI binary compounds. For the first time, high quality single-crystal (111) Cd1-xMnxTe was grown by conventional MOCVD on (100) GaAs wafers with high resolution cross-selectional transmission electron microscopy was used for structural characterization, showing atomically abrupt interfaces, but different microstructures within the epi-film depending on growth temperature. UV adsorption spectra of a number of metalalkyl sources for Cadmium, Zinc, Selenium, and Tellurium were measured and optical adsorption cross sections calculated. Preliminary depositions of Cadmium Telluride and Zinc telluride films on glass substrates were mase at 200 C with UV excitation provided by an excimer gas laser operating at 193 nm and by using a parallel beam geometry. Some optical and X-ray diffraction data are presented as well as a description of the low pressure laser photochemical deposition system. Keywords: UV Photolysis, Superlattices, Thin films, Epitaxy, II-VI Semiconductors.

AD-A191 547

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DESCRIPTORS: (U) *CADMIUM TELLURIDES, *GALLIUM ARSENIDES, *GROUP II-VI COMPOUNDS, *SEMICONDUCTORS, ADSORPTION, CHEMICAL REACTIONS, CRYSTAL LATTICES, DEPOSITION, DIFFRACTION, EXCIMERS, EXCITATION, FILMS, GAS LASERS, GEOMETRY, GLASS, GROWTH(GENERAL), LASERS, MICROSTRUCTURE, OPTICAL CROSS SECTIONS, OPTICAL DATA, OPTICS, ORGANOMETALLIC COMPOUNDS, PARALLEL ORIENTATION, PHOTOCHEMICAL REACTIONS, PHOTOLYSIS, SELENIUM, SINGLE CRYSTALS, STRUCTURES, SUBSTRATES, TELLURIDES, TELLURIUM, TEMPERATURE, THIN FILMS, ULTRAVIOLET LASERS, ULTRAVIOLET RADIATION, ULTRAVIOLET SPECTRA, VAPOR DEPOSITION, X RAY DIFFRACTION, ZINC.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305K4.

AD-A191 548 20/4

RUTGERS - THE STATE UNIV NEW BRUNSWICK NJ DEPT OF MECHANICAL AND AEROSPACE E NGINEERING

(U) Theoretical Investigation of 3-D Shock Wave-Turbulent Boundary Layer Interactions. Part 6.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 86-30 Sep 87,

JAN 88 48P

PERSONAL AUTHORS: Knight, Doyle D.

REPORT NO. RU-TR-171-MAE-F

CONTRACT NO. AFOSR-86-0268A

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR TR-88-0127

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Part 5, AD-A179 455.

ABSTRACT: (U) The research concerns the understanding of 3-D shock wave-turbulent boundary layer interactions. The research activity has focused on several areas. First, the 3-D swept compression corner has been computed at Mach 3 for a sweep angle of 40 deg and compression angle of 24 deg. The calculated flows are in good agreement with experiment. Second, the flowfield structure of the 3-D swept compression corner is dominated by a large vortical structure. Third, the interaction has been found quantitatively to be dominated by inviscid effects except within a small fraction of the boundary layer. Fourth, the effect of boundary layer bleed has been examined for the 3-D shock wave-turbulent boundary layer interaction generated by a sharp fin. The effects of bleed are principally limited to the near surface region. The overall vortical structure is insensitive to surface bleed. Keywords: High speed flows; Viscous-inviscid interactions; Computational fluid dynamics; Navier-Stokes equations.

DESCRIPTORS: (U) *BOUNDARY LAYER, *FLOW, *FLUID DYNAMICS,

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*INVISCID FLOW, *NAVIER STOKES EQUATIONS, ANGLES, COMPRESSION, COMPUTATIONS, FINS, HIGH VELOCITY, INTERACTIONS, SENSITIVITY, SHARPNESS, SURFACES, THEORY, VISCOUS FLOW, VORTICES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A1.

AD-A191 532 20/1

DELAWARE UNIV NEWARK DEPT OF MATHEMATICAL SCIENCES

(U) The Limited Aperture Problem of Inverse Acoustic Scattering: Dirichlet Boundary Conditions.

DESCRIPTIVE NOTE: Final rept.,

DEC 87 23P

PERSONAL AUTHORS: Ochs, Robert L., Jr

CONTRACT NO. AFOSR-86-0087

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR TR-88-0189

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SIAM Jnl. of Applied Mathmatics, v47 n6 p1320-1341 Dec 87.

ABSTRACT: (U) Let D be a bounded, simply connected domain in the plane and let F(theta; k, alpha sub l) be the far field pattern arising from the scattering of a time harmonic, acoustic plane wave u sub (x)=exp (ikx alpha sub l), where delta is a unit vector and k is the wave number and the time harmonic factor e - iwt has been factored out. It is assumed, in addition, that the total field satisfies homogeneous Dirichlet boundary conditions on delta D. In this paper, a method is presented for recovering delta D given the far field patterns F(theta; K, alpha sub l), l=1,...,N, for all theta in some interval (a,a + delta) strictly contained in (0,2 pi). The method used is a generalization of the orthogonal projection approach of Colton and Monk for solving the full aperture problem. In addition, the above method is numerically implemented. These computations show that one can recover by this method the shape of delta D if the length of the interval (a,a + delta) is as small as 180. Keywords: Limited aperture problem, Inverse scattering.

DESCRIPTORS: (U) *ACOUSTIC SCATTERING, *APERTURES, *INVERSE SCATTERING, BOUNDARY VALUE PROBLEMS, COMPUTATIONS, DIRICHLET INTEGRAL, FAR FIELD, FREQUENCY,

AD-A191 532 CONTINUED

HARMONICS, HOMOGENEITY, ORTHOGONALITY, PATTERNS, SHAPE, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A9.

AD-A191 531 7/4

NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) Purchase of an Array Processor to Enhance Quantum Chemistry Calculations.

DESCRIPTIVE NOTE: Final rept.,

DEC 87 14P

PERSONAL AUTHORS: Gordon, Mark S.

CONTRACT NO. AFOSR-88-0237

PROJECT NO. 2917

TASK NO. A2

MONITOR: AFOSR TR-88-0006

UNCLASSIFIED REPORT

ABSTRACT: (U) The original proposal was to add an array processor to the VAX 11/750, previously purchased with a DOD grant, in order to increase the throughput by a factor of five. However, after extensive comparative studies of array processors and stand-alone computers, it was concluded that none of the available array processors in the accessible price range were sufficiently reliable and that the desired factor of five increase in speed might not be achieved. Therefore, the alternative of trading in the VAX 11/750 on a new stand-alone computer was considered as an alternative. Benchmark tests were developed using the program GAMESS, and these benchmarks combined with known reliability led us to purchase a VAX 8530, manufactured by Digital Equipment Corporation. This computer, configured with 16 megabytes of real memory, 1.35 gigabytes of disk space, a tape drive, a printer, and a console, provides us with approximately six times the throughput of the 8530, thereby exceeding our expectations.

DESCRIPTORS: (U) *ARRAYS, *COMPUTERS, *PROCESSING EQUIPMENT, *QUANTUM CHEMISTRY, *QUANTUM STATISTICS, COSTS, DRIVES, MEMORY DEVICES, PRINTING EQUIPMENT, RELIABILITY, SELF CONTAINED, TAPES.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 530 7/2 7/3

NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) Evidence for the Formation of Diethylsilaneselone: A Reactive Intermediate with a Silicon-Selenium Double Bond.

87 3P

PERSONAL AUTHORS: Thompson, Dennis P.; Boudjouk, Philip

CONTRACT NO. AFOSR-84-0008

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-88-0182

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Chemical Society: Chemical Communications, p1466-1467 1987.

ABSTRACT: (U) Photolysis of hexamethylcyclotrisiloxane in the presence of hexamethylcyclotrisiloxane produces tetraethylcyclodisilaselenane and 4,4,6,6,8,8-hexamethyl-2,2-diethyl-1,5,7,3,2,4,6,8-trioxatetrasilaselenocane, diethylsilaneselone is postulated as an intermediate.

DESCRIPTORS: (U) *ETHYL RADICALS, *SILANES, *SILICON, *SELENIUM, PHOTOLYSIS, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A191 530

AD-A191 526 20/5

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF CHEMISTRY

(U) Reply to the 'Comment on: 'Nascent Product Excitations in Unimolecular Reactions: The Separate Statistical Ensembles Method'',

AUG 86 3P

PERSONAL AUTHORS: Wittig, C.; Nadler, I.; Reisler, H.; Noble, M.; Catanzarite, J.

CONTRACT NO. F49620-88-C-0004

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-88-0181

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v85 n3 p1710-1711, 1 Aug 86.

ABSTRACT: (U) In Troe's Comment, he points out that the SSE model, which fits our NCNO results very well, cannot provide accurate rate coefficients and does not fit the nascent state distributions for other unimolecular reactions such as H2O2 and CF3CN, which have been fit by SACM. He also discusses the most economical way to represent product distributions, and suggests the SACM is the best choice. It is important to not lose sight of the fact that statistical theories of unimolecular reactions are used for the rather practical reason that they are easy to implement and work well. There can be no first principles justification of their accuracy, regardless of how many parameters are used to fit experiments and calculations, and the parameters used in statistical models should not be assigned a physical significance that goes beyond their use. At present, it is not feasible to perform quantum scattering calculations on accurate potential energy surfaces (PES's), and even classical trajectories on accurate PES's are rare. Therefore, if the scientific community is to make useful extrapolations and predictions, it must presently rely on models which are mainly statistical. By their nature,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 526 CONTINUED

such models rely on comparisons with experimental results, for carefully chosen processes which provide tests of the different features of the models. With this philosophy in mind, the authors they have chosen to study the unimolecular reaction of NCNO, and they believe that this system provides the best set of experimental results reported to date concerning nascent product excitations.

DESCRIPTORS: (U) *STATISTICAL ANALYSIS, *MOLECULAR VIBRATION, ACCURACY, COEFFICIENTS, DISTRIBUTION, EXTRAPOLATION, MATHEMATICAL MODELS, MOLECULES, POTENTIAL ENERGY, QUANTUM STATISTICS, RATES, RESPONSE, SCATTERING, STATISTICS, REPRINTS, SURFACES, THEORY, TRAJECTORIES.

IDENTIFIERS: (U) *Unimolecular reactions, PE61102F, WUAFOSR2303B1.

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AD-A191 497 3/1

VIRGINIA UNIV CHARLOTTESVILLE DEPT OF ASTRONOMY

(U) Infrared Astronomy at Extremely Faint Light Levels in Support of the LAIRTS Program.

DESCRIPTIVE NOTE: Final technical rept. 1 Feb 85-30 Sep 87,

SEP 87 4P

PERSONAL AUTHORS: Thuan, Trinh X.

CONTRACT NO. AFOSR-85-0125

PROJECT NO. 2311

TASK NO. A1

MONITOR: AFOSR TR-88-0040

UNCLASSIFIED REPORT

ABSTRACT: (U) Near - infrared observations have been obtained for a large sample of dwarf irregular galaxies, dwarf elliptical and blue compact dwarf galaxies. Near infrared photometry was obtained for radio sources discovered in a deep VLA radio survey. Near infrared observations were also obtained for the first brightest galaxy in a sample of nearby clusters. A large redshift survey, using the 21-cm hydrogen line, of dwarf galaxies in the northern hemisphere has been completed. Work has been done to understand the stellar populations and star formation are presently occurring. Keywords: Astronomy.

DESCRIPTORS: (U) *NEAR INFRARED RADIATION, *RADIO SOURCES(ASTRONOMY), *ASTRONOMY, ASTRONOMY, GALAXIES, INFRARED RADIATION, LEVEL(QUANTITY), LIGHT, LOW INTENSITY, NORTHERN HEMISPHERE, PHOTOMETRY, POPULATION, STARS, STELLAR EVOLUTION.

IDENTIFIERS: (U) Dwarf galaxies, Infrared astronomy, PE61102F, WUAFOSR2311A1.

AD-A191 497

AD-A191 496 20/6 12/9 17/8

ARIZONA UNIV TUCSON OPTICAL SCIENCES CENTER

(U) Signal Processing with Degenerate Four-Wave Mixing.

DESCRIPTIVE NOTE: Final rept. 1 Sep 83-31 Aug 87,

DEC 87 10P

PERSONAL AUTHORS: Stegeman, G. I.; Seaton, C. T.

CONTRACT NO. AFOSR-84-0277

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR TR-88-0050

UNCLASSIFIED REPORT

ABSTRACT: (U) The original goals of this program were: 1. To demonstrate degenerate four-wave mixing in planar waveguides, 2. To fabricate nonlinear organic waveguides using the Langmuir-Blodgett (L-B) technique, and 3. To demonstrate all-optical signal processing based on degenerate four-wave mixing. During the course of this program, it became clear that nonlinear organic waveguides based on L-B deposition techniques would never exhibit losses low enough for guided-wave degenerate four-wave mixing. As a result, it was decided: 4. To develop semiconductor-doped glass waveguides, 5. To demonstrate degenerate four-wave mixing in these waveguides, and 6. To demonstrate all-optical signal processing in semiconductor-doped waveguides.

DESCRIPTORS: (U) *NONLINEAR SYSTEMS, *OPTICAL PROCESSING, *SIGNAL PROCESSING, *WAVEGUIDES, PLANAR STRUCTURES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B4.

AD-A191 496

AD-A191 495 11/6.1

CARNEGIE MELLON UNIV PITTSBURGH PA DEPT OF METALLURGICAL ENGINEERING AND MATE RIALS SCIENCE

(U) Fundamental Studies of Beta Phase Decomposition Modes in Titanium Alloys.

DESCRIPTIVE NOTE: Annual technical rept. 1 Oct 86-30 Sep 87,

JAN 88 30P

PERSONAL AUTHORS: Aaronson, H. I.; Dalley, A. M.; Furuhara, T.; Mou, Y.

CONTRACT NO. AFOSR-84-0303

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR 88-0021

UNCLASSIFIED REPORT

ABSTRACT: (U) An investigation of the interphase boundary structure of grain boundary alpha allotriomorphs in a Ti-7.15 W/O Cr alloy now in progress has established that complex, multiple sets of ledges are present at the interphase boundaries of allotriomorphs between not only the B grain with respect to which the allotriomorphs is Burgers oriented but also with respect to the adjacent B grain, with which the allotriomorph necessarily has a non-Burgers orientation relationship. Questions are arising, however, as to whether certain systems of ledges are (immobile) structural and growth ledges. Resolution of the misfit dislocations which must be present on the terraces of both types of ledges and distinguishing between misfit dislocations and ledges with short risers are important problems which have arisen in TEM studies of these interphase boundaries.

DESCRIPTORS: (U) *DECOMPOSITION, *PHASE STUDIES, *TITANIUM ALLOYS, CRYSTAL SUBSTRUCTURE, DISLOCATIONS, GRAIN BOUNDARIES, STRUCTURAL PROPERTIES, ALUMINUM ALLOYS, CRYSTAL STRUCTURE, IRON ALLOYS, SILVER ALLOYS, TITANIUM ALLOYS.

AD-A191 495

AD-A191 485 CONTINUED

IDENTIFIERS: (U) Allotriomorphs, PE61102F, WUAFOSR2306A1.

AD-A191 494 20/4

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Fundamental Aspects of the Structure of Supersonic Turbulent Boundary Layers.

DESCRIPTIVE NOTE: Final rept. Jan 85-Jan 88,

JAN 88 38P

PERSONAL AUTHORS: Smits, A. J.

CONTRACT NO. AFOSR-85-0128

PROJECT NO. 2305

TASK NO. A2

MONITOR: AFOSR TR-88-0028

UNCLASSIFIED REPORT

ABSTRACT: (U) This three-year contract originally had two tasks: to investigate the structure of flat plate supersonic turbulent boundary layers (Task A), and to investigate longitudinal curvature effects in turbulent boundary layers (Task B). As a result of the work performed under these task headings, we identified a need to study the structure of simple, wall-bounded vortex loops. This investigation (Task C) commenced in the third year, and we feel that it has made a major contribution to our understanding of the ensemble-averaged structure of low and high speed turbulent boundary layers. The progress reported here is that achieved in completing these three tasks. Keywords: Turbulent flow; Eddies(Fluid mechanics); Flow visualization.

DESCRIPTORS: (U) *TURBULENT BOUNDARY LAYER, *TURBULENT FLOW, CURVATURE, EDDIES(FLUID MECHANICS), FLOW VISUALIZATION, LENGTH, SUPERSONIC FLOW, PRESSURE GRADIENTS, CHARTS.

IDENTIFIERS: (U) Flat plates, PE61102F, WUAFOSR2307A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A191 492 10/1 22/2

INNOVATIVE SCIENCES INC SAN LEANDRO CA

(U) Electromagnetic Damping and Vibration Isolation of Space Structures.

DESCRIPTIVE NOTE: Final rept. 1 Feb-30 Sep 87,

AUG 87 66P

PERSONAL AUTHORS: Hulbert, J. K.; Maxfield, Bruce W.

REPORT NO. AFOSR.TR.87-0722A.DOC

CONTRACT NO. F49620-87-C-0029

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
88-0063

UNCLASSIFIED REPORT

ABSTRACT: (U) Structures used in the vacuum, zero gravity environment of space are quite different form earth-bound system. Vibrations induced in a space structure by the operation of equipment internal to the structure should, to the greatest extent possible, be dissipated through heat generation so that this vibrational energy is not simply redistributed throughout the structure. The usual restricted fluid flow dashpot damping system has several serious drawbacks when operating within a space environment. Phase I proposed the quantitative assessment of electromagnetic damping that results when conducting but non-magnetic body moves through a region of localized magnetic field. It was shown theoretically in the Phase I proposal that this damping should depend quadratically upon both the velocity and the magnetic field seen by the moving conducting body. From this, it follows that electromagnetic damping (ED) has the potential for both large energy and power dissipation. Although our initial approximate theoretical estimate predicted strong damping under ideal circumstances, the appropriate partial differential equations (PDE) had not been solved at the onset of Phase I. Consequently, one could not calculate the damping magnitude that might be realized under

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AD-A191 492 CONTINUED

practical conditions.

DESCRIPTORS: (U) *DAMPING, *VIBRATION ISOLATORS, *ENERGY CONVERSION, *ELECTROMECHANICAL DEVICES, *SPACE STATIONS, DISSIPATION, ELECTROMAGNETISM, ENERGY, ESTIMATES, HEAT, MAGNETIC FIELDS, MAGNETIC PROPERTIES, PARTIAL DIFFERENTIAL EQUATIONS, POWER, PRODUCTION, SPACE ENVIRONMENTS, VACUUM, VIBRATION, WEIGHTLESSNESS, STRUCTURAL RESPONSE, FINITE ELEMENT ANALYSIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B1.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A191 491 20/6 9/1 9/3

ROCHESTER UNIV N Y LAB FOR LASER ENERGETICS

(U) Air Force Ultrafast Optical Electronics Center Annual Technical Report, 1987.

DESCRIPTIVE NOTE: Rept. for 1 Nov 86-31 Oct 87,

87 24P

PERSONAL AUTHORS: Mourou, G.

CONTRACT NO. F49620-87-C-0016

PROJECT NO. 3484

TASK NO. A3

MONITOR: AFOSR
TR-88-0024

UNCLASSIFIED REPORT

ABSTRACT: (U) The general objective of the AFOSR URI Center at Rochester is to investigate the physics of electronic microstructures using ultrafast optical techniques. To achieve this goal, we have developed and improved state-of-the-art laser sources and diagnostic techniques so that optical or electrical measurements could be performed with unprecendented temporal resolution, typically in the picosecond or femtosecond domain.

DESCRIPTORS: (U) *ELECTRONICS, *LASERS, *MICROSTRUCTURE, *OPTICAL PROPERTIES, DIAGNOSIS(GENERAL), ELECTRICAL MEASUREMENT, HIGH RATE, MEASUREMENT, METHODOLOGY, OPTICS, PHYSICS, SOURCES, STATE OF THE ART.

IDENTIFIERS: (U) PE61102F, WUAFOSR3484A3.

AD-A191 491

AD-A191 489 20/4

CALIFORNIA UNIV IRVINE DEPT OF MECHANICAL ENGINEERING

(U) Study of Mixing and Reaction in the Field of a Vortex.

DESCRIPTIVE NOTE: Rept. for Oct 86-Oct 87,

NOV 87 5P

PERSONAL AUTHORS: Cetegen, B. M.; Sirignano, W. A.

CONTRACT NO. AFOSR-86-0016

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-88-0251

UNCLASSIFIED REPORT

ABSTRACT: (U) In turbulent reacting flows, completion of chemical reactions requires diffusion of reactive species at a molecular level. Eddies rich in one reactant can be present in many turbulent flows involving finite rate chemical reactions. Local species stratifications are dissipated by molecular diffusion and chemical reaction under the influence of the local flow field. In many turbulent flows, the local flow field has a strong rotational character. It is mostly this rotational motion which enhances mixing through flow stretch and convection leading to mixing at the molecular level. In this paper, molecular mixing and finite rate chemical reactions in a two dimensional viscous vortex are examined analytically. Two species initially separated across a plane are allowed to diffuse and react in the presence of a line vortex centered at this separation plane. Keywords: Turbulent reacting flows, Molecular mixing, Reaction, Turbulent structures.

DESCRIPTORS: (U) *VORTICES, *FLUID DYNAMICS, CHEMICAL REACTIONS, DIFFUSION, REACTIVITIES, CONVECTION, FLOW FIELDS, DIFFUSION, BOUNDARY LAYER, STRATIFICATION, MOLECULAR STATES, TURBULENCE, TURBULENT FLOW, TWO DIMENSIONAL, VISCOSITY, DENSITY, EQUATIONS.

IDENTIFIERS: (U) Probability density function, PE61102F, WUAFOSR2308A2.

AD-A191 489

AD-A191 460 11/8.1 11/3

ILLINOIS UNIV AT URBANA LASER AIDED MATERIALS PROCESSING LAB

(U) Effect of Extended Solid Solution of Hf on the Microstructure of the Laser Clad Ni-Fe-Cr-Al-Hf Alloys,

87 14P

PERSONAL AUTHORS: Singh, J.; Mazumder, J.

CONTRACT NO. AFOSR-85-0333

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR TR-87-1881

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Acta Metallurgica, v35 n8 p1995-2003 1987.

ABSTRACT: (U) Alloys and coatings for alloys for improved high temperature service life under aggressive atmosphere are of great contemporary interest. There is a general consensus that addition of reactive elements such as Hf will provide many beneficial effects for such alloys. The laser cladding technique was used to produce Ni-Fe-Cr-Al-Hf alloys with extended solid solution of Hf. A 10kW CO2 laser with mixed powder feed was used for laser cladding. Optical, scanning electron (SEM) and scanning transmission electron (STEM) microscopy were employed for microstructural evolution of alloys produced during laser cladding processes. The electron probe microanalysis and the auger electron spectroscopy were also used for micro-chemical analysis of different phases. Microstructural studies revealed a high degree of grain refinement, considerable increase in solubility of Hf in matrix and Hf rich precipitates and new metastable phases. This paper will report the microstructural development in this laser clad Ni-Fe-Cr-Al-Hf alloy.

DESCRIPTORS: (U) *CLADDING, *NICKEL ALLOYS, *HAFNIUM, *PROTECTIVE COATINGS, AUGER ELECTRON SPECTROSCOPY, ELECTRON PROBES, ELECTRONIC SCANNERS, GRAIN STRUCTURES(METALLURGY), HIGH TEMPERATURE, LIFE

AD-A191 460 CONTINUED

EXPECTANCY(SERVICE LIFE), METASTABLE STATE, MICROANALYSIS, MICROSCOPY, MICROSTRUCTURE, POWDERS, REPRINTS, SOLID SOLUTIONS, SOLUBILITY, TRANSMITTANCE, BONDING, IRON, CHROMIUM, ALUMINUM, YTTERBIUM, ALUMINUM OXIDES, CARBON DIOXIDE LASERS, LASER APPLICATIONS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 454 22/2 22/5 20/11

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG DEPT OF AEROSPACE AND OCE AN ENGINEERING

(U) Experimental Study of Active Vibration Control.

DESCRIPTIVE NOTE: Final technical rept. 30 Jan 86-31 Aug 87,

AUG 87 71P

PERSONAL AUTHORS: Hallauer, William L., Jr

CONTRACT NO. F49620-85-C-0024

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR TR-88-0060

UNCLASSIFIED REPORT

ABSTRACT: (U) Complementary experimental-theoretical studies were conducted on the following subjects related to the dynamics and control of flexible large spacecraft structures: 1) Transient wave propagation - Extensive results are presented for traveling waves in a laboratory structure excited by suddenly applied oscillatory point forces; 2) The dynamics of a thin-walled grid with a ridgid body slewing degree of freedom - The design, theoretical analysis, experimental testing, and experimental, and experimental-theoretical correlation are reported. Even after much refinement, the finite element model of the relatively simple structure did not satisfactorily predict the measured dynamic behavior; and 3) Active damping and control the slewsing gird with the use of structure-borne accelerometers and reaction wheel actuators - The results of an active vibration damping experiment are presented. Also discussed are the serious practical problems encountered in this research and the potential for future experiments with simultaneous control of maneuvering and vibration. Keywords: Structural dynamics; Structural wave propagation; Large spacecraft structures.

DESCRIPTORS: (U) *FLEXIBLE STRUCTURES, *SPACECRAFT COMPONENTS, *VIBRATION, *STRUCTURAL RESPONSE, CONTROL,

AD-A191 454 CONTINUED

DAMPING, DYNAMIC RESPONSE, DYNAMICS, FINITE ELEMENT ANALYSIS, GRIDS, MANEUVERABILITY, MATHEMATICAL MODELS, STRUCTURAL MEMBERS, STRUCTURAL PROPERTIES, SYNCHRONISM, THEORY, THIN WALLS, TRAVELING WAVES, WAVE PROPAGATION, SPACE STATIONS.

IDENTIFIERS: (U) Large spacecraft structures, PE61102F, WUAFOSR2302B1.

AD-A191 454

AD-A191 441 20/1

SCIENCE APPLICATIONS INTERNATIONAL CORP SAN FRANCISCO CA

(U) Transmitting Boundary for Finite-Difference Calculations with Finite Modeling of An Infinite Medium.

DESCRIPTIVE NOTE: Final rept. 1 Dec 84-30 Apr 86,

NOV 87 50P

PERSONAL AUTHORS: Yeung, William; Gross, Michael B.

CONTRACT NO. AFOSR-85-0023

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1754

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this effort was to study the construction of novel energy absorbing boundary conditions for use at the artificial far field boundaries of exterior wave problems. One approach was pursued which involves the superposition of the solutions for a fixed boundary and for a free boundary. An analytic model was used to identify the cause of the small errors that result in the cancellation process of this approach. This model showed that the appropriate velocity at the free boundary has to be modified when the computational time step is less than the maximum stable time step. First and second order corrections have been developed.

DESCRIPTORS: (U) *ENERGY ABSORBERS, *FINITE DIFFERENCE THEORY, *MATHEMATICAL MODELS, *ACOUSTIC WAVES, *NOISE REDUCTION, BOUNDARIES, CANCELLATION, COMPUTATIONS, CORRECTIONS, ERRORS, EXTERNAL, FAR FIELD, STABILITY, TIME, TRANSMITTING, ACOUSTIC REFLECTION, TRANSITIONS.

IDENTIFIERS: (U) Artificial reflections, PE61102F, WUAFOSR2304A3.

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AD-A191 431 5/1 13/8

MISSOURI UNIV-COLUMBIA

(U) An International Research Conference on Reliability and Quality.

DESCRIPTIVE NOTE: Final rept. Jun-Dec 86,

AUG 87 52P

PERSONAL AUTHORS: Basu, Asit P.

CONTRACT NO. AFOSR-86-0122

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1571

UNCLASSIFIED REPORT

ABSTRACT: (U) Partial Contents: The Role of Statistics in Industry; Statistical Problems in Developing Aided Engineering Methods for Designing Quality and Reliability into Products; Repairable Systems Reliability: Research Topics and Presentation of Research Results; An Investigation of Parameter Design Optimization; A Geometric Representation of Taguchi Signal to Noise Ratio; Measuring Variation for Quality Control; Bayesian Test Design for Bernoulli Processes - An Application; and Some Recent Results on Accelerated Life Testing.

DESCRIPTORS: (U) *QUALITY CONTROL, *RELIABILITY, ACCELERATED TESTING, BAYES THEOREM, ENGINEERING, EXPERIMENTAL DESIGN, GEOMETRIC FORMS, INDUSTRIES, INTERNATIONAL, LIFE TESTS, MEASUREMENT, OPTIMIZATION, REPAIR, SIGNAL TO NOISE RATIO, STATISTICS, SYMPOSIA, VARIATIONS, ACCELERATED TESTING, BAYES THEOREM, ENGINEERING, EXPERIMENTAL DESIGN, GEOMETRIC FORMS, INDUSTRIES, INTERNATIONAL, LIFE TESTS, MEASUREMENT, OPTIMIZATION, PARAMETERS, QUALITY CONTROL, RELIABILITY, REPAIR, SIGNAL TO NOISE RATIO, STATISTICS, SYMPOSIA, VARIATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 416 20/12 9/1 20/2

ILLINOIS UNIV CHAMPAIGN

(U) International Conference on Superlattices, Microstructures and Microdevices (3rd) Held in Chicago, Illinois on August 17-20, 1987.

DESCRIPTIVE NOTE: Final rept. 11-20 Aug 87,

AUG 87 175P

PERSONAL AUTHORS: Vojak, Bruce

CONTRACT NO. AFOSR-ISSA-87-0056

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR
TR-88-0005

UNCLASSIFIED REPORT

ABSTRACT: (U) The Third International Conference on Superlattices, Microstructures, and Microdevices was successfully held at the Westin Hotel, Chicago, on August 17-20, 1987. There were 286 attendees from around world who contributed 68 oral and 160 poster presentations on their research on ultra-small structures with application in optics and electronics. Unsolicited comments from attendees indicated that the quality of the technical presentations was very high. The conference was also a financial success based on costs relative to our 1985 estimates and value relative to price paid by attendees.

DESCRIPTORS: (U) *COSTS, *ELECTRONICS, *MICROSTRUCTURE, ILLINOIS, INTERNATIONAL, OPTICS, SYMPOSIA.

IDENTIFIERS: (U) PE61102f.

AD-A191 416

AD-A191 413 7/4

OKLAHOMA STATE UNIV STILLWATER DEPT OF CHEMISTRY

(U) Effect of the Lattice Model on the Dynamics of Dissociative Chemisorption of H2 on a Si(111) Surface,

87 20P

PERSONAL AUTHORS: Agrawal, Paras M.; Raff, Lionel M.; Thompson, Donald L.

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-87-1992

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Surface Science, v188 p402-420 1987.

ABSTRACT: (U) The effects of (a) surface relaxation to the 'bath' modes of the bulk, (b) the number of lattice atoms explicitly considered in the primary reaction zone, (c) lattice force constants, and (d) the functional form of the lattice potential upon the dynamics of H2 chemisorption on a Si(111) surface have been investigated. The H2 sticking probabilities, energy transfer rates out of the newly formed Si-H bond, and instantaneous surface mobilities have been computed. The sticking probabilities are virtually independent of surface relaxation, the size of the lattice model, and the nature of the lattice potential. Si-H vibrational energy transfer rates are increased and surface mobilities are decreased by inclusion of relaxation. However, the magnitude of these effects is less than a factor of two. Variation of the lattice potential is likewise found to exert a small effect upon the Si-H energy transfer rates and surface mobilities. The origin of these effects appears to be related to resonance effects between the Si-H vibrational motion and the phonon modes of the lattice. The results suggest that a three-layer lattice model with 25 atoms in the primary reaction zone is sufficient for this system. When primary zones of this size are employed, surface relaxation to the 'bath' modes of the bulk are not of major importance for semiconductor systems at low temperatures.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A191 413 CONTINUED

DESCRIPTORS: (U) *CHEMISORPTION, *CHEMICAL DISSOCIATION, *HYDROGEN, *LATTICE DYNAMICS, BATHS, DYNAMICS, LOW TEMPERATURE, MOBILITY, REPRINTS, PHONONS, RELAXATION, RESONANCE, SEMICONDUCTORS, SILICON, SURFACES, CHEMICAL BONDS, VIBRATION, ENERGY TRANSFER, GAS SURFACE INTERACTIONS, ADHESION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

AD-A191 389 12/3

COLUMBIA UNIV NEW YORK

(U) Studies in Reliability and Inference.

DESCRIPTIVE NOTE: Final rept. Oct 86-Sep 87,

JAN 88

PERSONAL AUTHORS: Robbins, H.; Katehakis, M.

CONTRACT NO. AFOSR-87-0072

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-88-0151

UNCLASSIFIED REPORT

ABSTRACT: (U) During this one year the grant research was continued on new problems in parameter estimation. Other research centered on the anti-search problems of target detection and on problem and models of optimal repair allocation. Finally, a mini-conference on Statistical Reliability and Related Topics was organized.

DESCRIPTORS: (U) *RELIABILITY, *STATISTICAL INFERENCE, ESTIMATES, PARAMETERS, REPAIR, TARGET DETECTION, OPTIMIZATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 380 20/4

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) Simulation of Laminar-Turbulent Transition in the Vicinity of a Wall.

DESCRIPTIVE NOTE: Final rept. Feb-Oct 87,

JAN 88 7P

PERSONAL AUTHORS: Ferziger, Joel H.; Reed, Helen L.

CONTRACT NO. AFOSR-84-0083

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR TR-88-0027

UNCLASSIFIED REPORT

ABSTRACT: (U) Numerical simulation was used to explore the process of transition that a flow undergoes in changing from a laminar state to a turbulent state. The effort concentrated on three relatively simple flows for which extensive databases exist; these are the plane channel, curved channel, and flat boundary layer flows. Significant results were produced for all three cases.

DESCRIPTORS: (U) *BOUNDARY LAYER FLOW, *FLOW, *LAMINAR FLOW, CHANNELS, CURVATURE, DATA BASES, MATHEMATICAL MODELS, NUMERICAL ANALYSIS, SIMULATION, TRANSITIONS, TURBULENCE, TURBULENT FLOW.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A2.

AD-A191 380

AD-A191 379 9/1 20/12 20/8 9/3 14/2

STANFORD UNIV CA EDWARD L GINZTON LAB OF PHYSICS

(U) Instrumentation for Ultrafast Electronics.

DESCRIPTIVE NOTE: Final rept. 1 Oct 86-30 Sep 87,

NOV 87 122P

PERSONAL AUTHORS: Bloom, D. M.

CONTRACT NO. AFOSR-87-0032

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR TR-88-0008

UNCLASSIFIED REPORT

ABSTRACT: (U) Increasing numbers of III-V compound semiconductor devices and circuits operate in a regime where internal node testing with traditional electronic means proves impossible due to circuit loading and limited time resolution. Electrooptic sampling employs picosecond infrared laser pulses to non-invasively examine internal node voltages with 100 GHz bandwidth. Under this grant, a very low phase noise synthesizer was purchased to provide stable drive to the laser mode-locker, and a microwave synthesizer was purchased to drive the device under test up to 40 GHz. In addition, a computer aided design graphics workstation was purchased to permit the design of novel ultrafast devices. In-house design, fabrication, and detailed diagnostic testing of ultrafast III-V integrated circuits are now all possible at this unique facility.

DESCRIPTORS: (U) *CIRCUITS, *ELECTRONICS, *ELECTROOPTICS, *GROUP III COMPOUNDS, *GROUP V COMPOUNDS, *INFRARED LASERS, *INFRARED PULSES, *INTEGRATED CIRCUITS, *SAMPLING, DIAGNOSIS(GENERAL), DRIVES, FREQUENCY SYNTHESIZERS, HIGH RATE, INTERNAL, MICROWAVE EQUIPMENT, NODES, NUMBERS, RESOLUTION, STABILITY, TEST AND EVALUATION, TIME, VOLTAGE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A3.

AD-A191 379

AD-A191 358 22/1 20/11

VIRGINIA UNIV CHARLOTTESVILLE DEPT OF ELECTRICAL ENGINEERING

(U) Vibration Control of Large Structures.

DESCRIPTIVE NOTE: Final technical rept. 1 Jan-31 Dec 86,

SEP 87 33P

PERSONAL AUTHORS: Amos, Anthony K.

REPORT NO. UVA/525873/MAE88/101

CONTRACT NO. F49620-86-K-0009

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR TR-88-0007

UNCLASSIFIED REPORT

ABSTRACT: (U) This is a study of vibration control for large space structures. Advantage is taken of the limiting performance characteristics of dynamic systems. This approach permits large problems with constraints to be analyzed. A modal formulation for the limiting performance was developed in order to enhance the applicability of limiting performance to large structural systems. One effort to develop an optimal control system is based on the limiting performance approach in combination with classical/optimal control theory. A limiting-performance/minimum-time solution was formulated to achieve the goal of rapid suopression of disturbances. Classical/optimal control studies show that a position loop might be useful in taking care of constraint controllers, such as proof-mass dampers. Finally, to derive feedback control law based on the limiting performance characteristics, parameter identification technique has been under investigation.

DESCRIPTORS: (U) *VIBRATION, *SPACE SYSTEMS, CONTROL, CONTROL SYSTEMS, CONTROL THEORY, DYNAMICS, FEEDBACK, FORMULATIONS, IDENTIFICATION, LIMITATIONS, LOOPS, OPTIMIZATION, POSITION(LOCATION), SPACECRAFT, STRUCTURES, DYNAMIC RESPONSE, DAMPING, SUPPRESSION, PERTURBATIONS.

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IDENTIFIERS: (U) Large space structures, Vibration control, PE61102F, WUAFOSR2302B1.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 357 12/9

VIRGINIA UNIV CHARLOTTESVILLE DEPT OF ELECTRICAL ENGINEERING

(U) A Sensor with Biological Preprocessing Features.

DESCRIPTIVE NOTE: Final rept. 1 Sep-31 Oct 87,

DEC 87 113P

PERSONAL AUTHORS: Inigo, Rafeal M.; Narathong, Chiewcharn; Doner, Jonathan F.; McVey, Eugene S.; Minnix, Jay I.

REPORT NO. UVA/525679/EE88/101

CONTRACT NO. AFOSR-85-0363

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR TR-88-0048

UNCLASSIFIED REPORT

ABSTRACT: (U) This report discusses on A Sensor with Biological Preprocessing Features during the period February 1, 1986 to October 31, 1987. The first part of the report reviews the basic geometric sensor configuration and its mapping to computation plane. Three basic configurations are discussed and their application to edge and short range motion detection follows. The next section covers a qualitative long range motion detection algorithm. The algorithm was tested first with synthetic images and next real images, and in both cases the results were very satisfactory. The algorithm is now being tested with multiple images. A one line correlation tracker is discussed in the next section. The correlation tracker can be implemented with parallel architecture and is, very fast. Tests have been performed with satisfactory results using real images. Pattern recognition using BVS together with a class transforms which are invariant to translations is discussed. It should be possible to implement this pattern recognition system using neural networks. A preliminary neural network implementation is given. The use of learning neural nets will allow recognition of sensor follows. A hardware configuration is proposed to map a rectangular

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array into a log-spiral array; and an error analysis is performed. Finally, depth computation from optical flow using the new sensor is discussed. Keywords: Cybernetics; Image processing; Spatial distribution; Two dimensional; Three dimensional; Computer simulation.

DESCRIPTORS: (U) *CYBERNETICS, *DETECTORS, *IMAGE PROCESSING, *PREPROCESSING, *SPATIAL DISTRIBUTION, ALGORITHMS, ARCHITECTURE, ARRAYS, BIOLOGY, COMPUTATIONS, COMPUTERIZED SIMULATION, CONFIGURATIONS, CORRELATION, DEPTH, DETECTION, EDGES, ERROR ANALYSIS, FLOW, GEOMETRIC FORMS, IMAGES, LEARNING, LINE SPECTRA, MAPPING, MOTION, NEURAL NETS, OPTICAL PROPERTIES, PATTERN RECOGNITION, RECOGNITION, RECTANGULAR BODIES, SHORT RANGE(DISTANCE), SYNTHESIS, TRACKING, PARALLEL PROCESSING, VISION.

IDENTIFIERS: (U) Motion detectors, PE61102F, WUAFOSR2305B4.

AD-A191 357

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 334 12/4

MISSOURI UNIV-COLUMBIA DEPT OF COMPUTER SCIENCE

(U) Iterative Methods for Linear Complementarity and Related Problems.

DESCRIPTIVE NOTE: Final rept. 1 Sep 85-31 Jan 86,

JAN 86 4P

PERSONAL AUTHORS: Shiau, Tzong-Huei

CONTRACT NO. AFOSR-85-0319

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1885

UNCLASSIFIED REPORT

ABSTRACT: (U) We have established that solutions of linear programs are globally Lipschitz continuous with respect to right-hand side perturbation of the constraints, but are not even locally Lipschitz continuous with respect to perturbation of the cost function. The latter implies that solutions of monotone linear complementarity problems are not Lipschitz continuous with respect to right-hand side perturbation of the constraints. On the other hand, we established that solutions of linear complementary problems with matrices with positive principal minors do have this Lipschitz continuity property. This includes strictly monotone linear complementary problems. We established that the distance between an arbitrary point and the solution set of a monotone linear complementarity problem is bounded by the product of a condition of the complementarity problem conditions by the point considered. When the point violates only the complementary condition, but satisfies the linear equalities, the residual consists of x to the T power times (Mx+q) plus its square root. The square root term is essential and without which the bound cannot hold. The result has import applications in the design and analysis of iterative methods for solving monotone linear complementarity problems.

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DESCRIPTORS: (U) *LINEAR PROGRAMMING, CONTINUITY, COSTS, ITERATIONS, LINEARITY, MONOTONE FUNCTIONS, PERTURBATIONS, SOLUTIONS(GENERAL), SQUARE ROOTS, INEQUALITIES.

IDENTIFIERS: (U) Lipschitz continuity, *Linear complementarity, Cost functions, PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A191 329 12/2

ILLINOIS UNIV AT URBANA COORDINATED SCIENCE LAB

(U) Distributed Algorithms for the Computation of Noncooperative Equilibria,

87 12P

PERSONAL AUTHORS: Li, Shu; Basar, Tamer

CONTRACT NO. AFOSR-84-0058

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-87-0997

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Automatica, v23 n4 p523-533 1987.

ABSTRACT: (U) In this paper, a general class of nonquadratic convex Nash games is studied, from the points of view of existence, stability and iterative computation of noncooperative equilibria. Conditions for contraction of general nonlinear operators are obtained, which are then used in the stability study of such games. These lead to existence and uniqueness conditions for analysis. Also, convergence of an algorithm which employs inaccurate search techniques is verified. It is shown in the context of a fish war example that the algorithm given is in some aspects superior to various algorithms found in the literature, and is furthermore more meaningful for real world implementation. Keywords: Game theory, Numerical methods and procedures, Reprints.

DESCRIPTORS: (U) *GAME THEORY, ALGORITHMS, COMPUTATIONS, DISTRIBUTION, ITERATIONS, NUMERICAL METHODS AND PROCEDURES, REPRINTS, SEARCHING, STABILITY.

IDENTIFIERS: (U) Existance theorems, Uniqueness theorems, Nash Games, WUAFOSR2304A1, PE61102F.

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AD-A191 310 11/4

OXFORD UNIV (ENGLAND) DEPT OF ENGINEERING SCIENCE

(U) Behaviour of Fibre-Reinforced Composites under Dynamic Loading.

DESCRIPTIVE NOTE: Final rept. 1 May-14 Nov 86,

OCT 87 79P

PERSONAL AUTHORS: Saka, K.; Li, R. K.; Harding, J.

CONTRACT NO. AFOSR-85-0218

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR TR-88-0061

UNCLASSIFIED REPORT

ABSTRACT: (U) Stress-strain curves are presented for tensile impact tests on plain-weave glss/epoxy and plain-weave carbon/epoxy laminates loaded in a direction at 45 deg to both the warp and weft directions. From the initial linear-elastic response the in-plane shear moduli for the two types of reinforcement at impact rates of strain are derived. In conjunction with results previously obtained from tensile impact tests on the same laminates loaded in the warp and the weft directions, two-dimensional stiffness matrices for both the glass-fabric and the carbon-fabric reinforced plies are determined. When compared with similar stiffness matrices previously obtained under quasi-static loading a marked effect of strain rate is apparent, particularly for the glass-reinforced ply. Keywords: Fibre reinforced composites, Tensile impact testing, Hopkinson-bar.

DESCRIPTORS: (U) *DYNAMIC LOADS, *FIBER REINFORCED COMPOSITES, *EPOXY LAMINATES, *CARBON REINFORCED COMPOSITES, ELASTIC PROPERTIES, IMPACT TESTS, LAMINATES, MATRICES(MATHEMATICS), STATIC LOADS, STIFFNESS, STRAIN RATE, TENSILE PROPERTIES, TENSILE TESTERS, TEST AND EVALUATION, STRESS STRAIN RELATIONS, FAILURE(MECHANICS), GLASS FIBERS.

IDENTIFIERS: (U) Impact damage, PE81102F.

AD-A191 310

AD-A191 297 20/8 20/12

FLORIDA UNIV GAINESVILLE DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) Investigation of Non-Linear Optical Behavior of Semiconductors for Optical Switching. Volume 1.

DESCRIPTIVE NOTE: Final rept. 1 Oct 84-30 Sep 86,

SEP 87 255P

PERSONAL AUTHORS: Simmons, Joseph H.

CONTRACT NO. AFOSR-84-0395

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-88-0133

UNCLASSIFIED REPORT

ABSTRACT: (U) Studies were conducted on semiconductor doped filter glasses which have been observed to exhibit third order optical non-linearity. This NLO behavior switches on and off in sub-picosecond times. However, the switching time, the NLO coefficient and the operating temperature are affected by the microstructure of the precipitated CdS and CdSe semiconductors. Studies were conducted to examine the crystal microstructures developed in these filter glasses and to correlate them with the optical properties of the semiconductors. There appears to be a potential for an increase in NLO coefficient by a factor of 10 to 1000 with the development of a suitable microstructure. Results and implications of the studies are presented. Studies on thin films of semiconducting CdS showed that microstructure can be controlled by suitable sputtering conditions. Strong exciton transitions were observed and have a high potential for NLO behavior. Composite thin films of CdS semiconducting crystals confined in a glass matrix were formed by co-evaporation. Studies of the phase separation behavior of fluoride glasses were continued in the system: CdF2, LiF, AlF3, PbF2. Two levels of phase separation were observed, consisting of a large microstructure of isolated spheres 3-10 micron in diameter, and a very small interconnected microstructure

resulting from secondary phase separation.

DESCRIPTORS: (U) *CIRCUIT INTERCONNECTIONS, *CRYSTALS, *GLASS, *FLUORIDES, *MATRIX MATERIALS, *NONLINEAR SYSTEMS, *OPTICAL PROPERTIES, *OPTICAL SWITCHING, *SEMICONDUCTORS, *THIN FILMS, BEHAVIOR, COEFFICIENTS, COMPOSITE MATERIALS, FILMS, FILTERS, MICROSTRUCTURE, PHASE, PHASE STUDIES, SECONDARY, SEPARATION, SPUTTERING, SWITCHES, SWITCHING, TIME.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A191 296 12/6 12/3

COLORADO STATE UNIV FORT COLLINS

(U) Computer Science and Statistics. Proceedings of the Symposium on the Interface (18th) Held on March 19-21, 1986 in Fort Collins, Colorado.

DESCRIPTIVE NOTE: Final rept. 15 Feb 86-14 Feb 87,

AUG 87 449P

PERSONAL AUTHORS: Boardman, Thomas J.

CONTRACT NO. AFOSR-86-0070

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-88-0153

UNCLASSIFIED REPORT

ABSTRACT: (U) Contents: Parallel Algorithms-Tutorial; Parallel Architecture in Statistics; Medical Decision Making; Controlling Graphics; Remote Sensing and Image Processing; The Language of Data; Knowledge Based Systems; Computer Support for Survey Sampling; Managing the Data Analysis Environment; Recent Developments in Multivariate Data Analysis Graphics; Computationally Intensive Methods and Supercomputers; Benchmarking Vendor Packages; Future Directions for Statistical Software; Frontiers in Simulation and Statistics I; Frontiers in Simulation and Statistics II; and Optimization Algorithms for Statistical Problems; and other Contributed Papers.

DESCRIPTORS: (U) *COMPUTERS, *STATISTICS, *SYMPOSIA, COLORADO, COMPUTERS, IMAGE PROCESSING, DECISION MAKING, MEDICINE, ALGORITHMS, OPTIMIZATION, REMOTE DETECTORS, STATISTICS, SUPERCOMPUTERS, DATA PROCESSING, DATA PROCESSING, MULTIVARIATE ANALYSIS, SIMULATION, COMPUTER PROGRAMS, SAMPLING, SURVEYS, COMPUTER GRAPHICS, COMPUTER ARCHITECTURE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

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AD-A191 285 5/1 5/6

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force Summer Faculty Research Program (1987). Program Technical Report. Volume 3.

DESCRIPTIVE NOTE: Annual rept.,

DEC 87 1037P

PERSONAL AUTHORS: Darrah, Rodney C.; Kopka, Richard; Espy, Susan K.

CONTRACT NO. F49620-85-C-0013

PROJECT NO. 3396

TASK NO. D5

MONITOR: AFOSR TR-88-0214

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 1, AD-A191 283.

ABSTRACT: (U) The U.S. AF Summer Faculty Research Program (USAF-SFRP) is a program designed to introduce university, college, and technical institute faculty members to Air Force research. This is accomplished by the faculty members being selected on a nationally advertised competitive basis for a ten-week assignment during the summer intersession period to perform research at Air Force laboratories/centers. Each assignment is in a subject area and at an Air Force facility mutually agreed upon by the faculty members and the Air Force. In addition to compensation, travel and cost of living allowances are also paid. The specific objectives of the 1987 USAF-SFRP are: (1) To provide a productive means for Scientists and Engineers holding Ph.D degrees to participate in research at the Air Force Weapons Laboratory; (2) To stimulate continuing professional association among the Scholars and their professional peers in the Air Force; (3) To further the research objectives of the United States Air Force; and (4) To Enhance the research productivity and capabilities of Scientists and Engineers especially as these relate to Air Force technical interests.

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DESCRIPTORS: (U) *AIR FORCE RESEARCH, *AIR FORCE PERSONNEL, *RESEARCH MANAGEMENT, AIR FORCE FACILITIES, COMPENSATION, COSTS, INSTRUCTORS, LABORATORIES, MILITARY FORCES(UNITED STATES), PRODUCTIVITY, SUMMER, TRAVEL, UNIVERSITIES, PERSONNEL MANAGEMENT, SCIENTISTS, ENGINEERS, STUDENTS.

AD-A191 285

AD-A191 284 5/1 5/6

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force Summer Faculty Research Program (1987). Program Technical Report. Volume 2.

DESCRIPTIVE NOTE: Annual rept.,

DEC 87 1023P

PERSONAL AUTHORS: Darrah, Rodney C.; Kopka, Richard; Espy, Susan K.

CONTRACT NO. F49620-85-C-0013

PROJECT NO. 3396

TASK NO. D5

MONITOR: AFOSR TR-88-0213

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 3, AD-A191 285.

ABSTRACT: (U) The U.S. AF Summer Faculty Research Program (USAF-SFRP) is a program designed to introduce university, college, and technical institute faculty members to Air Force research. This is accomplished by the faculty members being selected on a nationally advertised competitive basis for a ten-week assignment during the summer intersession period to perform research at Air Force laboratories /centers. Each assignment is in a subject area and at an Air Force facility mutually agreed upon by the faculty members and the Air Force. In addition to compensation, travel and cost of living allowances are also paid. The specific objectives of the 1987 USAF-SFRP are: (1) To provide a productive means for Scientists and Engineers holding Ph.D degrees to participate in research at the Air Force Weapons Laboratory; (2) To stimulate continuing professional association among the Scholars and their professional peers in the Air Force; (3) To further the research objectives of the United States Air Force; and (4) To Enhance the research productivity and capabilities of Scientists and Engineers especially as these relate to Air Force technical interests.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 284 CONTINUED

DESCRIPTORS: (U) *AIR FORCE RESEARCH, *AIR FORCE PERSONNEL, *RESEARCH MANAGEMENT, AIR FORCE FACILITIES, COMPENSATION, COSTS, INSTRUCTORS, LABORATORIES, MILITARY FORCES(UNITED STATES), PRODUCTIVITY, SUMMER, TRAVEL, UNIVERSITIES, PERSONNEL MANAGEMENT, ENGINEERS, SCIENTISTS, STUDENTS.

IDENTIFIERS: (U) WUAFOSR3396D5, PE61102F.

AD-A191 283 5/1 5/8

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force Summer Faculty Research Program (1987). Program Technical Report. Volume 1.

DESCRIPTIVE NOTE: Annual rept.,

DEC 87

PERSONAL AUTHORS: Darrah, Rodney C.; Kopka, Richard; Espy, Susan K.

CONTRACT NO. F49620-85-C-0013

PROJECT NO. 3396

TASK NO. D5

MONITOR: AFOSR TR-88-0212

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 2, AD-A191 284.

ABSTRACT: (U) The U.S. AF Summer Faculty Research Prgram (USAF-SFRP) is a program designed to introduce university, college, and technical institute faculty members to Air Force research. This is accomplished by the faculty members being selected on a nationally advertised competitive basis for a ten-week assignment during the summer intersession period to perform research at Air Force laboratories/centers. Each assignment is in a subject area and at an Air Force facility mutually agreed upon by the faculty members and the Air Force. In addition to compensation, travel and cost of living allowances are also paid. The specific objectives of the 1987 USAF-SFRP are: (1) To provide a productive means for Scientists and Engineers holding Ph.D. degrees to participate in research at the Air Force Weapons Laboratory; (2) To stimulate continuing professional association among the Scholars and their professional peers in the Air Force; (3) To further the research objectives of the United States Air Force; and (4) To enhance the research productivity and capabilities of Scientists and Engineers especially as these relate to Air Force technical interests.

AD-A191 283 CONTINUED

DESCRIPTORS: (U) *AIR FORCE RESEARCH, *AIR FORCE PERSONNEL, *RESEARCH MANAGEMENT, AIR FORCE FACILITIES, AIR FORCE, COMPENSATION, INSTRUCTORS, SUMMER, LABORATORIES, COSTS, PRODUCTIVITY, TRAVEL, UNIVERSITIES, PERSONNEL MANAGEMENT, SCIENTISTS, ENGINEERS, STUDENTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR3396D5.

AD-A191 282 5/1 5/6

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force Graduate Student Summer Support Program (1987). Program Management Report.

DESCRIPTIVE NOTE: Annual rept.,

DEC 87 200P

PERSONAL AUTHORS: Darrah, Rodney C.; Kopka, Richard; Espy, Susan K.

CONTRACT NO. F49620-85-C-0013

PROJECT NO. 3396

TASK NO. D5

MONITOR: AFOSR TR-88-0208

UNCLASSIFIED REPORT

ABSTRACT: (U) The Graduate Student Summer Support Program (GSSSP) is conducted as part of the Summer Faculty Research Program. The program provides opportunities for research in the physical sciences, engineering, life sciences, business, and administrative sciences. The program has been effective in providing basic research opportunities to the Graduate Students of universities, colleges, and technical institutions throughout the United States. The program is available to Graduate Students enrolled in either Masters Degree or Doctorate Programs. It has proven especially beneficial to the students who are starting their academic research programs. Beginning with the 1982 program, research opportunities were provided for 17 graduate students. The 1982 pilot student program was highly successful and was expanded in 1983 to 53 students; there were 84 graduate students in the 1984 program. In the previous programs, the graduate students were selected along with their professors to work on the program. For the 1985 program, the graduate students were selected on their own merits. They were assigned to be supervised by either a professor on the program or by an engineer at the Air Force Laboratories participating in the program. There were 101 graduate students selected for the 1987 program. Its purpose is to provide funds for selected graduate

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 282 CONTINUED

students to work at appropriate Air Force laboratories or centers with supervising professors who hold concurrent SFRP appointments.

DESCRIPTORS: (U) *RESEARCH MANAGEMENT, *AIR FORCE PERSONNEL, *AIR FORCE RESEARCH, AIR FORCE FACILITIES, INSTRUCTORS, LABORATORIES, LIFE SCIENCES, MANAGEMENT, PHYSICAL SCIENCES, STUDENTS, SUMMER, UNIVERSITIES, GRADUATES, MILITARY FORCES(UNITED STATES).

IDENTIFIERS: (U) WUAFOSR3396D5.

AD-A191 274 11/6.1

ILLINOIS UNIV AT URBANA LASER AIDED MATERIALS PROCESSING LAB

(U) Laser Cladding of Ni, Nb, and Mg Alloys for Improved Environmental Resistance at High Temperature.

DESCRIPTIVE NOTE: Annual progress rept. Nov 86-Oct 87,

OCT 87 208P

PERSONAL AUTHORS: Mazumder, J.

CONTRACT NO. AFOSR-85-0333

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR TR-87-1858

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes experimental and theoretical studies carried out during the period of Nov 1986 to Oct 1987 on laser cladding of Ni and Nb alloys for improved environmental resistance at high temperature. Major emphasis has been on Ni-Cr-Al-Hf system. Microstructural evolution and oxidation properties of these alloys were examined. For Nb alloys microstructural characterization and differential thermal analysis were carried out. One-dimensional diffusion model for finite domain to examine the extended solid solubility in laser cladding was also developed.

DESCRIPTORS: (U) *MAGNESIUM ALLOYS, *NICKEL ALLOYS, *NIOBIUM ALLOYS, *X RAY SPECTROSCOPY, *ENVIRONMENTAL TESTS, ALUMINUM, CHROMIUM, CLADDING, DIFFERENTIAL THERMAL ANALYSIS, DIFFUSION, EXPERIMENTAL DATA, HAFNIUM, LASERS, MICROSTRUCTURE, NICKEL, ONE DIMENSIONAL, OXIDATION, SOLUBILITY, INTERFACES, PHASE TRANSFORMATIONS, MARTENSITE, EUTECTICS, MATHEMATICAL MODELS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 255 20/4

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MATHEMATICS

(U) Final Report on AFOSR (Air Force Office of Scientific Research) Contract F49620-83-C-0064 on Massachusetts Institute of Technology, Cambridge. Volume 3.

DESCRIPTIVE NOTE: Rept. for 1 Feb 83-30 Nov 84,

MAY 87 46P

PERSONAL AUTHORS: Orszag, Steven A.

CONTRACT NO. F49620-83-C-0064

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR
TR-87-1390-VOL-3

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 1, AD-A191 253.

ABSTRACT: (U) The initiation and early growth of spots in channel and boundary layer flows is simulated using a three dimensional spectral code. The simulated spots show significant agreement with available experimental data for such quantities as growth rates and spreading angles. Disturbances are irtroduced into the center and edge of the developing channel spots to investigate the relative sensitivity of spots. Keywords: Navier Stokes equations, Incompressible flow, Marching multigrid nonlinear method.

DESCRIPTORS: (U) *BOUNDARY LAYER FLOW, *CHANNEL FLOW, *MATHEMATICAL MODELS, GROWTH(GENERAL), RATES, NAVIER STOKES EQUATIONS, CODING, SPECTRA, THREE DIMENSIONAL, EXPERIMENTAL DATA, INCOMPRESSIBLE FLOW, NONLINEAR SYSTEMS, COMPUTATIONS.

IDENTIFIERS: (U) Spots.

AD-A191 255

AD-A191 254 20/4 12/1

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MATHEMATICS

(U) Final Report on AFOSR (Air Force Office of Scientific Research) Contract F49620-83-C-0064 on Massachusetts Institute of Technology, Cambridge. Volume 2.

DESCRIPTIVE NOTE: Rept. for 1 Feb 83-30 Nov 84,

MAY 87 29P

PERSONAL AUTHORS: Orszag, Steven A.

CONTRACT NO. F49620-83-C-0064

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR
TR-87-1390-VOL-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 3, AD-A191 255.

ABSTRACT: (U) Downstream marching iterative schemes for the solution of the Parabolized or Thin Layer(PNS or TL) Navier-Stokes equations are described. Modifications of the primitive equation global relaxation sweep procedure result in efficient second-order marching schemes. These schemes take full account of the reduced order of the approximate equations as they behave like the SLOR for a single elliptic equation. The improved smoothing properties permit the introduction of Multi-Grid Acceleration. The proposed algorithm is essentially Reynolds number independent and therefore can be applied to the solution of the subsonic Euler equations. The convergence rates are similar to those obtained by the Multi-Grid solution of a single elliptic equation; the storage on is also comparable as only the pressure has to be stored all levels. Extensions to three-dimensional and compressional subsonic flows are discussed. Numerical results are presented. Keywords: Steady imcompressible two dimensional equations.

DESCRIPTORS: (U) *ITERATIONS, *NAVIER STOKES EQUATIONS, ADAPTERS, ALGORITHMS, CONVERGENCE, DIFFERENTIAL EQUATIONS, ELLIPSES, NUMERICAL ANALYSIS, RATES, SOLUTIONS(GENERAL),

AD-A191 254

AD-A191 254 CONTINUED

STORAGE, SUBSONIC FLOW, THREE DIMENSIONAL FLOW, INCOMPRESSIBILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A2.

AD-A191 253 20/4

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MATHEMATICS

(U) Final Report on AFOSR (Air Force Office of Scientific Research) Contract F49620-83-C-0064 on Massachusetts Institute of Technology, Cambridge. Volume 1.

DESCRIPTIVE NOTE: Rept. for 1 Feb 83-30 Nov 84,

MAY 87 50P

PERSONAL AUTHORS: Orszag, Steven A.

CONTRACT NO. F49620-83-C-0064

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR TR-87-1390-VOL-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 2, AD-A191 254.

ABSTRACT: (U) This document contains papers which summarize work done on this research project. The major results include: 1) Development of renormalization group techniques for large-eddy simulations of turbulent flows; 2) The first direct numerical simulation of turbulent spots in channel and boundary layer flows; 3) The further development of spectral methods for turbulence simulations; 4) The identification of secondary instability modes in free shear layers; 5) The development of an efficient multi-grid marching method for solution of the parabolized Navier-Stokes equations; 6)A mathematical analysis of boundary conditions for the parabolized compressible Navier-Stokes equations; and 7) The further development of a method to improve numerical solution of singular perturbation problems by use of asymptotic approximations.

DESCRIPTORS: (U) *BOUNDARY LAYER FLOW, *TURBULENCE, APPROXIMATION(MATHEMATICS), ASYMPTOTIC SERIES, BOUNDARIES, COMPRESSIBLE FLOW, LAYERS, MATHEMATICAL ANALYSIS, MATHEMATICAL MODELS, NAVIER STOKES EQUATIONS, NUMERICAL ANALYSIS, PARABOLAS, PERTURBATIONS, SECONDARY, SHEAR PROPERTIES, SIMULATION, SOLUTIONS(GENERAL), STABILITY,

AD-A191 254

AD-A191 253

AD-A191 253 CONTINUED

TURBULENT FLOW, CHANNEL FLOW, EDDIES(FLUID MECHANICS).

IDENTIFIERS: (U) Parabolic differential equations, PE61102F, WUAFOSR2307A2.

AD-A191 244 5/8 6/4

ILLINOIS UNIV CHAMPAIGN COGNITIVE PSYCHOPHYSIOLOGY LAB

(U) The Event-Related Brain Potential as an Index of Information Processing and Cognitive Activity: A Program of Basic Research.

DESCRIPTIVE NOTE: Final technical rept. 1 Jan-31 Dec 87,

FEB 88 917P

PERSONAL AUTHORS: Donchin, Emanuel; Coles, Michael; Kramer, Arthur

REPORT NO. CPL-88-1

CONTRACT NO. F49620-85-C-0041

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR TR-88-0316

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes research conducted in Cognitive Psychophysiology. Our primary mission has been to develop an understanding of the Event-Related Brain Potential (ERP) so that it can be used in the study of human cognitive function and in the assessment of man-machine interactions. To this end, we have conducted research in the following areas: The use of ERPs in the study of attention and skill acquisition, The use of ERPs in the study of mental chronometry, The use of ERPs in the study of mental resources and workload, The use of ERPs in the study of memory, The development of animal model of the P300 component, The use of ERPs as a communication channel. Listed are all chapters, papers, abstracts and presentations that were published, submitted, or in preparation in 1987. Keywords: Memory; Information processing; Brain function.

DESCRIPTORS: (U) *COGNITION, *INFORMATION PROCESSING, *PSYCHOPHYSIOLOGY, ACQUISITION, ANIMALS, ATTENTION, BRAIN, FUNCTIONS, HUMANS, INDEXES, INTERACTIONS, MAN MACHINE SYSTEMS, MEMORY DEVICES, MENTAL ABILITY, MISSIONS, MODELS, RESOURCES, SKILLS, WORKLOAD.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 244 CONTINUED

IDENTIFIERS: (U) Event related potentials, WUAFOSR2313A4, PE61102F.

AD-A191 240 7/2

NEW MEXICO UNIV ALBUQUERQUE

(U) Thin Film Research Diagnostics Instrumentation.

DESCRIPTIVE NOTE: Final rept. 1 Jan 85-30 Jun 86,

OCT 87 3P

PERSONAL AUTHORS: McNeil,

CONTRACT NO. AFOSR-85-0091

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR TR-87-1757

UNCLASSIFIED REPORT

ABSTRACT: (U) All equipment purchased under this contract has been used for deposition and analysis of thin films. In particular, the Ar-ion laser is being used to investigate film scatter at multiple wavelengths. The excimer laser is being used to enhance deposition mechanisms; it illuminates a coated surface throughout film disposition. The microscope and ellipsometer are part of diagnostics used to analyze films.

DESCRIPTORS: (U) *DEPOSITION, *THIN FILMS, COATINGS, ELLIPSOMETERS, EXCIMERS, FILMS, FREQUENCY, LASERS, SCATTERING, SURFACES.

IDENTIFIERS: (U) WUAFOSR2917A3, PE61102F.

AD-A191 239 12/5 12/1

CALIFORNIA UNIV BERKELEY CENTER FOR PURE AND APPLIED MATHEMATICS

(U) Scientific Computing Environments.

DESCRIPTIVE NOTE: Final rept. 15 Aug 86-14 Aug 87,

AUG 87 3P

PERSONAL AUTHORS: Kahan, W

CONTRACT NO. AFOSR-84-0158

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1767

UNCLASSIFIED REPORT

ABSTRACT: (U) The author pursued research to provide improved subroutines for common arithmetic functions for scientific computations. He produced an algorithm for the accurate implementation of rational arithmetic operations without resorting to mult-precision arithmetic. This was described in a paper entitled Rational arithmetic in floating point. He has also made a careful study of how to make branch cuts in the complex plane so as to allow evaluation of the elementary functions without any anomalies. This was presented in a talk at the conference on State-of-thu-Art in Numerical Analysis held in Birmingham, England, April 14-18, 1986.

DESCRIPTORS: (U) *COMPUTATIONS, *SUBROUTINES, ALGORITHMS, ARITHMETIC, FUNCTIONS(MATHEMATICS), GREAT BRITAIN, NUMERICAL ANALYSIS, FLOATING POINT OPERATION.

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F.

AD-A191 239

AD-A191 235 22/1 20/11

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF AERONAUTICS AND ASTRONAUTICS

(U) Travelling Wave Concepts for the Modeling and Control of Space Structures.

DESCRIPTIVE NOTE: Final rept. 1 Mar 86-31 Oct 87,

JAN 88 442P

PERSONAL AUTHORS: Von Flotow, A. H.; Hall, S. R.

CONTRACT NO. F49620-86-C-0039

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-88-0278

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summaries 20 months of research into Travelling Wave Concepts for the Modelling and Control of Space Structures. A good portion of the research has focused upon the development of techniques for the modelling of structural response in terms of disturbance propagation. Such models are of interest for several reasons: 1. Understanding the mechanisms that govern the propagation of disturbances through an elastic structure is useful for building intuition, for structural design and for design of active control, and 2. Disturbance propagation models have the potential for providing high-fidelity analysis capabilities in response regimes where other techniques are inapplicable. Of considerable interest to the researchers at MIT is the response of elastic spacecraft to disturbances with significant spectral content at frequencies including many (even hundreds) of the spacecraft natural modes of structural vibration; and 3. Elastic disturbance propagation is a classic area of research in applied mechanics, having application in acoustics, seismology, microwave electronics, transducer design, biological fluid mechanics, design of mechanisms and machines, and many other areas.

DESCRIPTORS: (U) *SPACECRAFT, *STRUCTURAL ENGINEERING,

AD-A191 235

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 235 CONTINUED

*STRUCTURAL PROPERTIES, *TRAVELING WAVES, ACOUSTICS, APPLIED MECHANICS, CONTROL, ELASTIC PROPERTIES, ELECTRONICS, PROPAGATION, TRANSDUCERS, VIBRATION, MATHEMATICAL MODELS, STRUCTURAL RESPONSE, TRUSSES, TRANSFER FUNCTIONS, TETHERING, FLEXIBLE STRUCTURES.

IDENTIFIERS: (U) Active control systems, Frequency domain, PE61102F, WUAFOSR2302B1.

AD-A191 228 7/2

ROCHESTER UNIV N Y LAB FOR LASER ENERGETICS

(U) Micro-Raman Analysis of Dielectric Optical Thin Films.

DESCRIPTIVE NOTE: Final technical rept. 1 May 85-30 Sep 87,

JAN 88 24P

PERSONAL AUTHORS: Schmid, Ansgar

CONTRACT NO. AFOSR-85-0221

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR TR-88-0160

UNCLASSIFIED REPORT

ABSTRACT: (U) Wide-band-gap dielectric thin films up to 6 micrometer in thickness are characterized by spontaneous and stimulated Raman-gain microscopy. Materials surveyed are Aluminum oxide, Yttrium oxide, Zirconium oxide, Hafnium oxide, and Tantalum oxide. 1-micrometer sized surface defects on Y203 are investigated.

DESCRIPTORS: (U) *DIELECTRIC FILMS, *OPTICAL MATERIALS, *RAMAN SPECTROSCOPY, *THIN FILMS, ALUMINUM OXIDES, HAFNIUM COMPOUNDS, OXIDES, TANTALUM, THICKNESS, YTTRIUM OXIDES, ZIRCONIUM OXIDES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A191 222 17/9 4/2 12/5

UNIVERSITY COLL LONDON (ENGLAND) DEPT OF PHYSICS AND ASTRONOMY

(U) Components of an Atmospheric Lidar System: Doppler Wind Lidar.

DESCRIPTIVE NOTE: Final rept. 1 Oct 86-30 Sep 87,

NOV 87 8P

PERSONAL AUTHORS: Rees, David

CONTRACT NO. AFOSR-85-0198

PROJECT NO. 7670, 2310

TASK NO. 16, A1

MONITOR: AFOSR TR-88-0039

UNCLASSIFIED REPORT

ABSTRACT: (U) Six papers have been published in the literature during the past two years, related to the development and performance of the Doppler Lidar Detector System, and its associated wavelength meters. The instrumentation and all of the necessary software is now available at University College London. Three complete Doppler Detector/Wavelength meter units have been fabricated. One of these has been delivered to AFGL, awaiting the completion of the Laser system. Another one of these combined units was integrated temporarily with the complete Lidar system of the Bonn University group at Andoya in August 1987, for proof of concept, and to demonstrate that all of the optical and electronic interfaces and software functionnd correctly. Due to limited time in the field, and very poor weather, it was not possible to obtain direct data on the lower thermosphere, but the tests did prove that the entire system functioned as designed. Further tests with Bonn University are planned in 1988.

DESCRIPTORS: (U) *COMPUTER PROGRAMS, *DOPPLER RADAR, *MEASURING INSTRUMENTS, *OPTICAL RADAR, DETECTORS, ELECTRONICS, FREQUENCY, INTERFACES, LASERS, OPTICAL PROPERTIES, THERMOSPHERE, TIME, UNIVERSITIES, WEATHER, WIND.

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IDENTIFIERS: (U) PE62101F, WUAFOSR767018, PE61102F, WUAFOSR2310A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 217 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL

(U) Poisson Functionals of Markov Processes and Queueing Networks.

DESCRIPTIVE NOTE: Interim rept. 1 Oct 86-25 Dec 87,

DEC 87 26P

PERSONAL AUTHORS: Serfozo, Richard F.

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-88-0335

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Georgia Institute of Technology, contract AFOSR-84-0367.

ABSTRACT: (U) We present conditions under which a point process of certain jump times of a Markov process is a Poisson process. One result is that if the Markov process is stationary and the compensator of the point process in reverse time has a constant intensity a, then the point process is Poisson with rate a. A classical example is that the output flow from a M/M/1 queueing system is Poisson. We also present similar Poisson Characterizations of more general marked point process functionals of a Markov process. These results yield easy-to-use criteria for a collection of such processes to be multi-variate Poisson or marked Poisson with a specified dependence or independence. We give several applications of queueing systems, and indicate how our results extend of functionals of non-Markovian processes.

DESCRIPTORS: (U) *MARKOV PROCESSES, *QUEUEING THEORY, FLOW, MULTIVARIATE ANALYSIS, NETWORKS, OUTPUT, POISSON DENSITY FUNCTIONS, POISSON EQUATION.

IDENTIFIERS: (U) PE61102F, WUAFOS2304A5.

AD-A191 202 4/1

SOUTHWEST RESEARCH INST SAN ANTONIO TX DEPT OF SPACE SCIENCES

(U) Proceedings of the Finnish-American Auroral Workshop (3rd) Held in Sodankylae (Finland) on October 14-18, 1985,

OCT 87 17P

PERSONAL AUTHORS: Turenen, E.; Kataja, E.

CONTRACT NO. F49620-85-C-0029, $NSF-INT85-09939

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR TR-88-0112

UNCLASSIFIED REPORT

ABSTRACT: (U) On December 15, 1981 an isolated substorm, preceded by a clear southward turning of the Interplanetary Magnetic Field occurred over the Finland/ Scandinavian sector. This paper uses particle and plasma flow measurements from the Dynamics Explorer-2 satellite to provide global information on the substorm development.

DESCRIPTORS: (U) *AURORAE, FINLAND, FLOW, GLOBAL, INFORMATION EXCHANGE, INTERPLANETARY SPACE, ISOLATION, MAGNETIC FIELDS, MEASUREMENT, PARTICLES, PLASMAS(PHYSICS), MAGNETIC STORMS, RADAR REFLECTIONS.

IDENTIFIERS: (U) IMF(Interplanetary Magnetic Fields), Dynamics Explorer 2 Satellite, PE61102F, WUAFOSR2310A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 201 4/1

SOUTHWEST RESEARCH INST SAN ANTONIO TX

(U) Ionospheric Convection Signatures and Magnetic Field Topology,

NOV 87 14P

PERSONAL AUTHORS: Coley, W. R.; Heelis, R. A.; Hanson, W. B.; Reiff, P. H.; Sharber, J. R.

CONTRACT NO. F49620-85-C-0029, F19628-83-K-0022

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR
TR-88-0113

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Geophysical Research, v92 nA11 p12352-12364, 1 Nov 87. Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

ABSTRACT: (U) A statistical study is presented of signatures of the high-latitude ionospheric convection pattern and the simultaneously observed energetic electron precipitation. Most often convection cells are found in which the sunward flowing region contains auroral particle precipitation but the antisunward flowing region does not. However, observations also show the frequent occurrence of convection cells in which neither the antisunward nor the sunward flowing plasma region contains auroral particle precipitation. These findings may appear within the dawnside or duskside convection pattern and strongly suggest that such convection cells may be associated with open magnetic field lines that thread the magnetotail lobes. Examination of the interplanetary magnetic field (IMF) data shows that this lobe cell convection signature is most likely to be accompanied by the signature of dayside merging when the IMF has a significant y component but is directed southward. A lobe convection cell has a location and sense of circulation that are dependent on the sign of By. For the northern hemisphere, clockwise circulation displaced to the duckside appears roughly 35% of the time

when By is positive, and anticlockwise circulation displaced to the dawnside appears when By is negative. The same circulation sense and location exist in the southern hemisphere for the opposite polarity of By. At times of northward IMF, the circulation within the polar cap can be at least partially on closed field lines and cannot be easily reconciled with merely a distortion of the standard two-cell convection pattern. The significance of these results to several models of the solar wind/magnetosphere interaction is discussed.

DESCRIPTORS: (U) *IONOSPHERE, AURORAE, CELLS, CONVECTION, DISTORTION, ELECTRONS, ENERGETIC PROPERTIES, HIGH LATITUDES, INTERACTIONS, INTERPLANETARY SPACE, MAGNETIC FIELDS, MAGNETOSPHERE, NORTHERN HEMISPHERE, PARTICLES, PATTERNS, POLAR CAP, PRECIPITATION, SIGNATURES, SOLAR WIND, SOUTHERN HEMISPHERE, STATISTICS, TOPOLOGY, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 200 7/2

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) Chemistry of the Silicon-Silicon Double Bond.

DEC 87 12P

PERSONAL AUTHORS: West, Robert

CONTRACT NO. F49620-86-C-0010, $NSF-CHE83-18820

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0141

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Angevandte Chemie, v28 n12 p1201-1211 Dec 87.

ABSTRACT: (U) Disilenes, compounds containing silicon-silicon double bonds, can be isolated as thermally stable, yellow- or orange-colored crystalline compounds; the substituent groups at silicon must be large (mesityl), tert-butyl, etc.) to prevent polymerization. Structural and spectroscopic studies indicate many similarities between the 3p-3p pi bonding in disilenes and the 2p-2p pi bonding in olefins, but disilenes are much more reactive than alkenes. The reactions of disilenes lead to many new classes of silicon compounds, including three- and four-membered rings which present novel problems in chemical bonding.

DESCRIPTORS: (U) *CHEMICAL BONDS, *SILICON, *SILICON COMPOUNDS, ALKENES, BONDED JOINTS, BONDING, CHEMISTRY, POLYMERIZATION, SILICON DIOXIDE, SPECTROSCOPY, STRUCTURAL PROPERTIES, SYNTHESIS(CHEMISTRY), CYCLIC COMPOUNDS, THERMAL STABILITY, REPRINTS, NUCLEAR RESONANCE.

IDENTIFIERS: (U) *Silicon silicon double bonds, Disilenes, Pi bonding, PE61102F, WUAFOSR2303B2.

AD-A191 168 1/1

DOUGLAS AIRCRAFT CO LONG BEACH CA

(U) Instability of Laminar Separation Bubbles: Causes and Effects.

DESCRIPTIVE NOTE: Technical rept. Mar-Sep 87,

SEP 87 16P

PERSONAL AUTHORS: Cebeci, Tuncer

REPORT NO. MDC-K0534

CONTRACT NO. F49620-84-C-0007

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-88-0249

UNCLASSIFIED REPORT

ABSTRACT: (U) A combination of interactive boundary layer and stability theories has been used to investigate the reasons for the instability of laminar separation bubbles on the leading edge of thin airfoils. It is shown that transition plays an important role and is likely to preclude the existence of long separation bubbles and their supposed instability. Keywords: Interactive boundary-layer theory, Laminar flow, Separation, Transition.

DESCRIPTORS: (U) *AIRFOILS, *BOUNDARY LAYER, *FLOW SEPARATION, *LAMINAR FLOW, BUBBLES, INTERACTIONS, LEADING EDGES, SEPARATION, STABILITY, THEORY, THINNESS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 127 20/4

CINCINNATI UNIV OH DEPT OF AEROSPACE ENGINEERING AND ENGINEERING MECHANICS

(U) Composite Reduced Navier-Stokes Procedures for Flow Problems with Strong Pressure Interactions.

DESCRIPTIVE NOTE: Annual rept. 1 Feb 87-31 Jan 88,

FEB 88 60P

PERSONAL AUTHORS: Rubin, S. G.; Khosla, P. K.

CONTRACT NO. F49620-85-C-0027

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR TR-88-0298

UNCLASSIFIED REPORT

ABSTRACT: (U) A Reduced Navier Stokes (RNS) system is more computationally efficient than full Navier Stokes solvers and more accurate and less cumbersome than matched viscous and inviscid methods has been shown to apply to a significant class of aerodynamic problems. The RNS system is a composite of the full Euler and boundary layer equations and is discritized to optimize the numerical representation of viscous and inviscid regions, respectively.

DESCRIPTORS: (U) *NAVIER STOKES EQUATIONS, AERODYNAMICS, BOUNDARY LAYER, INTERACTIONS, INVISCID FLOW, MATCHING, NUMERICAL ANALYSIS, PRESSURE, REDUCTION, VISCOSITY, VISCOUS FLOW, AIRFOILS, POTENTIAL FLOW, AFTERBODIES, UNSTEADY FLOW, SKIN FRICTION, FLOW SEPARATION, TRAILING EDGES.

IDENTIFIERS: (U) Reduced Navier Stokes equations, Euler methods, NACA 0012 airfoils, Biconvex airfoils, PE61102F, WUAFOSR2307A1.

AD-A191 126 7/4 20/5

QUEEN MARY COLL LONDON (ENGLAND)

(U) Quantum-Resolved Dynamics of Halogens and Interhalogens and Studies of NF and PF Radicals.

DESCRIPTIVE NOTE: Final rept.

81 3P

CONTRACT NO. AFOSR-78-3507

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-88-0330

UNCLASSIFIED REPORT

ABSTRACT: (U) Kinetic studies of ground and excited states of NF and PF radicals were carried out to determine radiative lifetimes, branching ratios, and quenching rate constants. Similar studies were performed on the diatomic halogens and interhalogens in order to identify and study dynamics of ground and excited states in order to evaluate the laser potential of these species.

DESCRIPTORS: (U) *HALOGENS, *CHEMICAL RADICALS, *FLUORIDES, *NITROGEN COMPOUNDS, *PHOSPHORUS COMPOUNDS, *REACTION KINETICS, CONSTANTS, DIATOMIC MOLECULES, DYNAMICS, HALOGEN COMPOUNDS, KINETICS, LASERS, QUENCHING, RADIATION, RATES, GROUND STATE, EXCITATION, ELECTRONIC STATES, QUANTUM CHEMISTRY.

IDENTIFIERS: (U) Radiative lifetime, PE61102F, WUAFOSR2303B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 125 20/12 12/1

ARIZONA STATE UNIV TEMPE

(U) Mathematical Models for VLSI Device Simulation.

DESCRIPTIVE NOTE: Final rept.,

NOV 87 9P

PERSONAL AUTHORS: Ringhofer, Christian

CONTRACT NO. AFOSR-85-0240

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-88-0348

UNCLASSIFIED REPORT

ABSTRACT: (U) The research supported under this grant was concerned with analytical and numerical simulation aspects of the basic semiconductor equations. The research focused on an analysis of the mathematical structure of solutions via a singular perturbation approach, and the development of numerical methods for the transient problem.

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *NUMERICAL ANALYSIS, *NUMERICAL METHODS AND PROCEDURES, *SEMICONDUCTORS, EQUATIONS, PERTURBATIONS, SIMULATION, SOLUTIONS(GENERAL), TRANSIENTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

AD-A191 125

AD-A191 122 5/1 5/6

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force Graduate Student Summer Support Program (1987). Program Technical Report. Volume 2.

DESCRIPTIVE NOTE: Annual rept.,

DEC 87 728P

PERSONAL AUTHORS: Darrah, Rodney C.; Kopka, Richard; Espy, Susan K.

CONTRACT NO. F49620-85-C-0013

PROJECT NO. 3396

TASK NO. D5

MONITOR: AFOSR
TR-88-0210

UNCLASSIFIED REPORT

ABSTRACT: (U) The U.S. AF Graduate Student Summer Support Program (USAF-GSSSP) is conducted under the United States Air Force Summer Faculty Research Program. The Program provides funds for selected graduate students to work at an appropriate Air Force Facility with a supervising professor who holds a concurrent Summer Faculty Research Program appointment or with a supervising Air Force Engineer. This is accomplished by the students being selected on a nationally advertised competitive basis for a ten-week assignment during the summer intersession period to perform research at Air Force laboratories/centers. Each assignment is in a subject area and at an Air Force Facility mutually agreed upon by the students and the Air Force. In addition to compensation, travel and cost of living allowances are also paid. The specific objectives of the 1987 USAF-GSSSP are: (1) To provide a productive means for the graduate students to participate in research at the Air Force Weapons Laboratory; (2) To stimulate continuing professional association among the Scholars and their professional peers in the Air Force; (3) To further the research objectives of the United States Air Force; and (4) To enhance the research productivity and capabilities of the graduate students especially as these relate to

AD-A191 122

AD-A191 122 CONTINUED

Air Force technical interests.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, *AIR FORCE PERSONNEL, *RESEARCH MANAGEMENT, AIR FORCE FACILITIES, COMPENSATION, COSTS, INSTRUCTORS, LABORATORIES, MILITARY FORCES(UNITED STATES), PRODUCTIVITY, SUMMER, STUDENTS, UNIVERSITIES, TRAVEL.

IDENTIFIERS: (U) WUAFOSR3396D5, PE61102F.

AD-A191 121 5/1 5/6

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force Graduate Student Summer Support Program (1987). Program Technical Report. Volume 1.

DESCRIPTIVE NOTE: Annual rept.,

DEC 87 696P

PERSONAL AUTHORS: Darrah, Rodney C.; Kopka, Richard; Espy, Susan K.

CONTRACT NO. F49620-85-C-0013

PROJECT NO. 3396

TASK NO. D5

MONITOR: AFOSR TR-88-0209

UNCLASSIFIED REPORT

ABSTRACT: (U) The U.S. AF Graduate Student Summer Support Program (USAF-GSSSP) is conducted under the United States Air Force Summer Faculty Research Program. The PRogram provides funds for selected graduate students to work at an appropriate Air Force Facility with a supervising professor who holds a concurrent Summer Faculty Research Program appointment or with a supervising Air Force Engineer. This is accomplished by the students being selected on a nationally advertised competitive basis for a ten-week assignment during the summer intersession period to perform research at Air Force laboratories/centers. Each assignment is in a subject area and at an Air Force Facility mutually agreed upon by the students and the Air Force. In addition to compensation, travel and cost of living allowances are also paid. The specific objectives of the 1987 USAF-GSSSP are: (1) To provide a productive means for the graduate students to participate in research at the Air Force Weapons Laboratory; (2) To stimulate continuing professional association among the Scholars and their professional peers in the Air Force; (3) To further the research objectives of the United States Air Force; and (4) To enhance the research productivity and capabilities of the graduate students especially as these relate to

AD-A191 121 CONTINUED

Air Force technical interests.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, *AIR FORCE PERSONNEL, *RESEARCH MANAGEMENT, AIR FORCE FACILITIES, COMPENSATION, COSTS, INSTRUCTORS, LABORATORIES, MILITARY FORCES(UNITED STATES), PRODUCTIVITY, SUMMER, TRAVEL, UNIVERSITIES, STUDENTS.

IDENTIFIERS: (U) WUAFOSR3396D5, PE61102F.

AD-A191 120 5/1 5/6

UNIVERSAL ENERGY SYSTEMS INC DAYTON OH

(U) United States Air Force Summer Faculty Research Program (1987). Program Management Report.

DESCRIPTIVE NOTE: Annual rept.,

DEC 87 374P

PERSONAL AUTHORS: Darrah, Rodney C.; Kopka, Richard; Espy, Susan K.

CONTRACT NO. F49620-85-C-0015

PROJECT NO. 3396

TASK NO. D5

MONITOR: AFOSR TR-88-0211

UNCLASSIFIED REPORT

ABSTRACT: (U) The Summer Faculty Research Program (SFRP) provides opportunities for research in the physical sciences, engineering, life sciences, business, and administrative sciences. The program has been effective in providing basic research opportunities to the faculty of universities, colleges, and technical institutions throughout the United States. The program is available to faculty members in all academic grades: instructor, assistant professor, professor, department chairman, and research faculty members who are starting their academic research programs and to senior faculty members who have spent time in university administrative and are desirous of returning to scholarly research programs. Beginning with the 1982 program, research opportunities were provided for 17 graduate students. The 1982 pilot student program was highly successful and was expanded in 1983 to 53 students; there were 84 graduate students in the 1984 program. In the previous programs, the graduate students were selected along with their professors to work on the program. For the 1985 program, the graduate students were selected on their own merits. There were 101 graduate students selected for the 1987 program. Follow-on research opportunities have been developed for a large percentage of the participants in the Summer Faculty Research Program in 1979-1983 period through an AFOSR

AD-A191 121

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A191 120 CONTINUED

Minigrant Program.

DESCRIPTORS: (U) *RESEARCH MANAGEMENT, *AIR FORCE PERSONNEL, *AIR FORCE RESEARCH, INSTRUCTORS, LIFE SCIENCES, MANAGEMENT, PHYSICAL SCIENCES, STUDENTS, SUMMER, UNIVERSITIES, MILITARY FORCES(UNITED STATES).

IDENTIFIERS: (U) WUAFOSR3398D5, PE61102F.

AD-A191 119 20/5 20/7

CALIFORNIA UNIV SAN DIEGO LA JOLLA

(U) A New Approach to Generating Negative Ion Beams.

DESCRIPTIVE NOTE: Final rept. 1 Jul 86-30 Sep 87,

NOV 87 4P

PERSONAL AUTHORS: Neynaber, Roy H.; Tang, Sheng Y.

CONTRACT NO. F49620-86-C-0085

PROJECT NO. 2301

MONITOR: AFOSR TR-87-1791

UNCLASSIFIED REPORT

ABSTRACT: (U) The report describes measurements of ion-pair production cross sections for He*(2(1,3)S)-Li, Li-Cs, Li-Na, and Li-Na*(3p) collisions at energies of several keV. Measurements of chemi-ionization cross sections for He*(2(1,3)S)-Li collisions are also mentioned. A method is described for exciting a fraction of the atoms in a Li vapor to the 2p resonance state using a dye laser. The fraction is determined by observing with the laser on and off the ion-pair production of Cl- when a fast Cl beam collides with the vapor. Keywords: Ion pair production, Ionization, Cross sections, Molecular beams, Reaction rates.

DESCRIPTORS: (U) *ION BEAMS, *IONIZATION, *MOLECULAR BEAMS, *PAIR PRODUCTION, ANIONS, CROSS SECTIONS, DYE LASERS, LASERS, RATES, REACTION TIME, HELIUM, LITHIUM, CESIUM, SODIUM, PARTICLE COLLISIONS.

IDENTIFIERS: (U) Chemiionization, WUAFOSR2301, PE61102F.

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AD-A191 119

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 118 20/12 20/2 20/7

CORNELL UNIV ITHACA NY SCHOOL OF ELECTRICAL ENGINEERING

(U) Microwave Semiconductor Research-Materials, Devices and Circuits.

DESCRIPTIVE NOTE: Final rept. 1 May 84-30 Apr 87,

OCT 87 52P

PERSONAL AUTHORS: Eastman, L. F.; Shealy, J. R.; Woodard, D. W.; Mukherjee, S.; Wicks, G. W.

CONTRACT NO. F49620-84-C-0060

PROJECT NO. 2305

TASK NO. A9

MONITOR: AFOSR TR-87-2019

UNCLASSIFIED REPORT

ABSTRACT: (U) This program covers the growth and assessment of gallium arsenide and related compounds and alloys for use in microwave, millimeter wave, and optical devices. It also covers the processing of the material into devices, the testing of the devices, and the theoretical modeling of carrier transport in these devices. Both molecular beam epitaxy (MBE) and organometallic vapor phase epitaxy (OMVPE) are used for growth.

DESCRIPTORS: (U) *CHARGE CARRIERS, *EPITAXIAL GROWTH, *GALLIUM ARSENIDES, *MOLECULAR BEAMS, ALLOYS, MATERIALS, MILLIMETER WAVES, MODELS, OPTICAL EQUIPMENT, ORGANOMETALLIC COMPOUNDS, PROCESSING, THEORY, TRANSPORT PROPERTIES, VAPOR PHASES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305A9.

AD-A191 118

AD-A191 117 6/4

TULANE UNIV NEW ORLEANS LA SCHOOL OF MEDICINE

(U) Electrotonic and Dye Coupling Between Mammalian Cortical Neurons: Mechanisms of Regulation.

DESCRIPTIVE NOTE: Final rept. 1 Sep 85-31 Aug 87,

NOV 87 14P

PERSONAL AUTHORS: Dudek, F. E.

CONTRACT NO. AFOSR-85-0317

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR TR-87-1801

UNCLASSIFIED REPORT

ABSTRACT: (U) Our research has involved studies on neuronal communication in the mammalian brain, and has focused on rapid conducting mechanisms in local neuronal circuits. Most of our work has centered on electrical interactions between cells in the hippocampus, but other research has involved excitatory chemical synaptic transmission in the hypothalmus. We have found that intracellular injection of antibodies directed at the liver gap junction polypeptide reduces dye coupling between cultured glial cells. Although antibody injections did not completely block junctional transmission, a similar approach could be useful with hippocampal pyramidal cells for understanding the role that electronic coupling may play in synchronization of neuronal activity. Another major area of research has involved low calcium solutions where chloride was replaced with propionate. These two treatments have been shown to block chemical synaptic transmission and electronic junctions, respectively. We have obtained preliminary evidence that synchronous activity can still be obtained in this solution, thus arguing that electrical field effects alone can synchronize the action potentials of hippocampal neurons. In collaboration with Roger Traub at IBM, theoretical studies with a computer model have provided a quantitative conceptual framework for understanding how electrical interactions operate in

AD-A191 117

AD-A191 117 CONTINUED

the hippocampus. Finally, studies with hypothalmic neuroendocrine cells have uncovered a synaptically activated slow depolarization and have provided evidence that excitatory amino acids may be responsible for fast excitatory transmission in the supraoptic nucleus.

DESCRIPTORS: (U) *HIPPOCAMPUS, *MOTOR NEURONS, *NEUROCHEMICAL TRANSMISSION, *ELECTROPHYSIOLOGY, *HYPOTHALAMUS, ACTIVATION, AMINO ACIDS, ANTIBODIES, BRAIN, CALCIUM, CELLS(BIOLOGY), CHLORIDES, CIRCUITS, COMPUTERIZED SIMULATION, COUPLING(INTERACTION), DEPOLARIZATION, DYES, ELECTRIC FIELDS, ENDOCRINE GLANDS, INJECTION, INTERACTIONS, JUNCTIONS, MAMMALS, NERVE CELLS, NEUROLOGY, SOLUTIONS(GENERAL), SYNAPSE, SYNCHRONIZATION(ELECTRONICS), THEORY, BIOLOGICAL STAINS, STIMULATION(PHYSIOLOGY), CALCIUM.

IDENTIFIERS: (U) Glia cells, Electrotonic transmission, WUAFOSR2312A2, PE61102F.

AD-A191 117

AD-A191 107 7/4

SOUTHAMPTON UNIV (ENGLAND) DEPT OF CHEMISTRY

(U) High-Temperature Photoelectron Spectroscopy. An Increased Sensitivity Spectrometer for Studying Vapor-Phase Species Produced at Furnace Temperatures > 2000 K.

88 21P

PERSONAL AUTHORS: Morris, A.; Dyke, J. M.; Josland, G. D.; Hastings, M. P.; Francis, P. D.

CONTRACT NO. AFOSR-83-0283

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-87-1953

UNCLASSIFIED REPORT

Availability: Document partially illegible.

SUPPLEMENTARY NOTE: Pub. in High Temperature Science, v22 p95-113 1986.

ABSTRACT: (U) The construction and performance of a photoelectron spectrometer designed for the vapor phase study of high-temperature species is described. An inductively heated furnace is used to produce atoms and molecules in the vapor phase at furnace temperature >2000 K. Electrical interference is eliminated using pulsed heating and gated electronics. A microchannel plate phosphor silicon intensified target camera detector is used for rapid data acquisition to minimize problems caused by time-dependent contamination in the ionization region. A dedicated, menu-driven, firmware-based data interface, with key pad control is utilized. The TV monitoring of the photoelectron line images and use of a video window to select data allow optimum spectral conditions to be preserved during an experiment. Results show reductions in data acquisition times of up to 90 compared to equivalent single-channel detector experiments. Keywords: Great Britain.

DESCRIPTORS: (U) *HIGH TEMPERATURE, *PHOTOELECTRON

AD-A191 107

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A191 107 CONTINUED

SPECTRA, *PHOTOELECTRONS, *SPECTROMETERS, *VAPOR PHASES, ACQUISITION, ATOMS, CAMERAS, CHANNELS, CONTAMINATION, DATA ACQUISITION, DETECTORS, ELECTRICAL PROPERTIES, ELECTRONICS, FURNACES, GATES(CIRCUITS), GREAT BRITAIN, HEAT, HEATING, IMAGES, INTERFERENCE, IONIZATION, LINE SCANNING, MOLECULES, OPTIMIZATION, PULSES, SENSITIVITY, SPECTRA, TARGETS, TIME DEPENDENCE, VIDEO SIGNALS, WINDOWS.

IDENTIFIERS: (U) WUAFOSR2303B1, PE61102F.

AD-A191 088 12/3

STANFORD UNIV CA

(U) Conference on Stochastic Processes and their Applications (16th) Held in Stanford, California on August 17-21, 1987.

DESCRIPTIVE NOTE: Final rept. 30 Sep 86-29 Sep 87,

AUG 87 157P

PERSONAL AUTHORS: Iglehart, Donald L.

CONTRACT NO. AFOSR-86-0329

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-2018

UNCLASSIFIED REPORT

ABSTRACT: (U) The 16th conference on Stochastic processes and their applications was held at Stanford University between August 17 and 21 1987. The conference was attended by 189 researchers. There were 19 invited papers and several sessions of contributed papers. Ample time was allowed for interactions. Keywords: Shape; Inequalities; Network simulation; Travelling waves; Finite particles; Boundary value problems; Random walks; Gaussian processes; Estimation; Statistical inference; Queueing networks; Deviation; Martingales; Economic models; Optimization; Reliability.

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, BOUNDARY VALUE PROBLEMS, ECONOMIC MODELS, NETWORKS, OPTIMIZATION, PARTICLES, QUEUEING THEORY, RELIABILITY, SIMULATION, STATISTICAL INFERENCE, STATISTICAL PROCESSES, SYMPOSIA, TRAVELING WAVES, INEQUALITIES, ABSTRACTS.

IDENTIFIERS: (U) Guassian processes, Random walk process, Martingales(Mathematics), PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A191 087 12/1 9/1

PROMETHESUS INC SHARON MA

(U) Null Steering Applications of Polynomials with Unimodular Coefficients.

DESCRIPTIVE NOTE: Final rept. 1 Aug 86-28 Feb 87,

MAR 87 78P

PERSONAL AUTHORS: Byrnes, James S.; Newman, Donald J.; Goldstein, Martin

REPORT NO. 87-01

CONTRACT NO. F49620-86-C-0088

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR TR-87-2014

UNCLASSIFIED REPORT

ABSTRACT: (U) Concerning adaptive array and null steering applications of polynomials with restricted coefficients, the basic mathematical question to consider in electronic beam steering, with a discrete array consisting of omnidirectional elements spaced at equal increments along a straight line, is how coefficients of a polynomial may be chosen in a robust yet computationally efficient manner so as to arrive at a desired beam pattern. In numerous applications, these coefficients are required to satisfy certain restrictions, such as a bound on their dynamic range. Thus, particularly in null steering, it is often advantageous, or even necessary, for the shading coefficients to all have the same magnitude. Basic properties of such polynomials and their applications to beamforming are described. Keywords: Notched fitters, Applied mathematics.

DESCRIPTORS: (U) *APPLIED MATHEMATICS, *POLYNOMIALS, *BEAM STEERING, ADAPTIVE SYSTEMS, COEFFICIENTS, DYNAMIC RANGE, NULLS(AMPLITUDE), OMNIDIRECTIONAL, SHADOWS, BEAM FORMING, PATTERNS, ARRAYS, ELECTRON BEAMS, LIMITATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A4.

AD-A191 087

AD-A190 996 6/4

GORDON RESEARCH CONFERENCES INC KINGSTON RI

(U) 1987 Gordon Research Conference on Neural Plasticity.

DESCRIPTIVE NOTE: Final rept. 15 Jul-7 Aug 87,

OCT 87 11P

PERSONAL AUTHORS: Wilson, David

CONTRACT NO. AFOSR-87-0261

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR TR-87-1564

UNCLASSIFIED REPORT

ABSTRACT: (U) This document consists of a schedule of events and the registration lost for the Gordon Research Conference of Neural Plasticity. Keywords Nerve cells, Molecular biology, Genetics, Musculoskeletal system, sympcsia.

DESCRIPTORS: (U) *NERVOUS SYSTEM, GENETICS, MOLECULAR BIOLOGY, MUSCULOSKELETAL SYSTEM, NERVE CELLS, PLASTIC PROPERTIES, SCHEDULING, SYMPOSIA, NERVE TRANSMISSION, NEUROCHEMISTRY, MEMORY(PSYCHOLOGY), LEARNING, HIPPOCAMPUS, EYE MOVEMENTS, PHOSPHORUS TRANSFERASES.

IDENTIFIERS: (U) *Neural plasticity, PE61102F, WUAFOSR2312A1.

AD-A190 996

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 986 7/4

HOUSTON UNIV TEX DEPT OF MATHEMATICS

(U) Research in Nonlinear Partial Differential Equations and Bifurcation Theory.

DESCRIPTIVE NOTE: Final rept. 15 Jul 86-14 Oct 87,

DEC 87 29P

PERSONAL AUTHORS: Wagner, David H.

CONTRACT NO. AFOSR-86-0218

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR TR-88-0087

UNCLASSIFIED REPORT

ABSTRACT: (U) We prove a necessary condition and a sufficient condition for the existence of steady plane wave solutions to the Navier Stokes equations for a reacting gas. These solutions represent plane detonation waves, and converge to ZND detonation waves as the viscosity, heat conductivity, and species diffusion rates tend to zero. We assume that the Prandtl number is 3/4, but we permit arbitrary Lewis numbers. We make no assumption concerning the activation energy. We show that the stagnation enthalpy and the entropy flux are always monotone for such solutions, and that the mass density and pressure are nearly always not monotone, as predicted by the ZND theory. In certain parameter ranges, typically that of large diffusion, many of these waves have the appearance of a weak detonation followed by an inert shock wave. This confirms a phenomenon observed in numerical calculations and in a model system by Colella, Majda, and Roytburd.

DESCRIPTORS: (U) *DETONATION WAVES, *PLANE WAVES, *VISCOSITY, ACTIVATION ENERGY, COMPUTATIONS, DENSITY, DETONATIONS, DIFFUSION, ENTHALPY, ENTROPY, FLUX(RATE), MASS, NAVIER STOKES EQUATIONS, NONLINEAR DIFFERENTIAL EQUATIONS, NUMERICAL ANALYSIS, PARAMETERS, PARTIAL DIFFERENTIAL EQUATIONS, PRANDTL NUMBER, RATES, SHOCK WAVES, SOLUTIONS(GENERAL), STAGNATION, STEADY STATE,

AD-A190 986 CONTINUED

THERMAL CONDUCTIVITY, REACTIVE GASES, BIFURCATION(MATHEMATICS), EXOTHERMIC REACTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A9.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 978 7/2 7/4

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Photodissociation Dynamics of Negative Ion Clusters: (SO2)2,

SEP 86 9P

PERSONAL AUTHORS: Kim, Hyun-Sook; Bowers, Michael T.

CONTRACT NO. AFOSR-86-0268, $NSF-CHE85-12711

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-87-1998

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v85 n1 p2718-2725, 1 Sep 86.

ABSTRACT: (U) The photodissociation dynamics of (SO2) 2(-) to form SO2/SO 2(-) products is investigated over the wavelength range 656 (1.89 eV) to 458 nm (2.71 eV). Product angular distributions are obtained. An asymmetry parameter analysis indicates the lifetime of the (SO2) 2(-) photoexcited state is much less than a rotational period. Product kinetic energy distributions are obtained at all wavelengths. Both the overall shape of these distributions and comparison with statistical phase space theory calculations indicate the excited state assessed by the photon is repulsive consistent with the asymmetry parameter analysis. An impulsive model analysis suggests the bond between the two SO2 moeities in (SO2) 2(-) is probably between one oxygen atom on each moeity and the structure is quasilinear. Structure is also observed in the kinetic energy distributions. It is suggested this is due to selective photoexcitation of vibrational states of either the SO2 or SO 2(-) moeity in (SO2) 2(-). Hodges and Vanderhoff have reported a bimodel photodestruction cross section for (SO2) 2(-) with major peaks near 600 and 400 nm. We argue these peaks are due to photodissociation of (SO2) 2(-) not photodetachment, with the first excited doublet state (repulsive) leading to the 600 nm peak and the second excited doublet state (bound) leading to the second maxima. The repulsive state must correlate to ground state SO2/SO 2(-) products and the bound state to electronically excited SO2/SO 2(-) products. Predictions regarding the dissociation dynamics of the bound state are made. Keywords: Photodissociation; Negative ion clusters; Reprints.

DESCRIPTORS: (U) *ANIONS, *CLUSTERING, *PHOTODISSOCIATION, *SULFIDES, ANGLES, ASYMMETRY, ATOMS, CHEMICAL DISSOCIATION, DISSOCIATION, DISTRIBUTION, DYNAMICS, ENERGY, FREQUENCY, KINETIC ENERGY, MODELS, OXYGEN, PARAMETRIC ANALYSIS, PHOTOCHEMICAL REACTIONS, PULSES, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 977 7/5

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Photodissociation Dynamics of Weakly Bound Ion-Neutral Clusters: SO2.O2+,

MAR 87

PERSONAL AUTHORS: Kim, Hyun-Sook; Bowers, Michael T.; Kuo, Chau-Hong

CONTRACT NO. AFOSR-86-0059, $AFOSR-86-0268

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-87-1997

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v86 n6 p3283-3291, 15 Mar 87.

ABSTRACT: (U) A photodissociation study of SO2 O2+ is presented. The experiments were carried out on mass selected ion beams that were crossed with a polarized laser beam and then photoproducts were mass and energy analyzed. The SO2 O2+ ions were formed by three body association reactions in a pressure and temperature dependent ion source. Studies were carried out at wavelengths of 582, 514, 488, 458, and 357 + or - 7 nm using an argon ion laser/dye laser system. Both O2+/SO2 and SO2+/O2 photoproducts were observed and the branching ratio measured as a function of lambda. In addition, product kinetic energy distributions and angular distributions (asymmetry parameters) were measured and statistical phase space theory calculations were carried out. The results indicate the O2+/SO2 products are formed from photon absorption to a bound excite state at all wavelengths followed by internal conversion to the ground state and statistical vibrational predissociation. Keywords: Photodissociation, Weakly bound ion neutral, Clusters, Sulfides, Oxygen.

DESCRIPTORS: (U) *PHOTODISSOCIATION, *SULFUR OXIDES, ABSORPTION, ASYMMETRY, CLUSTERING, DYNAMICS, ENERGY, GROUND STATE, INTERNAL CONVERSION, ION BEAMS, ION SOURCES,

AD-A190 977

AD-A190 977 CONTINUED

IONS, KINETIC ENERGY, LASER BEAMS, NEUTRAL, OXYGEN, PHOTONS, POLARIZATION, ARGON LASERS, DYE LASERS, THERMAL PROPERTIES, REPRINTS.

IDENTIFIERS: (U) Sulfur dioxide, PE61102F, WUAFOSR2303B1.

DTIC REPORT BIBLIOGRAPHY

AD-A190 953 12/2

TEXAS UNIV AT ARLINGTON COLL OF ENGINEERING

(U) Development of Adaptive Grid Schemes Based on Poisson Grid Generators.

DESCRIPTIVE NOTE: Annual rept. 15 Nov 86-14 Nov 87,

DEC 87 22P

PERSONAL AUTHORS: Anderson, Dale A.

CONTRACT NO. AFOSR-85-0195

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-88-0126

UNCLASSIFIED REPORT

ABSTRACT: (U) A summary of the technical work performed during the past twelve months under AFOSR Grant 85-0195 is presented in this report. Significant progress on a number of adaptive concepts has been made. Problems associated with earlier adaptive mesh schemes controlling cell area/volume have been resolved. Resolution of this difficulty led to the evolution of an adaptive orthogonal scheme for two-dimensional grids. This technique is even structurally simpler than the original Poisson equation based adaptive methods. Other research emphasis has been placed on developing an unstructured solution scheme as a fast solver to generate these grids.

DESCRIPTORS: (U) *GRIDS, *VOLUME, ADAPTIVE SYSTEMS, GENERATORS, MESH, ORTHOGONALITY, POISSON DENSITY FUNCTIONS, SOLUTIONS(GENERAL), TWO DIMENSIONAL.

IDENTIFIERS: (U) Adaptive grids, PE61102F, WUAFOSR2307A1.

AD-A190 953

SEARCH CONTROL NO. EVI12B

AD-A190 924 20/5

MINISTERE DES ARMEES SAINT-CLOUD (FRANCE) DIRECTION TECHNIQUES DES ARMEMENTS TERRESTRES

(U) Contributions of Autoionizing Resonances to the Electron Collisional Excitation Rates for Be-Like Ions,

SEP 87 28P

PERSONAL AUTHORS: Chen, Mau H.; Crasemann, Bernd

CONTRACT NO. AFOSR-87-0028

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-87-1994

UNCLASSIFIED REPORT

ABSTRACT: (U) The contributions of autoionizing resonances to the electron-impact excitation-rate coefficients for the n = 2 to n = 2 transitions in Be-like ions have been evaluated for six ions with atomic numbers Z = 30, 34, 38, 42, 47, and 54. The calculations were carried out in the isolated-resonance approximation. Interference between direct and resonance channels was neglected. The detailed Auger and radiative rates were computed using the multiconfiguration Dirac-Fock model. Results for 45 transitions among 10 states from '1s2 2l 2l' configurations are listed. For electric dipole allowed transitions, the contributions from the autoionizing resonance are quite small. However, the autoionizing resonances can enhance the excitation rates by a factor of 2-4 dipole forbidden transitions.

DESCRIPTORS: (U) *ELECTRON IMPACT SPECTRA, *AUGER ELECTRON SPECTROSCOPY, ATOMIC PROPERTIES, CHANNELS, COLLISIONS, ELECTRONS, EXCITATION, IONIZATION, IONS, MASS NUMBER, RADIATION, RATES, RESONANCE, BERYLLIUM, ELECTRON TRANSITIONS.

IDENTIFIERS: (U) Forbidden transitions, PE61102F, WUAFOSR2301A4.

AD-A190 924

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A190 906 20/5

JOINT INST FOR LAB ASTROPHYSICS BOULDER CO

(U) Direct Observation of Ba(+) Velocity Distributions in a Drift Tube Using Single-Frequency Laser-Induced Fluorescence,

NOV 87 3P

PERSONAL AUTHORS: Dressler, Rainer A.; Meyer, Henning; Langford, Andrew O.; Bierbaum, Veronica M.; Leone, Stephen R.

CONTRACT NO. AFOSR-86-0018

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-87-2004

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v87 n9 p5578-5579, 1 Nov 87.

ABSTRACT: (U) First results are presented on velocity distribution measurements of Ba+ ions drifted in helium using a well-characterized drift tube and single-frequency laser-induced fluorescence detection. Reduced mobilities of Ba+ in helium are obtained for E/N values between 7.74 and 23.2 Td. The velocity distributions that are observed parallel to the electric field fit a displaced Maxwell-Boltzmann distribution, in agreement with theoretical predictions. However, the temperatures parallel and perpendicular to the field are not in good agreement with theoretical treatments. Keywords: Ion; Laser; Mobility; Velocity; Barium.

DESCRIPTORS: (U) *LASER INDUCED FLUORESCENCE, *PARTICLE ACCELERATOR COMPONENTS, *VELOCITY, BARIUM, DETECTION, DISTRIBUTION, ELECTRODES, HELIUM, IONS, LASERS, MEASUREMENT, MOBILITY, OBSERVATION, PREDICTIONS, REDUCTION, THEORY, STATISTICAL DISTRIBUTIONS.

IDENTIFIERS: (U) Drift tubes, Maxwell boltzmann distribution.

AD-A190 906

AD-A190 904 7/2

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) Disilaoxiranes: Synthesis and Crystal Structure,

87 3P

PERSONAL AUTHORS: Yokelson, Howard B.; Millevolte, Anthony J.; Gillette, Gregory R.; West, Robert

CONTRACT NO. F49620-88-C-0010

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1810

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of American Chemical Society, v109 p6865-6866 1987.

ABSTRACT: (U) Reaction of tetraaryldisilenes with N2O produces tetraaryldisilaoxiranes, R4Si2O where R = mesityl, 2,6-xylyl and 2,6-dimethyl-4-tert-butylphenyl. The crystal structure of tetramesityldisilaxirane (2a) has been determined by x-ray crystallography. The sum of bond angles C-Si-Si', C-Si-C' and C'-Si-Si' at each silicon is 360, and the Si-Si distance is very short, 222.7 pm. These results suggest that bonding in the disilaoxirane structure may be regarded as intermediate between a disilene-oxygen pi-complex and a three-membered ring.

DESCRIPTORS: (U) *CARBON, *SILICON COMPOUNDS, *SYNTHESIS(CHEMISTRY), CRYSTAL STRUCTURE, CRYSTALLOGRAPHY, SILICON, X RAYS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A190 904

AD-A190 897 20/4 12/5

INSTITUTE FOR SCIENTIFIC COMPUTING FORT COLLINS CO

(U) Fast Algorithms for Euler and Navier-Stokes Simulations.

DESCRIPTIVE NOTE: Final rept. 1 Jan-30 Sep 87,

NOV 87 15P

PERSONAL AUTHORS: Johnson, G. M.

CONTRACT NO. AFOSR-87-0133

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1983

UNCLASSIFIED REPORT

ABSTRACT: (U) An explicit flow solver, applicable to the hierarchy of model equations ranging from Euler to full Navier-Stokes, was combined with several techniques designed to reduce computational expense. The computational domain consisted of local grid refinements embedded in a global coarse mesh, where the locations of these refinements are defined by the physics of the flow. Flow characteristics were also used to determine which set of model equations is appropriate for solution in each region, thereby reducing not only the number of grid points at which the solution must be obtained, but also the computational effort required to get that solution. Acceleration to steady-state was achieved by applying multigrid on each of the subgrids, regardless of the particular model equations being solved. Since each of these components is explicit, advantage could readily be taken of the vector-and parallel-processing capabilities of machines such as the Cray X-MP and Cray 2.

DESCRIPTORS: (U) *ALGORITHMS, *NAVIER STOKES EQUATIONS, *COMPUTERIZED SIMULATION, ACCELERATION, COMPUTATIONS, COSTS, FLOW, GRIDS, MATHEMATICAL MODELS, PHYSICS, SIMULATION, STEADY STATE, PARALLEL PROCESSING, THREE DIMENSIONAL FLOW, MULTIPROCESSORS, EMBEDDING, MESH.

IDENTIFIERS: (U) WUAFOSR2304A3, PE61102F.

AD-A190 897

AD-A190 892 7/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) The Reformatsky Reaction,

87 3P

PERSONAL AUTHORS: Dewar, Michael J.; Merz, Kenneth M., Jr

CONTRACT NO. AFOSR-86-0022

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-87-2000

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical Society, v109 p6553-6554 1987.

ABSTRACT: (U) While the Reformatsky reaction is celebrating the centennial of its discovery this year, the mechanism is still a matter of controversy. Early mechanistic suggestions have centered around the rearrangement of adducts 1 and 2 of the two possible monomeric forms of the Reformatsky reagent (RR) with the majority of the chemical evidence favoring the enolate form 2. However, recent X-ray evidence has shown that the RR is dimeric in THF, throwing doubt on the suggestion that the monomeric forms participate at all. Here we report a detailed theoretical study of the reaction, with use of the MNDO has been recently parametrized to handle organozinc compounds. The aldehyde and ether component of the RR was modelled by formaldehyde and dimethyl ether, respectively.

DESCRIPTORS: (U) *ETHERS, *FORMALDEHYDE, *CHEMICAL REACTIONS, CHEMICAL AGENTS, METHYL RADICALS, REPRINTS, X RAYS.

IDENTIFIERS: (U) *Reformatsky reaction, PE61102F, WUAFOSR2303B2.

AD-A190 892

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 891 7/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) An Unusually Large Secondary Deuterium Isotope Effect. Thermal Trans-Cis Isomerization of trans-1-Phenylcyclohexene,

87 3P

PERSONAL AUTHORS: Caldwell, Richard A.; Misawa, Hiroaki; Healy, Eamonn F.; Dewar, Michael J.

CONTRACT NO. AFOSR-86-0022

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-2001

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical Society, v109 p6869-6870 1987.

ABSTRACT: (U) The magnitudes of secondary deuterium isotope effects (SDIE) are generally in the range of 0.9 < kH/Kd < 1.25, and are often satisfactorily rationalized by the zero-point energy (ZPE) change on going from reactant to transition state due to C-H rehybridization. We now report a far larger SDIE for the title reaction. Its rationalization on the basis of transition state theory suggests that it more closely resembles a primary isotope effect. Laser flash photolysis of cis-1-phenylcyclohexene (direct, 266 nm, or sensitized by thioxanthone, 355 nm) affords its trans isomer which in heptane exclusively reverts to 1, k = 2.1 x 10 to the 5th power s at 300 K. Isotopically substituted 2-2-d1 or 2-2, 6-6-d3 (generated similarly from the corresponding cis isomers5) both have rates of reversion longer than 2 itself by a factor of 2.0 at room temperature No previously reported SDIE approaches this magnitude.

DESCRIPTORS: (U) *CYCLOHEXENES, LASERS, PHOTOLYSIS, REACTANTS(CHEMISTRY), TRANSITIONS, ISOTOPE EFFECT, REPRINTS, DEUTERIUM, ISOTOPES, PHENYL RADICALS, ISOMERS.

IDENTIFIERS: (U) *Phenylcyclohexenes, Secondary

AD-A190 891

AD-A190 891 CONTINUED

deuterium isotope effects, PE61102F, WUAFOSR2303B2.

AD-A190 891

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A190 890 7/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Alternative Transition States in the Cope Rearrangements of Hexa-1,5-diene,

87 5P

PERSONAL AUTHORS: Dewar, Michael J.; Jie, Caoxian

CONTRACT NO. AFOSR-86-0022

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-2002

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Chemical Society: Chemical Communications, p1451-1453 1987.

ABSTRACT: (U) The Cope rearrangement of hexa-1,5-diene derivatives was long regarded as a classic example of an 'allowed' pericyclic reaction, taking place via an aromatic transition state (TS) isoconjugate with benzene and with a chair geometry. This view was challenged some years ago by Doering et al., who suggested that the reaction might be nonsynchronous, the TS being a biradical by a through-bond interaction between the radical centres, i.e. a biradicaloid. Keywords: Reprints.

DESCRIPTORS: (U) *DIENES, *ISOMERIC TRANSITIONS, AROMATIC COMPOUNDS, TRANSITIONS, REPRINTS, GEOMETRY.

IDENTIFIERS: (U) *Hexa-1-5-Diene, *Cope rearrangements, PE61102F, WUAFOSR230382.

AD-A190 889 7/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Syntheses of Pentacyclo(5.4.0.0(2,6).0(3,10).0(5,9)) undecane-4,8,11-trione, Pentacyclo(6.3.0.0(2,6).0(3,10) .0(5,9))undecane-4,7,11-trione (D3-Trishomocubanetrione), and 4,4,7,7,11,11-Hexanitro(6.3. 0.0(2,6).0(3,10).0(5,9)undecane (D3-Hexanitrotrishomocubane),

87 7P

PERSONAL AUTHORS: Marchand, Alan P.; Sharma, G. V.; Annapurna, G. S.; Pednekar, P. R.

CONTRACT NO. DAAA21-86-C-0091, $AFOSR-84-0085

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1835

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organic Chemistry, v52 n21 p4784-4788 1987.

ABSTRACT: (U) The title compounds (1, 2a and 2b, respectively) have been synthesized from 4,4-dimethoxypentacyclo(5.4.0.02,6.03,10.05,9)undecane-exo, exo-8,11-diol (4). Thus, hydrolysis of the ketal functionality in 4 followed by oxidation of the resulting ketodiol afforded 1 in essentially quantitative yield. When 4 was heated with acetic acid in the presence of concentrated sulfuric acid, a mixture of cage ketodiacetates 6 and 7 was produced. Compound 2a was synthesized in several steps from this mixture by using the route shown in Scheme I. This synthesis could be shortened considerably when propionic acid was substituted for acetic acid in the acid-promoted rearrangement of 4. An improved synthesis of 2a based on this latter approach is shown in Scheme II. Compound 2a was then converted into the corresponding tris(oxime) from which the corresponding D3-hexanitrotrishomcubane (2b) could be synthesized by using an established literature procedure.

AD-A190 890

AD-A190 889

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 889 CONTINUED

DESCRIPTORS: (U) *DECANES, *CYCLOPENTENES, *NITRO RADICALS, *ORGANIC MATERIALS, ACETIC ACID, PROPIONIC ACID, HYDROLYSIS, OXIDATION, YIELD, SYNTHESIS(CHEMISTRY), ISOMERIZATION, REPRINTS.

IDENTIFIERS: (U) *Pentacyclo undecane-4-8-11-trione, *Pentacycloundecanetrione, *Hexanitro undecane, *Cubanes, PE61102F, WUAFOSR230382.

AD-A190 888 7/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Ab Initio Study of the Chair Cope Rearrangement of 1,5-Hexadiene,

NOV 87 8P

PERSONAL AUTHORS: Dewar, M. J.; Healy, E. F.

CONTRACT NO. AFOSR-86-0022

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR TR-87-2003

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v141 n6 p521-524, 27 Nov 87.

ABSTRACT: (U) Ab initio calculations up to the MPS4SDQ/6-31G level are reported for the chair Cope rearrangement of 1,5-hexadiene. These are consistent with a recent AM1 study, which showed the reaction to take place via a biradicaloid intermediate. Recent AM1 calculations seem to have established that the chair Cope rearrangements of 1,5-hexadiene and its derivatives take place by the non-synchronous mechanism suggested by Doering et al. involving a biradicaloid derived from the 1,4-cyclohexylene biradical as a symmetrical intermediate. These reactions had earlier been assumed to be typical synchronous allowed pericyclic processes taking place via aromatic transition states a mechanism supported by a recent ab inito MC SCF study.

DESCRIPTORS: (U) *DIENES, *HEXYL RADICALS, AROMATIC COMPOUNDS, TRANSITIONS, MOLECULAR ISOMERISM, SYNTHESIS(CHEMISTRY), REPRINTS.

IDENTIFIERS: (U) *Cope rearrangements, Hexadiene, PE61102F, WUAFOSR2303B2.

AD-A190 887 12/5

ILLINOIS UNIV AT URBANA CENTER FOR SUPERCOMPUTING RESEARCH AND DEVELOPMENT

(U) Supercomputer Programming Environments.

DESCRIPTIVE NOTE: Rept. for 1 Oct 86-30 Sep 87,

OCT 87 31P

PERSONAL AUTHORS: Padua, David A.; Guarna, Vincent A., Jr.; Lawrie, Duncan H.

REPORT NO. CSRD-673

CONTRACT NO. F49620-86-C-0136, DE-FG02-85ER25001

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1987

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Grants NSF-DCR84-06916, NSF-DCR84-10110 and AFOSR-85-0211.

ABSTRACT: (U) The quest to apply an ever-increasing amount of computing power to numerical applications has resulted in the evolution of a broad spectrum of ideas and implementations for high performance computing systems. The architectural complexity of these high performance systems typically requires special tools and techniques to achieve efficient utilization of available computational resources. These tools range from automatic restructuring and optimizing compilers to interactive debugging and performance analysis systems. The programming environment for these for these systems must be general and adaptive, providing the appropriate level of assistance for users of varying levels of sophistication. This paper presents recent developments in supercomputer environments, and focuses in more detail on the Cedar Project which is currently under way at the University of Illinois Center for Supercomputing Research and Development. The Cedar Project consists of the construction of a prototype multiprocessor, restructuring compilers for the Fortran and C programming languages,

AD-A190 887

AD-A190 887 CONTINUED

and an integrated graphics-based programming environment intended to serve the needs of scientific applications users.

DESCRIPTORS: (U) *COMPUTER PROGRAMMING, *PARALLEL PROCESSORS, COMPILERS, COMPUTATIONS, DEBUGGING(COMPUTERS), EFFICIENCY, FORTRAN, INTERACTIONS, MULTIPROCESSORS, NUMERICAL METHODS AND PROCEDURES, PROGRAMMING LANGUAGES, PROTOTYPES, RESOURCES, UTILIZATION, COMPUTER ARCHITECTURE, INPUT OUTPUT PROCESSING.

IDENTIFIERS: (U) Software tools, *Supercomputers, C Programming language, PE61102F, WUAFOSR2304A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A190 886 12/5

ILLINOIS UNIV AT URBANA CENTER FOR SUPERCOMPUTING RESEARCH AND DEVELOPMENT

(U) High Resolution Process Timing User's Manual.

DESCRIPTIVE NOTE: Rept. for 1 Oct 86-30 Sep 87,

OCT 87 9P

PERSONAL AUTHORS: Maloney, Allen D.

REPORT NO. CSRD-676

CONTRACT NO. F49620-86-C-0136

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1970

UNCLASSIFIED REPORT

ABSTRACT: (U) A high-resolution process timing facility, called HRTIME, has been implemented for the Cedar system. HRTIME is an extension of the Concentrix USER and SYSTEM process states with 10 usec accuracy. In addition, HRTIME provides individual processor timing measurements to give a detailed account of the time spent in various states of sequential and concurrent execution. The main purpose of this manual is to explain how to use the HRTIME facility. In particular, the manual discusses how to access the timing data, to correctly time a program section, and to interpret the resulting time measurements. Although a brief overview is given describing what the time measurements are and how they are produced, the user should refer to BELM87 for a complete discussion of the HRTIME design and implementation. Keywords: Multiprocessors, Fortran, Program compilation.

DESCRIPTORS: (U) *HIGH RESOLUTION, *COMPUTER PROGRAM DOCUMENTATION, TIME, MEASUREMENT, PROCESSING EQUIPMENT, FORTRAN, MULTIPROCESSORS.

IDENTIFIERS: (U) HRTIME computer program, HRTIME(High Resolution Time), PE61102F, WUAFOSR2304A3.

AD-A190 886

AD-A190 885 12/5

ILLINOIS UNIV AT URBANA CENTER FOR SUPERCOMPUTING RESEARCH AND DEVELOPMENT

(U) VPC - A Proposal for a Vector Parallel C Programming Language.

DESCRIPTIVE NOTE: Rept. for 1 Oct 86-30 Sep 87,

OCT 87 32P

PERSONAL AUTHORS: Guarna, Vincent A., Jr

REPORT NO. CSRD-668

CONTRACT NO. F49620-86-C-0136, DE-FG02-85ER25001

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1969

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Grants NSF-DCR84-06916, NSF-DCR84-10110 and AFOSR-85-0211.

ABSTRACT: (U) This paper proposes a definition for VPC, an extended C programming language for vector-parallel applications. VPC is a superset of the conventional C language that contains extensions for vector and parallel machines. New constructs and their semantics are presented, along with some discussion about potential problems that arise when extending C into the parallel domain. The reader is assumed to be familiar with the C programming language--this paper only describes those aspects of VPC that differ from the standard definition. Keywords: Parallel processing; Synchronization.

DESCRIPTORS: (U) *HIGH LEVEL LANGUAGES, MACHINES, PARALLEL PROCESSING, SEMANTICS, VECTOR ANALYSIS, MULTIPROCESSORS.

IDENTIFIERS: (U) C Programming language, VPC Programming language, VPC(Vector Parallel C), PE61102F, WUAFOSR2304A3.

AD-A190 885

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 884 12/5

ILLINOIS UNIV AT URBANA CENTER FOR SUPERCOMPUTING RESEARCH AND DEVELOPMENT

(U) Concurrency Efficiency User's Manual.

DESCRIPTIVE NOTE: Rept. for 1 Oct 86-30 Sep 87,

OCT 87 8P

PERSONAL AUTHORS: Malony, Allen D.

REPORT NO. CSRD-675

CONTRACT NO. F49620-86-C-0138

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1985

UNCLASSIFIED REPORT

ABSTRACT: (U) This document explains how to use a facility for measuring concurrency efficiency on the Alliant FX/8 implemented as part of CSRD's modifications to the Concentrix operating system. A brief overview of the concurrency efficiency analysis is presented first. The CSRD implementation is then described to point out the measurement's limitations. Concurrency efficiency measurements are directly controlled by the user program. Instructions for determining CEFF values from within a program are given. Concurrency efficiency statistics for the entire program are often desired. A tool for generating this data without requiring user program modification is described. Finally, we give some suggestions on the use of CEFF results in association with other program performance information. Keywords: Variables, FORTRAN computations.

DESCRIPTORS: (U) *PROGRAMMING MANUALS, COMPUTATIONS, EFFICIENCY, MEASUREMENT, MODIFICATION, STATISTICS, USER MANUALS, USER NEEDS, VARIABLES, FORTRAN.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

AD-A190 884

AD-A190 883 12/5

ILLINOIS UNIV AT URBANA CENTER FOR SUPERCOMPUTING RESEARCH AND DEVELOPMENT

(U) Program Profiling in Cedar,

MAR 87 42P

PERSONAL AUTHORS: Malony, Allen

REPORT NO. CSRD-654

CONTRACT NO. F49620-86-C-0138, DE-FG02-85ER25001

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1986

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Grants NSF-DCR84-06916, NSF-DCR84-10110 and AFOSR-85-0211.

ABSTRACT: (U) The goal of program profiling is to provide an accurate characterization of a program's behavior and performance. Program profiling can have several different meanings depending on the measurements of interest and the programming environment. Generally, profiling measurements are concerned with collecting information regarding the dynamic execution behavior of the program. The purpose is to help the user evaluate alternative implementations and to guide program optimizations. This paper presents an analysis of parallel program profiling for the Cedar multiprocessor and a preliminary functional specification of a parallel program profiling tool, cprof. The standard UNIX profiling tools serve as a beginning design basis for cprof and their basic functionality is discussed in Section 2. Section 3 describes the problems with parallel program profiling. In particular, profiling in the Cedar program execution environment is analyzed. The initial version of cprof supports routine counting and timing functionality. The proposed cprof implementation is presented in detail in Section 4. Profiling operations other than routine counting and timing are interesting for parallel programs. Section 5 briefly describes

AD-A190 883

AD-A190 883 CONTINUED

possible extensions of cprof.

DESCRIPTORS: (U) *COMPUTER PROGRAM VERIFICATION, BEHAVIOR, COMPUTER PROGRAMMING, COUNTING METHODS, ENVIRONMENTS, SPECIFICATIONS, OPTIMIZATION, MULTIPROCESSORS.

IDENTIFIERS: (U) UNIX operating system, PE61102F.

AD-A190 882 12/2

NORTH CAROLINA STATE UNIV AT RALEIGH CENTER FOR RESEARCH IN SCIENTIFIC COMPUTA TION

(U) Derivative Arrays, Geometric Control Theory, and Realizations of Linear Descriptor Systems.

DESCRIPTIVE NOTE: Technical rept.,

NOV 87 15P

PERSONAL AUTHORS: Campbell, Stephen L.; Terrell, William J.

REPORT NO. CRSC-TR-112587-01

CONTRACT NO. AFOSR-87-0051, $NSF-DMS86-13093

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-87-1975

UNCLASSIFIED REPORT

ABSTRACT: (U) The relationship between numerical methods for realizations of E(t)x'(t) + F(t)x(t)=f(t) based on derivative arrays and geometric control realization procedures based on Lie derivatives is examined.

DESCRIPTORS: (U) *ARRAYS, *NUMERICAL METHODS AND PROCEDURES, *DERIVATIVES(MATHEMATICS), GEOMETRY, LINEAR SYSTEMS, DIFFERENTIAL EQUATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A190 881 12/1

NORTH CAROLINA STATE UNIV AT RALEIGH CENTER FOR RESEARCH IN SCIENTIFIC COMPUTA TION

(U) Solving Singular Systems *Using* Orthogonal Functions.

DESCRIPTIVE NOTE: Technical rept.,

OCT 87 *10P*

PERSONAL AUTHORS: Campbell, Stephen L.; Yeomans, Kevin D.

REPORT NO. CRSC-TR-100587-01

CONTRACT NO. AFOSR-87-005;, $NSF-DMS88-13093

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-87-1977

UNCLASSIFIED REPORT

ABSTRACT: (U) Orthogonal functions, and in particular, Walsh functions, have been advocated in the literature as a method of approximating the solutions of singular systems Ex' = Fx + Bu of index k. This paper gives the first analysis of the accuracy of these approximations. For Walsh functions, divergence is shown for k > or - 3 and convergence for k = 0,1. The index two case is also analyzed. Keywords: Singular control systems; Constant matrices; Coefficients.

DESCRIPTORS: (U) *ORTHOGONALITY, *WALSH FUNCTIONS, ACCURACY, COEFFICIENTS, CONTROL SYSTEMS, INDEXES, SOLUTIONS(GENERAL), CONVERGENCE, APPROXIMATION(MATHEMATICS).

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A190 879 20/10 9/1 12/9

UTAH UNIV SALT LAKE CITY DEPT OF PHYSICS

(U) Fluxons and Order in Long Josephson Junctions.

DESCRIPTIVE NOTE: Annual rept. 15 Nov 86-15 Nov 87,

DEC 87 27P

PERSONAL AUTHORS: Symko, Orest G.

CONTRACT NO. AFOSR-86-0020

PROJECT NO. 2305

TASK NO. C3

MONITOR: AFOSR
TR-88-0171

UNCLASSIFIED REPORT

ABSTRACT: (U) This report presents the research that was conducted in the year 1987 and some of the results were achieved. Low frequency fluctuations were studied at metastable states of long Josephson junctions biased at Fiske steps in a magnetic field. The fluctuations exhibit telegraph type of noise whose origin in the thermal noise of the internal resistance of the junction. Temperature dependence of these fluctuations shows that a thermal activation process is responsible for the behavior. At lower temperatures, quantum mechanical tunneling is expected to contribute to the fluctuations and experiments are presently being prepared for such studies down to 10 mK in a 3He-4He dilution refrigerator. The I-V curves for our junctions show a regular step structure due to cavity resonances and they also show subharmonic generation of period three due to the strong non-linearities of the dissipative system. Such subharmonic voltage steps are important because they normally precede chaotic behavior. A study was also made of the effects of geometry on fluxon motion and the results show that the device characteristics depend strongly on the bias current distribution in the junction. Studies for the next period are presented; they consist of experiments on fluxon quantum tunneling down to temperatures of 10 mK and effects of dissipation on such tunneling; conductance fluctuations in the junction will also be investigated.

AD-A190 879 CONTINUED

DESCRIPTORS: (U) *JOSEPHSON JUNCTIONS, *MAGNETIC FIELDS, *METASTABLE STATE, *NOISE, *QUANTUM ELECTRONICS, *TUNNELING, *VARIATIONS, ACTIVATION, BIAS, CAVITY RESONATORS, CONDUCTIVITY, DISSIPATION, DISTRIBUTION, HARMONICS, INTERNAL, LOW FREQUENCY, LOW TEMPERATURE, NOISE(ELECTRICAL AND ELECTROMAGNETIC), QUANTUM THEORY, RESISTANCE, TELEGRAPH SYSTEMS, TEMPERATURE, THERMAL PROPERTIES, THERMAL RESISTANCE, VOLTAGE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305C3.

AD-A190 878 7/3 21/2

DELAWARE UNIV NEWARK DEPT OF CHEMISTRY

(U) Structure/Property/Reactivity Relations Among Nitramine and Other Energetic Materials.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 86-30 Sep 87,

OCT 87 12P

PERSONAL AUTHORS: Brill, Thomas B.

CONTRACT NO. AFOSR-87-0033

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR TR-88-0169

UNCLASSIFIED REPORT

ABSTRACT: (U) High heating rate thermoylsis studies of energetic materials using rapid-scan Fourier transform infrared spectroscopy as the diagnostic technique have yielded considerable information on the origins of the pressure dependence of the process and structure/property/reactivity relationships. The pressure dependence of the observed gas products up to 1000 psi was shown for the first time to originate from heterogeneous gas/condensed phase reactions. The formation of NH3 from alkylammonium nitrate salts occurs only if the O/H ratio is less than one. The thermochemistry of cyclic and acyclic nitramines is shown to be different in the condensed phase as a result of the different global molecular shapes. Hydrogen bonding as a stabilizing feature in the impact sensitivity of an energetic material was shown to be overridden by the presence of energetic functional groups. Keywords: Thermal decomposition, Infrared spectroscopy, Pressure effects, Gas analysis, Impact sensitivity, Energetic materials.

DESCRIPTORS: (U) *NITRAMINES, *ENERGETIC PROPERTIES, *COMBUSTION PRODUCTS, *PROPELLANTS, *THERMOCHEMISTRY, MATERIALS, GASES, SENSITIVITY, NITRAMINES, GAS ANALYSIS, HYDROGEN BONDS, INFRARED SPECTROSCOPY, VAPOR PHASES, PYROLYSIS, REACTIVITIES.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 878 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1.

AD-A190 877 7/4

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES

(U) Radiative and Non-Radiative Processes in Jet-Cooled NCNO.

AUG 87 8P

PERSONAL AUTHORS: Qian, C. X.; Reisler, H.; Wittig, C.

CONTRACT NO. F49620-86-C-0004

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-88-0139

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v139 n2 p175-181, 21 Aug 87.

ABSTRACT: (U) Lifetimes of excited vibronic levels in NCNO are measured both by LIF and by monitoring excited state absorptions. Fluorescence lifetimes are longer than S sub 1 radiative lifetimes at all wavelengths between the band origin (11, 339/cm) and D sub 0 (17,085/cm). In the language of radiationless transitions, the behavior below D sub 0 is characteristic of the small or intermediate molecule limit. Keywords: Dissociation; Surfaces; Molecular dynamics; Reprints.

DESCRIPTORS: (U) *DISSOCIATION, *MOLECULES, *RADIATION, *TRANSITIONS, *VIBRATION, ABSORPTION, BEHAVIOR, DYNAMICS, FLUORESCENCE, FREQUENCY, LIFE SPAN(BIOLOGY), LIMITATIONS, MOLECULAR PROPERTIES, MONITORING, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A190 825 6/2

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Modulating Transfer RNA Anticodon Modifications and Biologic Responses in Human Cells.

DESCRIPTIVE NOTE: Final rept. 15 Oct 85-14 Oct 87,

DEC 87 11P

PERSONAL AUTHORS: Trewyn, Ronald

CONTRACT NO. AFOSR-85-0003

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR TR-88-0037

UNCLASSIFIED REPORT

ABSTRACT: (U) This research project was designed to assess the role of tRNA anticodon modifications in regulating gene expression and to determine the potential for manipulating these modifications to modulate biologic responses in human cells. The modification reactions of primary interest were those involved in generating the nucleosides queuosine and inosine exclusively in the first position of the anticodon of specific tRNAs. These are the only two tRNA modifications known to occur by base exchange mechanisms, whereby queuine and hypoxanthine are inserted directly into tRNA macromolecules. Various human cell culture systems were used to determine whether and/or how the dietary factor queuine and the normal purine catabolite hypoxanthine: Inhibit the effects of tumor promoters, block the neoplastic process subsequent to the initiation event, reverse the expression of transformed phenotypes by malignant cells, and induce the maturation of undifferentiated cells. The relationship to specific tRNA structural changes in the anticodon was evaluated.

DESCRIPTORS: (U) *RIBONUCLEIC ACIDS, *GENETIC ENGINEERING, EXCHANGE, DIET, CELLS(BIOLOGY), CULTURES(BIOLOGY), HUMANS, ADENINE, HYDROLYSIS, MATURATION, MODULATION, RIBONUCLEIC ACIDS, TRANSFER, NUCLEOSIDES, RESPONSE(BIOLOGY), GENES, CELLS(BIOLOGY),

AD-A190 825

AD-A190 825 CONTINUED

HUMANS, INOSINE, MODIFICATION, NEOPLASMS, STRUCTURAL PROPERTIES.

IDENTIFIERS: (U) *Transfer ribonucleic acid, *Anticodon, queuosine, PE61102F, WUAFOSR2312A5, OSURF764432716730.

AD-A190 825

AD-A190 819 12/3

NORTH CAROLINA STATE UNIV AT RALEIGH CENTER FOR RESEARCH IN SCIENTIFIC COMPUTA TION

(U) Distributional Convergence of BDF (Backward Differentiation Formulas) Approximations to Solutions of Descriptor Systems.

DESCRIPTIVE NOTE: Technical rept.,

NOV 87 8P

PERSONAL AUTHORS: Campbell, Stephen L.

REPORT NO. CRSC-TR-091787-01

CONTRACT NO. AFOSR-87-0051, $NSF-DMS86-13093

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-87-1976

UNCLASSIFIED REPORT

ABSTRACT: (U) It has been frequently observed that the backward differentiation approximation of the solutions of Ex' + Fx = f can fail to converge even pointwise in an initial boundary layer. This note shows that the approximations converge in a distributional sense even if the exact solution is also distributional. Keywords: Matrices; Convergence; Approximation.

DESCRIPTORS: (U) *APPROXIMATION(MATHEMATICS), *CONVERGENCE, BOUNDARY LAYER, SOLUTIONS(GENERAL), MATRICES(MATHEMATICS), DISTRIBUTION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A190 818 11/6.1 20/11 11/2

VIRGINIA UNIV CHARLOTTESVILLE SCHOOL OF ENGINEERING AND APPLIED SCIENCE

(U) Fatigue '87. Papers presented at the International Conference on Fatigue and Fatigue Threshold (3rd) Held in Charlottesville, Virginia on June 28-July 3, 1987. Volume 3.

DESCRIPTIVE NOTE: Final technical rept. 1 Jan-30 Sep 87,

OCT 87 486P

PERSONAL AUTHORS: Ritchie, R. O.; Starke, E. A., Jr

CONTRACT NO. AFOSR-87-0062

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR
TR-87-1665-VOL-3

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 1, AD-A190 816.

ABSTRACT: (U) Fracture by the progressive growth of incipient flaws under cyclically varying loads, i.e., by fatigue, must now be considered as the principal cause of in-service failures of engineering structures and components, whether associated with mechanical sliding and friction (fretting fatigue), rolling contact, aggressive environments (corrosion fatigue), or elevated temperatures (creep-fatigue). Of particular importance are the early stages of fatigue damage, involving the initial extension of microcracks and their subsequent growth at very low velocities, as these processes tend to dominate overall lifetime. This has been reflected by trends in fatigue research over the past five years, which have focused largely on so-called 'small cracks,' of dimensions comparable with the scale of microstructure or local plasticity, and on crack growth in the near-threshold regime, i.e., at stress intensities approaching the fatigue threshold below which cracks are presumed dormant. In addition, associated mechanistic studies have highlighted the critical role of crack tip shielding in fatigue, which arises predominantly from crack closure

AD-A190 818 CONTINUED

and deflection, and this has proved to be important in modeling aspects of environmentally-assisted cracking and behavior under variable amplitude loads, and in rationalizing the classical stress/strain-life and defect-tolerant design approaches. The series of international conferences 'Fatigue '87 covered a wide range of diverse views of the fundamental and applied aspects of fatigue. This included questions of cyclic deformation, crack initiation and propagation, small cracks, crack closure, variable amplitude effects, and environmentally-influenced behavior.

DESCRIPTORS: (U) *CRACKS, *FATIGUE(MECHANICS), *SYMPOSIA, *LOW ALLOY STEELS, *SUPERALLOYS, *FATIGUE LIFE, CLOSURES, CORROSION, CRACK PROPAGATION, CRACKING(FRACTURING), DEFORMATION, FRETTING, FRICTION, INTERNATIONAL, MECHANICAL PROPERTIES, MICROCRACKING, MICROSTRUCTURE, PLASTIC PROPERTIES, SHIELDING, SLIDING, STRESSES, THRESHOLD EFFECTS, SULFUR.

AD-A190 817 11/6.1 20/11

VIRGINIA UNIV CHARLOTTESVILLE SCHOOL OF ENGINEERING AND APPLIED SCIENCE

(U) Fatigue '87. Papers presented at the International Conference on Fatigue and Fatigue Threshold (3rd) Held in Charlottesville, Virginia on June 28-July 3, 1987. Volume 2.

DESCRIPTIVE NOTE: Final technical rept. 1 Jan-30 Sep 87,

OCT 87 570P

PERSONAL AUTHORS: Ritchie, R. O.; Starke, E. A., Jr

CONTRACT NO. AFOSR-87-0082

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR TR-87-1665-VOL-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 3, AD-A190 818.

ABSTRACT: (U) Fracture by the progressive growth of incipient flaws under cyclically varying loads, i.e., by fatigue, must now be considered as the principal cause of in-service failures of engineering structures and components, whether associated with mechanical sliding and friction (fretting fatigue), rolling contact, aggressive environments (corrosion fatigue), or elevated temperatures (creep-fatigue). Of particular importance are the early stages of fatigue damage, involving the initial extension of microcracks and their subsequent growth at very low velocities, as these processes tend to dominate overall lifetime. This has been reflected by trends in fatigue research over the past five years, which have focused largely on so-called 'small cracks,' of dimensions comparable with the scale of microstructure or local plasticity, and on crack growth in the near-threshold regime, i.e., at stress intensities approaching the fatigue threshold below which cracks are presumed dormant. In addition, associated mechanistic studies have highlighted the critical role of crack tip shielding in fatigue, which arises predominantly from crack closure

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 817 CONTINUED

and deflection, and this has proved to be important in modeling aspects of environmentally-assisted cracking and behavior under variable amplitude loads, and in rationalizing the classical stress/strain-life and defect-tolerant design approaches. The series of international conferences 'Fatigue '87' covered a wide range of diverse views of the fundamental and applied aspects of fatigue. This included questions of cyclic deformation, crack initiation and propagation, small cracks, crack closure, variable amplitude effects, and environmentally-influenced behavior.

DESCRIPTORS: (U) *CRACKS, *FATIGUE(MECHANICS), *SYMPOSIA, *STEEL, *NICKEL ALLOYS, *SUPERALLOYS, CORROSION, CRACK PROPAGATION, CRACKING(FRACTURING), DAMAGE, DEFLECTION, DEFORMATION, FRETTING, FRICTION, INTERNATIONAL, LOW VELOCITY, MECHANICAL PROPERTIES, MICROCRACKING, MICROSTRUCTURE, PLASTIC PROPERTIES, SCALE, SHIELDING, STRESSES, THRESHOLD EFFECTS, CRYSTALLOGRAPHY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A1.

AD-A190 817

AD-A190 818 11/6.1 20/11

VIRGINIA UNIV CHARLOTTESVILLE SCHOOL OF ENGINEERING AND APPLIED SCIENCE

(U) Fatigue '87. Papers presented at the International Conference on Fatigue and Fatigue Threshold (3rd) Held in Charlottesville, Virginia on June 28-July 3, 1987. Volume 1.

DESCRIPTIVE NOTE: Final technical rept. 1 Jan-30 Sep 87,

OCT 87 800P

PERSONAL AUTHORS: Ritchie, R. O.; Starke, E. A., Jr

CONTRACT NO. AFOSR-87-0062

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR TR-87-1885-VOL-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 2, AD-A190 817.

ABSTRACT: (U) Fracture by the progressive growth of incipient flaws under cyclically varying loads, i.e., by fatigue, must now be considered as the principal cause of in-service failures of engineering structures and components, whether associated with mechanical sliding and friction (fretting fatigue), rolling contact, aggressive environments (corrosion fatigue), rolling contact, aggressive environments (corrosion fatigue), or elevated temperatures (creep-fatigue). Of particular importance are the early stages of fatigue damage, involving the initial extension of microcracks and their subsequent growth at very low velocities, as these processes tend to dominate overall lifetime. This has been reflected by trends in fatigue research over the past five years, which have focused largely on so-called 'small cracks,' of dimensions comparable with the scale of microstructure or local plasticity, and on crack growth in the near-threshold regime, i.e., at stress intensities approaching the fatigue threshold below which cracks are presumed dormant. In addition, associated mechanistic studies have highlighted the critical role of

AD-A190 816

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 816 CONTINUED

crack tip shielding in fatigue, which arises predominantly from crack closure and deflection, and this has proved to be important in modeling aspects of environmentally-assisted cracking and behavior under variable amplitude loads, and in rationalizing the classical stress/strain-life and defect-tolerant design approaches. The series of international conferences 'Fatigue '87' covered a wide range of diverse views of the fundamental and applied aspects of fatigue. This included questions of cyclic deformation, crack initiation and propagation, small cracks, crack closure, variable amplitude effects, and environmentally-influenced behavior.

DESCRIPTORS: (U) *CRACKS, *FATIGUE(MECHANICS), *SYMPOSIA, CLOSURES, CORROSION, CRACK PROPAGATION, CRACKING(FRACTURING), CYCLES, DAMAGE, DEFORMATION, FRETTING, FRICTION, INTENSITY, INTERNATIONAL, LOW VELOCITY, MICROCRACKING, MICROSTRUCTURE, PLASTIC PROPERTIES, REFLECTION, STRESSES, THRESHOLD EFFECTS, ION BEAMS, SUPERALLOYS, GRAIN BOUNDARIES, TEST METHODS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A1.

AD-A190 816

AD-A190 808 12/2

IOWA STATE UNIV AMES

(U) Finite Element Approximation of a Reaction-Diffusion Equation. Part 1. Application of Topological Techniques to the Analysis of Asymptotic Behavior of the Semidiscrete Approximations,

JUL 88

PERSONAL AUTHORS: Khalsa, Sat N.

CONTRACT NO. AFOSR-84-0252

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR TR-87-1950

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Quarterly of Applied Mathematics, v44 n2 p375-388 Jul 88.

ABSTRACT: (U) The initial-boundary value problem for a reaction diffusion equation sub t = u sub xx +f(u) f(u)=-u(u-b) (u-1) 0<b<1/2 (*) has been analyzed using the Conley index. This paper the asymptotic behavior of the semidiscrete finite element approximations, with interpolation of the coefficients in the nonlinear terms. We show that for small h the spectrum of the linearized discrete steady-state problem is a good approximation for the spectrum of the linearized continuous steady state problem. Using the interpretation of the Conley index as the dimension of an unstable manifold of a steady state solution, we establish that the properties of the semidiscrete approximations are completely analagous to those of the solution (*). The asymptotic, as t approaches infinity, optimal order convergence of the approximate solution is proved.

DESCRIPTORS: (U) *FINITE ELEMENT ANALYSIS, *TOPOLOGY, *APPROXIMATION(MATHEMATICS), ASYMPTOTIC SERIES, BOUNDARY VALUE PROBLEMS, COEFFICIENTS, CONVERGENCE, DIFFUSION, EQUATIONS, INTERPOLATION, LINEARITY, NONLINEAR SYSTEMS, OPTIMIZATION, SOLUTIONS(GENERAL), STEADY STATE.

AD-A190 808

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A190 808 CONTINUED

IDENTIFIERS: (U) Conley index, PE61102F, WUAFOSR2304A4.

AD-A190 807 12/2

IOWA STATE UNIV AMES DEPT OF MATHEMATICS

(U) A Potential Well Theory for the Wave Equation with a Nonlinear Boundary Condition,

87 27P

PERSONAL AUTHORS: Levine, Howard A.; Smith, Richard A.

CONTRACT NO. AFOSR-84-0252

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR TR-87-1492

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. fuer die Reine und Angewandte Mathematik, v374 p1-23 1987.

ABSTRACT: (U) This paper employs potential well arguments to obtain existence-nonexistence alternative for solution to the linear wave equation subject to a nonlinear boundary condition.

DESCRIPTORS: (U) *POTENTIAL THEORY, *WAVE EQUATIONS, BOUNDARIES, LINEAR DIFFERENTIAL EQUATIONS, NONLINEAR SYSTEMS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A4.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A190 752 21/2 21/9.2

RENSSELAER POLYTECHNIC INST TROY NY

(U) Advanced B and Al Iota Combustion Kinetics over Wide Temperature Ranges.

DESCRIPTIVE NOTE: Annual rept. 1 Dec 86-31 Nov 87,

DEC 87

PERSONAL AUTHORS: Fontijn, Arthur

CONTRACT NO. AFOSR-86-0019

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-88-0170

UNCLASSIFIED REPORT

ABSTRACT: (U) Current ability to improve the combustion efficiency of B and Al solid propellants and slurries is hampered by a lack of understanding and knowledge of the kinetics of the individual reactions involved and the ways and manner by which temperature affects the rate coefficients and product channels. While the simple Arrhenius-type equation k(T) = AT(to the 1/2 power) exp(-E(A)/RT) has over limited temperature ranges been of great value, when applied to wide temperature ranges it is often not obeyed. Particularly for exothermic and slightly endothermic reactions, order of magnitude errors can be made by extrapolations based on the Arrhenius equation. It is the goal of this program to provide an insight in the kinetic behavior of B and Al radical oxidation reactions as influenced by temperature. To this end measurements are made in high-temperature fast-flow reactors (HTFFR). These unique tools provide measurements on isolated elementary reactions in a heat bath.

DESCRIPTORS: (U) *COMBUSTION, ARRHENIUS EQUATION, BATHS, CHANNELS, COEFFICIENTS, EFFICIENCY, ENDOTHERMIC REACTIONS, ERRORS, EXTRAPOLATION, FAST REACTORS, HEAT, HIGH TEMPERATURE, ISOLATION, REACTION KINETICS, MEASUREMENT, OXIDATION REDUCTION REACTIONS, RANGE(EXTREMES), RATES, SOLID PROPELLANTS, TEMPERATURE, SOLID ROCKET PROPELLANTS, ALUMINIZED PROPELLANTS, BORON COMPOUNDS, CHLORIDES,

AD-A190 752

AD-A190 752 CONTINUED

ALUMINUM COMPOUNDS.

IDENTIFIERS: (U) Boron chloride,Aluminum chloride, Radiative lifetimes, PE61102F, WUAFOSR2308A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 741 9/1

MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF ELECTRONICS

(U) Interface Formation and Precursory Dynamics.

DESCRIPTIVE NOTE: Annual rept. 15 Nov 86-15 Nov 87,

DEC 87 12P

PERSONAL AUTHORS: Poannopoulos, John D.

CONTRACT NO. AFOSR-87-0098

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR
TR-88-0056

UNCLASSIFIED REPORT

ABSTRACT: (U) A completely ab initio investigation was made of the structure of a grain boundary in geranium. This was accomplished using a quantum molecular dynamics simulated annealing method. This method allows global minimisation of the boundary energy to be achieved with respect to all electronic and ionic structural degrees of freedom using ab initio local pseudopotentials. The method has significant advantages in computational speed and storage requirements over traditional total energy techniques, especially when systems of low symmetry are involved or in which large relaxations take place.

DESCRIPTORS: (U) *GRAIN BOUNDARIES, *SEMICONDUCTORS, BOUNDARIES, COMPUTATIONS, INTERFACES, RELAXATION, REQUIREMENTS, STORAGE, SYMMETRY, GERMANIUM, CHARGE DENSITY, QUENCHING, CRYSTAL STRUCTURE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306B1.

AD-A190 738 7/6

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Picosecond Time-Resolved and Frequency Domain Coherent Raman Scattering Study of Conjugated Polymeric Films: A Soluble Polydiacetylene, Poly-4-BCMU,

AUG 87 8P

PERSONAL AUTHORS: Swiatkiewicz, Jacek; Mi, Xin; Chopra, Pratibha; Prasad, Paras N.

REPORT NO. SUNY/AB/TR-13

CONTRACT NO. F49620-85-C-0052, $NSF-DMR84-03987

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-88-0072

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v87 n3 p1882-1888, 1 Aug 87.

ABSTRACT: (U) We report the first study of both time-resolved and frequency domain coherent Raman scattering in a conjugated polymer, specifically a soluble polydiacetylene called poly-4-BCMU. Both CARS and CSRS spectra were recorded at room temperature and at 4 K in the region of -C=C- stretch on a approx. 12 micro m thick film of poly-4-BCMU in the red amorphous form. The relevant CSRS spectra of the blue crystalline form are also reported. Frequency domain study reveals the vibrational resonance frequency to be independent of the polymer molecular weight in the red form, but different for the blue and red form. The line shapes are asymmetric, but do not seem to fit the predictions of a simple model involving dominant two-photon resonance contributions. The observed vibrational dephasing in the time-resolved study is very fast at both room temperature and 4 K, being within the time-resolution available. From the combined analysis of the frequency domain and time-resolved studies at both room temperature and 4 K, an inhomogeneous mechanism of dephasing is inferred. The inhomogeneous dephasing arises from simultaneous coherent

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI126

AD-A190 738 CONTINUED

excitation of a distribution of vibrational frequencies originating from a distribution of polymer conjugation length. Keywords: Picosecond, Time-resolved, Frequency domain, Coherent Raman scattering, Conjugated polymeric films, Soluble, Polydiacetylene.

DESCRIPTORS: (U) *COHERENT SCATTERING, *LIGHT SCATTERING, *POLYMERIC FILMS, *POLYMERS, *RAMAN SPECTRA, *ACETYLENES, BLUE(COLOR), COHERENCE, CRYSTALS, DISTRIBUTION, EXCITATION, FREQUENCY, LENGTH, MOLECULAR WEIGHT, PHOTONS, RESONANCE, RESONANT FREQUENCY, ROOM TEMPERATURE, SHAPE, SYNCHRONISM, TIME, VIBRATION, REPRINTS.

IDENTIFIERS: (U) PF61102F, WUAFOSR2303A3.

AD-A190 737 7/6

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Third Harmonic Generation from a Monolayer Film of a Polydiacetylene, Poly-4-BCMU,

AUG 87 3P

PERSONAL AUTHORS: Berkovic, G.; Shen, Y. R.; Prasad, P. N.

REPORT NO. SUNY/AB/TR-11

CONTRACT NO. F49620-85-C-0052, DE-AC03-76SF000098

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-88-0070

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v87 n3 p1897-1898, 1 Aug 87.

ABSTRACT: (U) We report here the first observation of third harmonic generation (THG) from a monolayer film of a processable polydiacetylene, poly-4-BCMU, spread on a water subphase. Surface second harmonic generation (SHG) has been used sucessfully in the past to probe monolayer molecular arrangement and orientations at an interface; however, due to symmetry requirements this technique cannot be applied to centrosymmetric molecules. Our present work shows that for centrosymmetric conjugated polymers, THG instead of SHG can serve as a powerful tool to obtain information on the molecular orientation and to probe any conformational transition in the polymer monolayer films. Poly-4-BCMU was selected as a suitable choice for two reasons: (i) it has large third-order nonlinear susceptibility X(3), and (ii) when compressed into the monolayer film form, it undergoes a conformational transition from a less pi-electron conjugated yellow form to a more conjugated red form. Keywords: Third harmonic generation, Monolayer film, Polydiacetylene.

DESCRIPTORS: (U) *HARMONIC GENERATORS, *POLYMERIC FILMS, *THIRD HARMONIC GENERATION, *ACETYLENES, FILMS, LAYERS,

AD-A190 737 CONTINUED

MOLECULES, OBSERVATION, ORIENTATION(DIRECTION), PROBES, RED(COLOR), REQUIREMENTS, SURFACES, SYMMETRY, WATER, REPRINTS.

IDENTIFIERS: (U) *Polydiacetylene, PE61102F, WUAFOSR2303A3.

AD-A190 735 7/4

STATE UNIV OF NEW YORK AT BUFFALO AMHERST

(U) Dynamical Analysis of Molecular Decay at Spherical Surfaces,

DEC 87 3P

PERSONAL AUTHORS: Leung, P. T.; George, Thomas F.

CONTRACT NO. F49620-86-C-0009, $NSF-CHE86-20274

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-87-2005

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v87 n11 p8722-8724, 1 Dec 87.

ABSTRACT: (U) · A dynamical approach to the classical decay rates for molecules near a dielectric sphere is presented through the application of the diffraction theory for a dipole antenna establishes by Van del Pol and Bemmer. This theory is somewhat simpler than but formally equivalent to that established by Rupping and preserves a feature which is closer to the method of the theory established by Chance, Prock and Silbey for a flat surface. The results, when compared to those obtained from the static image theory, show that this latter theory can be very inaccurate for large molecule-sphere distances of highly-conducting spheres, consistent with previous findings for surfaces with perfect flatness or small roughness. Keywords: Molecule decay; Dynamical analysis; Spherical surfaces; Dielectric sphere; Diffraction; Dipole antenna.

DESCRIPTORS: (U) *DECAY, *DIELECTRICS, *MOLECULES, *SPHERES, DIFFRACTION, DIPOLE ANTENNAS, DYNAMICS, IMAGES, RATES, ROUGHNESS, STATICS, THEORY, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 716 20/6 9/3

FLORIDA UNIV GAINESVILLE SPACE ASTRONOMY LAB

(U) The Interaction of Small Particles with Laser Beams.

DESCRIPTIVE NOTE: Annual rept. 10 Oct 86-9 Oct 87,

DEC 87 42P

PERSONAL AUTHORS: Misconi, N. Y.; Ratcliff, K. F.; Rusk, E. T.

CONTRACT NO. F49620-85-C-0117

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR TR-87-2043

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes our research under Award/Contract F49620-85-C-0117 which deals with light scattering measurements of levitated spherical and irregular particles in an Argon laser beam (effective wavelength, 514.5 nm) of highly transparent silica. The particles range in size from 25-55 microns in diameter. Comparisons between the measurements (for scattering angles theta = 27 to 162 deg and computed theoretical Mie scattering curves are made. Preliminary results on rotating irregular particles are included.

DESCRIPTORS: (U) *LASER BEAMS, *LIGHT SCATTERING, *MIE SCATTERING, ARGON LASERS, INTERACTIONS, MEASUREMENT, PARTICLE SIZE, PARTICLES, SILICON DIOXIDE, TRANSPARENCE, REFRACTIVE INDEX.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A2.

AD-A190 715 20/6

ARIZONA UNIV TUCSON

(U) Nonlinear Behavior in Optical and Other Systems.

DESCRIPTIVE NOTE: Final rept. 1 Jun 83-30 Sep 86,

SEP 86 19P

PERSONAL AUTHORS: Newell, Alan C.

CONTRACT NO. AFOSR-83-0227

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-87-2021

UNCLASSIFIED REPORT

ABSTRACT: (U) The research under this grant focused on nonlinear behavior, coherence and chaos, in partial differential equations, especially those occuring nonlinear optics. Sixteen papers were published during the period of this grant.

DESCRIPTORS: (U) *OPTICS, *ENTROPY, NONLINEAR SYSTEMS, PARTIAL DIFFERENTIAL EQUATIONS, ENERGY TRANSFER, CONSERVATION, TURBULENCE, OPTICAL PROPERTIES, OPTICAL WAVEGUIDES, WAVEGUIDE COUPLERS.

IDENTIFIERS: (U) Nonlinear optics, Chaos, Solitons, PE61102F, WUAFOSR2304A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 714 20/11

BATTELLE PACIFIC NORTHWEST LAB RICHLAND WA

(U) Evolution of Hardening and Damage during Viscoplastic Deformation.

DESCRIPTIVE NOTE: Final rept. 1 Dec 86-30 Aug 87,

OCT 87 70P

PERSONAL AUTHORS: Williford, R. E.

REPORT NO. 23111-07367

CONTRACT NO. F49620-87-C-0031

MONITOR: AFOSR
TR-87-2007

UNCLASSIFIED REPORT

ABSTRACT: (U) Although theories of nonlocal mechanics were developed to address the role of hardening and damage microstructures in heterogeneous engineering materials, these theories frequently require additional, but unavailable, information concerning the concentrations or size distributions of the microstructures to compute the internal stresses. An objective of this work was to develop generalized equations for the size distributions of hardening and damage microstructures as functions of the stress, strain rate, and the scale of observation, and thus to reduce the above information requirements. The two approaches employed addressed incompressible and compressible materials. Limitations identified from the incompressible formulation were employed to construct a variational integral for compressible materials. Definition of the variables in this integral was completed except for a strain rate scale factor. The associated Euler Lagrange equations are expected to provide the desired microstructure evolution equations. Keywords: Hardening, Damage, Viscoplasticity, Nonlocal stress polarization, Variational methods, Scale factors, Fractals.

DESCRIPTORS: (U) *ENGINEERING, *HARDENING, *HETEROGENEITY, *MATERIALS, *SCALING FACTORS, *STRAIN RATE, *VISCOPLASTIC PROPERTIES, COMPRESSIBLE FLOW, DAMAGE, DIFFERENTIAL EQUATIONS, DISTRIBUTION, EQUATIONS, EVOLUTION(GENERAL), FORMULATIONS, INCOMPRESSIBILITY,

AD-A190 714

AD-A190 714 CONTINUED

INTERNAL, LAGRANGIAN FUNCTIONS, MECHANICS, MICROSTRUCTURE, OBSERVATION, POLARIZATION, REQUIREMENTS, SCALE, STRESSES, THEORY, VARIATIONAL METHODS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B1.

AD-A190 714

OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A190 712 11/2

NATIONAL BUREAU OF STANDARDS GAITHERSBURG MD CERAMICS DIV

(U) Strength and Microstructure of Ceramics.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 86-30 Sep 87,

NOV 87 38P

PERSONAL AUTHORS: Lawn, Brian R.; Swanson, Peter L.; Fairbanks, Carolyn J.; Hockey, Bernard J.; Mai, Yiu-Wing

CONTRACT NO. AFOSR-ISSA-87-0034

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR TR-87-2041

UNCLASSIFIED REPORT

ABSTRACT: (U) Our goal in this program continues to be the understanding of the role of microstructure in the strength properties of ceramics. It is becoming increasingly apparent to the brittle fracture community that the toughness characteristics and flaw distributions of structural ceramics can be very much influenced, sometimes with great sensitivity, by small details in the microstructural makeup. For instance, the addition of less than 1% glassy phase to the grain boundaries of alumina polycrystals can alter the fracture properties dramatically, giving rise to significant improvements in strength.

DESCRIPTORS: (U) *CERAMIC MATERIALS, *MICROSTRUCTURE, *STRENGTH(MECHANICS), ALUMINUM OXIDES, BRITTLENESS, DEFECTS(MATERIALS), DISTRIBUTION, FRACTURE(MECHANICS), GRAIN BOUNDARIES, POLYCRYSTALLINE, SENSITIVITY, STRUCTURAL PROPERTIES, TOUGHNESS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A2, LPN-NBS-4200484.

AD-A190 712

AD-A190 711 17/11 12/6 12/5

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF ELECTRICAL AND COMPUTER ENGINEERIN G

(U) Multi-Disciplinary Techniques for Understanding Time-Varying Space-Based Imagery.

DESCRIPTIVE NOTE: Rept. for May 85-Mar 87,

APR 87 154P

PERSONAL AUTHORS: Casasent, David; Sanderson, Arthur; Kanade, Takeo; Vijaya Kumar, B. V.

CONTRACT NO. AFOSR-84-0239

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR TR-87-1756

UNCLASSIFIED REPORT

ABSTRACT: (U) This project combined pattern recognition, image understanding and artificial intelligence techniques for space-based image processing. A special feature of this effort is the attempt to use both optical and digital processing methods. Subpixel target detection and tracking algorithms are analyzed and conclusions are presented regarding their suitability for this application. We also present an adaptive subpixel delay estimation method using Group-Delay Functions. Image understanding techniques for three dimensional scene interpretation are also discussed.

DESCRIPTORS: (U) *ALGORITHMS, *DIGITAL SYSTEMS, *IMAGE PROCESSING, *OPTICAL PROCESSING, *PATTERN RECOGNITION, *TARGET DETECTION, DELAY, ESTIMATES, INTELLIGENCE, METHODOLOGY, PROCESSING, SPACE BASED, TRACKING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B4.

AD-A190 711

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A190 708 7/8

CINCINNATI UNIV OH DEPT OF CHEMISTRY

(U) High-Performance Polymeric Materials.

DESCRIPTIVE NOTE: Final rept 1 Nov 82-31 Oct 87,

DEC 87 233P

PERSONAL AUTHORS: Mark, J. E.

CONTRACT NO. AFOSR-83-0027

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-87-2011

UNCLASSIFIED REPORT

ABSTRACT: (U) A variety of theoretical methods were used to elucidate the structure and properties of rigid rodlike polymer chains which are of interest as high-performance polymeric materials. Semi-empirical molecular mechanics methods were used to calculate the intramolecular and intermolecular energies pertinent to conformational flexibility and chain packing effects. Also, geometry optimized CNDO/2 molecular orbital calculations were carried out to investigate the structure and conformational characteristics of the rodlike polymers, in both the unprotonated and protonated states. Electronic band gap calculations within the extended Huckel approximation were carried out to elucidate the packing and electronic properties of these chains in the crystalline state. Keywords: Rodlike polymers, Aromatic heterocyclic polymers, Conformational energies, Intermolecular interactions, Polybenzobisoxazoles, Polybenzobisthiazoles, Chain flexibility, Chain packing, Electrical conductivity, Ceramic particles, Elastomer reinforcement.

DESCRIPTORS: (U) *POLYMERS, CERAMIC MATERIALS, CRYSTALS, ELASTOMERS, ELECTRICAL CONDUCTIVITY, ELECTRONICS, INTERACTIONS, MECHANICS, MOLECULE MOLECULE INTERACTIONS, MOLECULES, PACKAGING, SILANES, THIAZOLES, THERMAL STABILITY, SILICATES, BRITTLENESS, ELASTIC PROPERTIES, GERMANIUM COMPOUNDS, AROMATIC COMPOUNDS, REPRINTS.

AD-A190 708

AD-A190 708 CONTINUED

IDENTIFIERS: (U) Benzobisoxazoles, Benzobisthiazoles, PE61102F, WUAFOSR2303A3.

AD-A190 708

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 655 20/5

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) Fluids, Gels and Glasses under Extreme Conditions of Pressure and Temperature.

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 86-30 Sep 87,

JAN 88 18P

PERSONAL AUTHORS: Jonas, Jiri

CONTRACT NO. AFOSR-87-0045

PROJECT NO. 2917

TASK NO. A2

MONITOR: AFOSR
TR-88-0158

UNCLASSIFIED REPORT

ABSTRACT: (U) A multi-nuclear, high resolution, high field NMR spectrometer system equipped with wide-bore (89 mm) 7.05 Tesla superconducting magnet, and accessories for high resolution solid state work and an NMR data station were funded under this instrumentation grant. The basic system, a General Electric GN-300, was installed in September, 1986. The necessary accessories for high resolution NMR work on solids were installed during the week of February 23-28, 1987. The new Nicolet 1280 NMR data system, delivered in October 1986, is currently being used to control a recently built specialized NMR spectrometer using a wide bore 4.2 Tesla superconducting magnet made by Oxford Instruments. Keywords: High field, High resolution, Spectrometer, Nuclear magnetic resonance.

DESCRIPTORS: (U) *NUCLEAR MAGNETIC RESONANCE, *GLASS, FLUIDS, GELS, HIGH RESOLUTION, MAGNETS, SOLIDS, SPECTROMETERS, SUPERCONDUCTORS, PROCUREMENT, LABORATORY EQUIPMENT, SPECIFICATIONS, REPORTS.

IDENTIFIERS: (U) Superconducting magnet, PE61102F, WUAFOSR2917A2.

AD-A190 655

AD-A190 649 11/4

MICHIGAN STATE UNIV EAST LANSING COLL OF ENGINEERING

(U) Interfacial Structure-Property Relationships at the Fiber-Matrix Interphase in Advanced Composites.

DESCRIPTIVE NOTE: Final rept. 1 Sep 86-30 Sep 87,

SEP 87 7P

PERSONAL AUTHORS: Drzal, Lawrence T.

CONTRACT NO. AFOSR-86-0286

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR
TR-87-1780

UNCLASSIFIED REPORT

ABSTRACT: (U) Interfacial structure property relationships at the fiber matrix interphase in advanced composite materials. This grant approved under the DOD University Research Instrumentation Grant Program was used to partially fund the purchase of surface spectroscopy equipment. The report contains the listings and descriptions of equipment actually acquired, a summary of research projects on which the equipment will be used, and other research work of interest to DOD for which this equipment will be used. Keywords: Metal matrix composite, Carbon fiber composites, Ceramic matrix composites.

DESCRIPTORS: (U) *CARBON FIBERS, *FIBER REINFORCED COMPOSITES, *METAL MATRIX COMPOSITES, *CARBON REINFORCED COMPOSITES, CERAMIC MATERIALS, INTERFACES, MOLECULAR STRUCTURE, PHASE STUDIES, SPECTROSCOPY, SURFACES, REINFORCED CONCRETE, POLYMERIZATION, SURFACE CHEMISTRY.

IDENTIFIERS: (U) *Interfacial properties, Equipment, PE61102F, WUAFOSR2917A3.

AD-A190 649

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A190 647 14/2

MARYLAND UNIV COLLEGE PARK DEPT OF CIVIL ENGINEERING

(U) University Research Instrumentation Program. Equipment for Instrumentation of Bridge Rehabilitation and Geotechnical Explosives Testing.

DESCRIPTIVE NOTE: Final rept. Aug 86-Sep 87,

NOV 87 32P

PERSONAL AUTHORS: Goodings, D. J.; Ayyub, B.

CONTRACT NO. AFOSR-86-0333

PROJECT NO. 2917

TASK NO. A1

MONITOR: AFOSR TR-87-1990

UNCLASSIFIED REPORT

ABSTRACT: (U) The report describes the performance criteria sought and the system selected for data acquisition on two quite different civil engineering research facilities: one for testing composite structural section with application to bridge rehabilitation, and one for geotechnical centrifugal modelling. It also outlines the initial applications of the systems.

DESCRIPTORS: (U) *DATA ACQUISITION, BRIDGES, CIVIL ENGINEERING, COMPOSITE STRUCTURES, INSTRUMENTATION, REHABILITATION, RESEARCH FACILITIES, TEST AND EVALUATION, UNIVERSITIES, SAND, CRATERS, MODELS, CENTRIFUGES, EXPLOSION EFFECTS, STRAIN GAGES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A1.

AD-A190 647

AD-A190 644 22/2

CLARKSON UNIV POTSDAM NY

(U) Nonlinear Analysis and Optimal Design of Dynamic Mechanical Systems for Spacecraft Application.

DESCRIPTIVE NOTE: Final technical rept. 1 Feb 84-31 Jul 87,

SEP 87 103P

PERSONAL AUTHORS: Willmert, K. D.; Sathyamoorthy, M.

CONTRACT NO. AFOSR-84-0076

PROJECT NO. 2302

TASK NO. B

MONITOR: AFOSR TR-87-2008

UNCLASSIFIED REPORT

ABSTRACT: (U) This research developed analysis and optimal designed procedures for planar as well as spatial mechanisms that are frequently used in space structures. A nonlinear finite element procedure developed originally for planar mechanisms during the initial stages of this research, has been modified considerably to handle complex mechanisms with sliding masses and mechanisms operating at relatively high speeds. The analysis takes into account the effects of geometric mand material nonlinearities, vibrational effects and coupling of deformations. Numerical results have been reported for certain mechanism examples. The effects of nonlinearities have been found to be significant on the dynamic behavior of mechanisms. Considerable progress has been made in developing a nonlinear finite element procedure for three-dimensional mechanisms. Numerical results obtained for some example problems indicate the validity of the current three-dimensional formulation. A new optimization algorithm has also been developed based on the Gauss method to handle various types of nonlinear constraints with the goal of reducing the number of analyses required to obtain an optimal design. Complete details of the nonlinear finite element procedures as well as the optimization technique are available in published papers, copies of which are included here in the Appendix.

AD-A190 644

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 644 CONTINUED

Because of the complex nature of the nonlinear analysis, which had to be repeated many times during the optimization process, considerable amount of computer was needed for this research.

DESCRIPTORS: (U) *FINITE ELEMENT ANALYSIS, *SPACECRAFT COMPONENTS, ALGORITHMS, COUPLING(INTERACTION), DEFORMATION, DYNAMIC RESPONSE, DYNAMICS, FORMULATIONS, HIGH VELOCITY, MATERIALS, MECHANICAL COMPONENTS, NONLINEAR ANALYSIS, NONLINEAR SYSTEMS, NUMERICAL ANALYSIS, OPTIMIZATION, PLANAR STRUCTURES, SPACECRAFT, SPATIAL DISTRIBUTION, THREE DIMENSIONAL, VIBRATION, MANIPULATORS.

IDENTIFIERS: (U) Gauss method, VAX-11/785 computers, PE61102F, WUAFOSR2302B1.

AD-A190 633 12/5 12/6

ILLINOIS UNIV AT URBANA

(U) Supercomputer Environment.

DESCRIPTIVE NOTE: Annual technical rept. 1 Oct 86-30 Sep 87.

OCT 87 7P

CONTRACT NO. F49620-86-C-0138

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1988

UNCLASSIFIED REPORT

ABSTRACT: (U) This summary covers goals and first year accomplishments of the Faust project, a research effort to develop a software engineering environment of supercomputer application development. The goal of Faust is to provide a user-friendly workstation of integrated development tools that caters to a broad range of user expertise. Faust comprises individual efforts in the area of user interface tools, expert systems, parallel program debugging, performance evaluation, symbolic processing, error analysis, and graphics. The Faust project is additionally supporting efforts in the areas of fluid and structural dynamics. Overall project goals are outlined, followed by a summary of first contract year's accomplishments that were presented to the Faust project review team on August 6, 1987.

DESCRIPTORS: (U) *SUPERCOMPUTERS, *COMPUTER PROGRAMMING, COMPUTER PROGRAMS, DEBUGGING(COMPUTERS), DYNAMICS, ERROR ANALYSIS, FLUIDS, INTEGRATED SYSTEMS, INTERFACES, PERFORMANCE TESTS, PARALLEL PROCESSING, TOOLS, SYSTEMS ENGINEERING, TOOLS, USER NEEDS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 611 22/2 20/11

WEA CAMBRIDGE MA

(U) Wave Propagation and Dynamics of Lattice Structures.

DESCRIPTIVE NOTE: Final rept. 1 Sep 85-30 Sep 87,

OCT 87 8P

PERSONAL AUTHORS: Williams, James H., Jr

CONTRACT NO. F49620-85-C-0148

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR
TR-87-1777

UNCLASSIFIED REPORT

ABSTRACT: (U) One of the most attractive structural configurations for large space structures (LSS) for outer space applications is the repetitive lattice concept. Achieving the operational requirements of such structures will necessitate considerable knowledge of the dynamics, control, materials and nondestructive evaluation (NDE) of these structural systems. Wave propagation analyses provide potentially valuable perspectives from which to consider this broad range of analysis, design and synthesis issues. The theoretical and experimental results of a two-year research program on the wave propagation and dynamics of LSS are briefly reviewed. Potential benefits to wave propagation analyses in the vibration, parameter identification, dynamic failure, control and NDE of lattice structures have been identified and are summarized in this report. Keywords: Wave propagation, Dynamic failure, Lattice structures, Large space structures.

DESCRIPTORS: (U) *DYNAMICS, *SPACECRAFT, *STRUCTURAL PROPERTIES, *VIBRATION, *WAVE PROPAGATION, BENEFITS, FAILURE, IDENTIFICATION, NONDESTPUCTIVE TESTING, OUTER SPACE, REQUIREMENTS, SPACE TECHNOLOGY, STRUCTURES, SYNTHESIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B1.

AD-A190 611

AD-A190 606 20/4

MICHIGAN UNIV ANN ARBOR GAS DYNAMICS LABS

(U) Dense-Spray Structure and Phenomena. Part 1. Turbulence/Dispersed-Phase Interactions.

DESCRIPTIVE NOTE: Annual rept. 15 Jul 86-14 Jul 87,

AUG 87 81P

PERSONAL AUTHORS: Parthasarathy, R. N.; Faeth, G. M.

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-87-1758-PT-1

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes one aspect of an investigation of dense-spray processes: namely turbulence/dispersed-phase interactions. The work was divided into two phases: (1) measurements of particle-laden jets injected into a still liquid; and homogenous particle flows, consisting of particles falling in a still (in the mean) liquid bath. The structure of turbulent, dilute, particle-laden water jets, submerged in still water, was studied both experimentally and theoretically. Nonintrusive measurements were made of mean and fluctuating phase velocities and particle number fluxes. Analysis was used to help interpret the measurements, considering three limiting cases, as follows: (1) locally-homogenous flow, where relative velocities between the phases are ignored; (2) deterministic separated flow, where relative velocities are considered, but particle/turbulence interactions are ignored; and (3) stochastic separated flow, where both phenomena are considered using random-walk methods. The locally-homogenous flow approximation was more effective than for past work involving larger density ratios between the phases; nevertheless, stochastic analysis yielded best agreement with measurements. Effects of enhanced drag (due to high relative turbulent intensities of particle motion) and effects of particles on liquid turbulence properties (turbulence modulation), were observed. Several recent proposals for treating these phenomena were examined; however, none appears to be adequate for reliable general

AD-A190 606

AD-A190 606 CONTINUED

use.

DESCRIPTORS: (U) *WATER JETS, *TWO PHASE FLOW, *DISPERSING, BATHS, DENSITY, DETERMINANTS(MATHEMATICS), DRAG, FLOW, FLOW SEPARATION, HIGH RATE, HOMOGENEITY, INTENSITY, INTERACTIONS, LIMITATIONS, LIQUIDS, MODULATION, MOTION, PARTICLE COLLISIONS, PARTICLE FLUX, PARTICLES, PHASE, RATIOS, STOCHASTIC PROCESSES, TURBULENCE, VELOCITY, WATER, SPRAYS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A190 580 8/4

BOSTON UNIV MA CENTER FOR ADAPTIVE SYSTEMS

(U) Cortical Dynamics of Three-Dimensional Form, Color, and Brightness Perception, 2. Binocular Theory,

87

PERSONAL AUTHORS: Grossberg, Stephen

CONTRACT NO. F49620-86-C-0037, DAAG29-85-K-0095

MONITOR: ARO, AFOSR 22399.18-MA, TR-88-0380

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: *Pub. in Perception and Psychophysics*, v41 n2 p87-116 1987. See also Part 1, AD-A190579.

ABSTRACT: (U) A real-time visual processing theory is developed to explain how three-dimensional form, color, and brightness precepts are coherently synthesized. The theory describes how several fundamental uncertainty principles which limit the computation of visual information at individual processing stages are resolved through parallel and hierarchical interactions among several processing stages. The theory hereby provides a unified analysis and many predictions of data about stereopsis, binocular rivalry, hyperacuity, McCollough effect, textural grouping, border distinctness surface perception, monocular and binocular brightness precepts, filling-in, metacontrast, transparency, figural aftereffects, lateral inhibition within spatial frequency channels, proximity-luminance covariance, tissue contrast, motion segmentation, and illusory figures, as well as about reciprocal interactions among the hyper-columns, blobs, and stripes of cortical areas V1, V2, and V4. Monocular and binocular interactions between a Boundary Contour (BC) system and a Feature Contour (FC) System are developed. The BC System, defined by a hierarchy of oriented interactions, synthesizes an emergent and coherent binocular boundary segmentation from combinations of unoriented and oriented scenic elements.

DESCRIPTORS: (U) *IMAGE PROCESSING, *VISUAL PERCEPTION, *VISUAL CORTEX, BOUNDARIES, BRIGHTNESS, CHANNELS, COHERENCE, COMPUTATIONS, EYE, FREQUENCY, INTERACTIONS, MOTION, PREDICTIONS, REAL TIME, SEGMENTED, SPATIAL

AD-A190 580 CONTINUED

DISTRIBUTION, STEREOSCOPES, STRIPES, SURFACES, TEXTURE, THEORY, VISION, THREE DIMENSIONAL, DYNAMICS, PARALLEL PROCESSING, SHAPE, REPRINTS.

IDENTIFIERS: (U) *Binocular vision.

AD-A190 579 12/9

BOSTON UNIV MA CENTER FOR ADAPTIVE SYSTEMS

(U) Cortical Dynamics of Three-Dimensional Form, Color, and Brightness Perception. 1. Monocular Theory.

87

PERSONAL AUTHORS: Grossberg, Stephen

CONTRACT NO. F49620-86-C-0037, DAAG29-85-K-0095

MONITOR: ARO, AFOSR
22399.18-MA, TR-88-0379

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Perception and Psychophysics, v41 n2 p87-116 1987. See also Part 2, AD-A190580.

ABSTRACT: (U) A real-time visual processing theory is developed to explain how three-dimensional form, color, and brightness percepts are coherently synthesized. The theory describes how several fundamental uncertainty principles which limit the computation of visual information at individual processing stages are resolved through parallel and hierarchical interactions among several processing stages. The theory hereby provides unified analysis and many predictions of data about stereopsis, binocular rivalry, hyperacuity, McCollough effect, textural grouping, border distinctness, surface perception, monocular and binocular brightness percepts, filling-in, metacontrast, transparency, figural aftereffects, lateral inhibition within spatial frequency channels, proximity luminance covariance, tissue contrast, motion segmentation, and illusory figures, as well as about reciprocal interactions among the hypercolumns, blobs, and stripes of cortical areas V1, V2, and V4. Monocular and binocular interactions between a Boundary Contour (BC) System and a Feature Contour (FC) System are developed. The BC System, defined by a hierarchy of oriented interactions, synthesizes an emergent and coherent binocular boundary segmentation from combinations of unoriented and oriented scenic elements.

DESCRIPTORS: (U) *CYBERNETICS, *VISUAL CORTEX, *VISUAL PERCEPTION, BOUNDARIES, BRIGHTNESS, CHANNELS, COHERENCE, EYE, FREQUENCY, HIERARCHIES, INTERACTIONS, PREDICTIONS, SEGMENTED, SPATIAL DISTRIBUTION, STEREOSCOPES, STRIPES,

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 579 CONTINUED

SURFACES, TEXTURE, THEORY, VISION, *PARALLEL PROCESSING*, IMAGE PROCESSING, SPACE PERCEPTION, MATHEMATICAL MODELS, REPRINTS.

IDENTIFIERS: (U) Stereopsis, Binocular vision, *Computer vision.

AD-A190 563 12/3 12/2 7/4

NORTHWESTERN UNIV EVANSTON IL

(U) Markov Processes Applied to Control, Replacement, and Signal Analysis.

DESCRIPTIVE NOTE: Final technical rept. 1 Jun 82-31 Jul 87,

SEP 87 5P

PERSONAL AUTHORS: Pinsky, Mark A.

CONTRACT NO. AFOSR-82-0189

PROJECT NO. 2304

TASK NO. A5

MONITOR: *AFOSR* TR-87-2015

UNCLASSIFIED REPORT

ABSTRACT: (U) The top Lyapunov exponent of a system of stochastic differential equations was investigated. Brownian motion paths on a Riemannian manifold were discussed and several theoretical results were obtained. A new asymptotic formula for the volume of a small extrinsic ball in a submanifold was obtained. Finally, an invariance principle for Lie groups was obtained.

DESCRIPTORS: (U) *BROWNIAN MOTION, *DIFFERENTIAL EQUATIONS, *LIE GROUPS, *MARKOV PROCESSES, *STOCHASTIC PROCESSES, INVARIANCE, LYAPUNOV FUNCTIONS, PATHS, SIGNALS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12D

AD-A190 552 7/2

ILLINOIS UNIV AT URBANA COORDINATED SCIENCE LAB

(U) Workshop on Future Opportunities through GaAs on Silicon Held in Marina del Ray, California on June 18-19, 1987.

DESCRIPTIVE NOTE: Final technical rept.,

DEC 87 15P

PERSONAL AUTHORS: Markoc, H.

CONTRACT NO. AFOSR-87-0198

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR
TR-87-1922

UNCLASSIFIED REPORT

ABSTRACT: (U) The workshop was attended by about 110 researchers who are actively involved, in one phase or another, with GaAs on Si and related problems. The format of the workshop was such that there was ample opportunity for spontaneous discussions in subjects ranging from materials growth to potential systems that may be possible. The enclosed program details and the list of attendees should provide a sufficient account of what went on at the workshop. Keywords: Meeting agenda, Attendees, Discussion topics, Gallium arsenides, Silicon.

DESCRIPTORS: (U) *GALLIUM ARSENIDES, CALIFORNIA, GROWTH(GENERAL), MATERIALS, SILICON.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305C1.

AD-A190 551 12/9 5/7

ILLINOIS UNIV AT URBANA COORDINATED SCIENCE LAB

(U) Robotics with Natural Language Comprehension and Learning Abilities.

DESCRIPTIVE NOTE: Final rept. 1 Jun 82-31 Dec 85,

JAN 85 8P

PERSONAL AUTHORS: DeJong, Gerald

CONTRACT NO. F49620-82-K-0009

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1748

UNCLASSIFIED REPORT

ABSTRACT: (U) Research is progressing on two fronts: our learning robotics system and natural language processing. The robotics system is nearly implemented. It will run in INTERLISP on a XEROX 1108 Lisp Processor. Most of the major component sub-systems have been finished. A solid modeling system has been implemented to support the reasoning necessary for manipulation of pieces within a workspace. It can model cylindrical and rectangular solid primitives which can be added and subtracted to form complex pieces. A graphics package has been developed which is capable of presenting any of the complex pieces on a bitmapped video screen as correct perspective wire-frame drawings. A schema organization sub-component has also been developed. There are three projects proceeding in the area of natural language processing.

DESCRIPTORS: (U) *LEARNING, *NATURAL LANGUAGE, *ROBOTICS, COMPREHENSION, GRAPHICS, MODELS, ORGANIZATIONS, PARTS, PROCESSING, REASONING, RECTANGULAR BODIES, SKILLS, SOLIDS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A190 539 20/13

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF MATHEMATICAL SCIENCES

(U) Solidification Fronts/Viscous Phase Transitions Forwards-Backwards Heat Equations.

DESCRIPTIVE NOTE: Final rept.,

JAN 87

PERSONAL AUTHORS: Novick-Cohen, A.; Rosenau, P.

CONTRACT NO. AFOSR-86-0179

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR
TR-87-1798

UNCLASSIFIED REPORT

ABSTRACT: (U) Directional solidification in the presence of an impurity may be described by a set of impurity concentration and thermal diffusion equations coupled at a free boundary. In the limit of a small distribution coefficient, a long wavelength expansion can be used to obtain a single fourth order parabolic equation describing the deviations of the interface from planarity in the limit in which the deviations are small. Here we present an alternate version of this asymptotic scheme which isolates and preserves the nonlinearities in their original form. While the new asymptotic expansion is of an equivalent level of asymptotic validity, the extrapolated predictions of cusping, blow up and front formation appear to be more accurate.

DESCRIPTORS: (U) *IMPURITIES, *SOLIDIFICATION, *THERMAL DIFFUSION, ASYMPTOTIC SERIES, BOUNDARIES, COEFFICIENTS, CONCENTRATION(COMPOSITION), DIRECTIONAL, DISTRIBUTION, EQUATIONS, EXPANSION, INTERFACES, BINARY ALLOYS, PHASE TRANSFORMATIONS.

IDENTIFIERS: (U) Kuramoto Sivashinsky equation.

AD-A190 539

AD-A190 538 20/11

RENSSELAER POLYTECHNIC INST TROY NY

(U) Problems in Nonlinear Continuum Dynamics.

DESCRIPTIVE NOTE: Final progress rept.,

87 9P

PERSONAL AUTHORS: Slemrod, Marshall

CONTRACT NO. AFOSR-85-0239

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-87-1769

UNCLASSIFIED REPORT

ABSTRACT: (U) The focus of this research was primarily feedback stabilization of distributed parameter systems. The principal investigator derived feedback operators for a general class of distributed systems, which include flexible beams, under the constraint of bounded control. Six papers were published, including Feedback Stabilization in Hilbert Space. Feedback laws are found for control systems governed by partial differential equations. In particular those control systems which give the dynamics of aeroelastic systems have been of particular interest.

DESCRIPTORS: (U) *AEROELASTICITY, *CONTROL SYSTEMS, *FEEDBACK, *CONTINUUM MECHANICS, CONTROL, DISTRIBUTION, DYNAMICS, HILBERT SPACE, NONLINEAR SYSTEMS, PARTIAL DIFFERENTIAL EQUATIONS, STABILIZATION, LAGRANGIAN FUNCTIONS.

IDENTIFIERS: (U) Spinodal decomposition, PE61102F, WUAFOSR2304A1.

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A190 536 22/2

DEPARTMENT OF THE AIR FORCE WASHINGTON D C DIRECTORATE OF STUDIES AND ANALYS IS

(U) Feedback Control of Distributed Parameter Systems with Applications to Large Space Structures.

DESCRIPTIVE NOTE: Final progress rept. 28 Dec 83-1 Sep 87,

OCT 87 27P

PERSONAL AUTHORS: Balas, Mark J.

CONTRACT NO. AFOSR-83-0124

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-87-2034

UNCLASSIFIED REPORT

ABSTRACT: (U) Large space structures exhibit distributed parameter behavior in their dynamics and thus must be described on infinite-dimensional state-spaces. However, the controller algorithm must be finite-dimensional to be implemented. The focus of this research has been to make finite-dimensional approximations of infinite-dimensional controllers which stabilize the distributed parameter system. The investigator has shown conditions under which Galerkin approximation schemes can yield finite-dimensional stabilizing controllers for linear distributed parameter systems.

DESCRIPTORS: (U) *SPACECRAFT, *STRUCTURAL RESPONSE, *ATTITUDE CONTROL SYSTEMS, ALGORITHMS, APPROXIMATION(MATHEMATICS), CONTROL, DISTRIBUTION, DYNAMICS, FEEDBACK, SIZES(DIMENSIONS).

IDENTIFIERS: (U) Galerkin approximation, PE61102F, WUAFOSR2304A1.

AD-A190 535 11/8.2

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF MATHEMATICAL SCIENCES

(U) Laser Photodeposition and Etching Study.

DESCRIPTIVE NOTE: Final rept. 1 Jul 86-30 Jun 87,

JUN 87 6P

PERSONAL AUTHORS: Novick-Cohen, A.

CONTRACT NO. AFOSR-86-0179

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR TR-87-1765

UNCLASSIFIED REPORT

ABSTRACT: (U) The important result reported is that under a distinguished limit procedure an alternative to the K-S Equation is obtained when modelling the evolution of solidification fronts. Three papers are being prepared for publication. Solidification Fronts: Asymptotic equations are derived to model the evolution of the solid liquid interface which occurs in the directional solidification of binary alloys. In the limit where GD/VCo(g + fc) is small, the Kuramoto-Sivashinsky equation is obtained. Viscous Phase Transition: Two equations are derived and analyzed which model the dynamics of viscous first order phase transitions.

DESCRIPTORS: (U) *BINARY ALLOYS, *SOLIDIFICATION, DIRECTIONAL, DYNAMICS, EQUATIONS, ETCHING, INTERFACES, LIQUIDS, MODELS, PHASE TRANSFORMATIONS, SOLIDS, VISCOSITY, LASER APPLICATIONS, DEPOSITION, ASYMPTOTIC NORMALITY, MATHEMATICAL MODELS.

IDENTIFIERS: (U) Photodeposition, PE61102F, WUAFOSR2304A9.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 534 4/1 20/8

TECHNION - ISRAEL INST OF TECH HAIFA DEPT OF PHYSICS

(U) Measurement of Atmospheric Transmission over Long Paths in the Infrared Spectral Region.

DESCRIPTIVE NOTE: Final scientific rept. 1 Apr 85-30 Nov 86,

NOV 86 6P

PERSONAL AUTHORS: Oppenheim, U. P.; Lipson, S. G.

CONTRACT NO. AFOSR-83-0023

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR
TR-87-1786

UNCLASSIFIED REPORT

ABSTRACT: (U) Atmospheric transmission over a 10.37 km and a 38.9 km path is reported as a function of wavelength in the 3-5 micron region of the spectrum. High relative humidity conditions prevailed and good signal to noise was achieved with a spectral resolution of 2%.

DESCRIPTORS: (U) *ATMOSPHERES, *HIGH HUMIDITY, *INFRARED SPECTRA, *PATHS, *TRANSMITTANCE, MEASUREMENT, SIGNAL TO NOISE RATIO.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A1.

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NORTHWESTERN UNIV EVANSTON IL DEPT OF CHEMISTRY

(U) The Spectroscopy and Reaction Kinetics of Coordinatively Unsaturated Metal Carbonyls.

DESCRIPTIVE NOTE: Final technical rept. Oct 83-Oct 87,

OCT 87 17P

PERSONAL AUTHORS: Weitz, Eric

CONTRACT NO. AFOSR-83-0372

PROJECT NO. 2306

TASK NO. C4

MONITOR: AFOSR
TR-87-1785

UNCLASSIFIED REPORT

ABSTRACT: (U) A program involving the investigation and characterization of reactions of coordinatively unsaturated organometallic species is described. The program emphasizes the measurement of rates of reaction of photolytically produced coordinatively unsaturated species with the parent and rates for cluster formation. Experimental measurements are performed using a time resolved transient absorption apparatus which uses a line turnable carbon monoxide (CO) laser and a diode laser to record spectral and kinetic information by means of probing absorptions in the CO stretch region of the infrared. Systems that have been investigated include coordinatively unsaturated species generated from the Fe (CO)5, Cr(CO)6 and Mn2(CO)10 parents. The results of experiments with these systems are discussed.

DESCRIPTORS: (U) *REACTION KINETICS, *CARBINOLS, ABSORPTION, CARBON MONOXIDE, EXPERIMENTAL DATA, KINETICS, LASERS, SPECTRA, SPECTROSCOPY, CLUSTERING, ORGANOMETALLIC COMPOUNDS, COMPUTER AIDED DIAGNOSIS, INFRARED SPECTROSCOPY, CATALYSTS, CHROMIUM, IRON.

IDENTIFIERS: (U) *Metal carbonyls, PE61102F, WUAFOSR2306C4.

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DTIC REPOR, BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 532 6/1 6/11 21/4

ILLINOIS UNIV AT URBANA DEPT OF VETERINARY BIOSCIENCES

(U) A Comparative Study Regarding the Association of Alpha-2U Globulin with the Nephrotoxic Mechanism of Certain Petroleum-Based Air Force Fuels.

DESCRIPTIVE NOTE: Final rept. 1 Sep 86-31 Aug 87,

OCT 87 14P

PERSONAL AUTHORS: Eurell, Thomas E.

CONTRACT NO. AFOSR-86-0313

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-87-1784

UNCLASSIFIED REPORT

ABSTRACT: (U) Alpha-2U globulin is a low molecular weight urinary protein which may be associated with a hydrocarbon-induced proximal tubular cell degeneration in the male rat kidney. A new method was developed to obtain monospecific immunologic reagents for alpha-2U globulin using diafiltration, anion-exchange and hydroxylapatite chromatography. Isoelectric focusing techniques were developed to isolate the major isoelectric variants of the alpha-2U globulin molecule and to assess changes in alpha-2U globulin after experimental exposure to hydrocarbon compounds. Alpha-2U globulin was isolated from the urine of albino and pigmented male rats to study strain susceptibility to the nephrotoxic process. An alpha-2u globulin isoelectric variant profile distinguishing albino from non-albino male rats was not apparent, however, strain differences were revealed. Fischer 344 male rats appear to have higher levels of the isoelectric variants than the other strains studied. These findings suggest that if a strain susceptibility to the hydrocarbon-induced nephrotoxic lesion exists, it may be associated with the alpha-2U globulin isoelectric variant profile.

DESCRIPTORS: (U) *FUELS, *HYDROCARBONS, *KIDNEYS, *GLOBULINS, *TOXICITY, *BIOASSAY, AIR FORCE,

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CELLS(BIOLOGY), CHEMICAL AGENTS, IMMUNOLOGY, MALES, PETROLEUM PRODUCTS, RATS, URINE, EXPOSURE(PHYSIOLOGY), LESIONS, ANTIBODIES, TOXIC TOLERANCES.

IDENTIFIERS: (U) Alpha-2U Globulin, Nephrons, PE61102F, WUAFOSR2312A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 531 7/4

MICHIGAN UNIV ANN ARBOR DEPT OF NUCLEAR ENGINEERING

(U) Vacuum Spectrograph for E-Beam Ablation Studies.

DESCRIPTIVE NOTE: Final technical rept. 1 Aug 86-31 Jul 87,

JUL 87 9P

PERSONAL AUTHORS: Brake, M. L.

CONTRACT NO. AFOSR-86-0252

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR TR-87-1783

UNCLASSIFIED REPORT

ABSTRACT: (U) A vacuum spectrograph and pumping station have been purchased and installed in the Intense Beam Interaction Laboratory at the University of Michigan. Specifically, an Acton Research Corporation Model VM-510 1.0 meter, f/8.7 corrected Czerny-Turner vacuum monochromator with turbo-molecular pump and three gratings (1) 1200 g/mm plane ruled blazed at 500 nm, (2) 1200 g/mm plane ruled blazed at 200 nm and (3) 600 g/mm plane ruled blazed at 400 nm. This instrument has been tested and has been used to obtain data on several research projects. This instrument is being used to study population inversions in ablation plasmas generated by long pulse, intense, relativistic electron beams, a project currently supported by the Air Force Office of Scientific Research (AFOSR 86-0012). Keywords: Vacuum spectrograph.

DESCRIPTORS: (U) *ABLATION, *ELECTRON BEAMS, *SPECTROGRAPHS, *VACUUM, GRATINGS(SPECTRA), INTENSITY, INTERACTIONS, INVERSION, LABORATORIES, PLASMAS(PHYSICS), POPULATION, PULSES, PUMPING STATIONS, RELATIVITY THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A8.

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MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Use of Tyrosine or Foods to Amplify Catecholamine Release.

DESCRIPTIVE NOTE: Final rept. 30 Sep 85-31 Mar 87,

NOV 87 14P

PERSONAL AUTHORS: Wurtman, Richard J.

CONTRACT NO. AFOSR-83-0366

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR TR-87-1774

UNCLASSIFIED REPORT

ABSTRACT: (U) This project examined the effects of supplemental tyrosine on catecholamine (CA) release and on various behaviors and brain functions thought to be mediated by CAs. It included studies on both human and experimental animals. The human studies focused on: development of a paradigm to produce short-term psychological stress in humans and evaluation of a treatment-- administration of the A.A. tyrosine--that may mitigate some of the adverse behavioral and cardiovascular consequences of such stress; establishment of a collaborative research program with USAF School of Aerospace Medicine to develop various nutritional and psychopharmacologic strategies to enhance performance in stressful environments. The animal studies focused on: developing a brain slice system in which tyrosine levels in the medium could affect release; examining the ability of supplemental tyrosine to suppress the neuro-chemical, behavioral and endocrine effects of experimental stress; determining whether particular stress situations altered plasma amino acid levels so as to affect tyrosine's availability to catecholaminergic neurons; determining whether tyrosine is toxic in doses that might be used to enhance CA release; setting up an isolated perfused retina experimental system in which tyrosine levels affect dopamine release from retinal amacrine cells; determining whether tyrosine-containing dipeptides

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constitute a useful source of circulating tyrosine.

DESCRIPTORS: (U) *CATECHOLAMINES, *TYROSINE, BRAIN, CIRCULATION, DOPAMINE, DOSAGE, FOOD, HUMANS, LABORATORY ANIMALS, RELEASE, RETINA, SOURCES, STRESSES, STRESS(PSYCHOLOGY), STRESS(PHYSIOLOGY), RESPONSE(BIOLOGY).

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2.

AD-A190 529 5/2 20/1

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J

(U) Selective Mechanisms in Auditory and Bimodal Signal Processing.

DESCRIPTIVE NOTE: Final scientific rept. 15 Jul 83-31 May 87,

OCT 87 38P

PERSONAL AUTHORS: Kowler, E.; Sternberg, S.; Mulligan, R. M.

CONTRACT NO. AFOSR-83-0206

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR TR-87-1773

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this research program was the investigation of mechanisms of attention in auditory and bimodal information processing. The manner in which division of attention influences three stages of information processing-- stimulus coding, decision making, and response selection -- was described previously by the principle investigator in a general, quantitative theory of attention. Previous work had shown that, framework of this theory, the effects of division of attention on the first two stages could be separately identified.. As in the earlier research, the work reported here has focused on two key issues: (What are the decision processes involved in combining information from two or more sources, and Does division of attention degrade the information obtained from each source (i.e., does it result in losses of information at the coding stage)? Keywords: Attention, Information processing, Auditory psychophysics decision making.

DESCRIPTORS: (U) *AUDITORY SIGNALS, *DECISION MAKING, *DUAL MODE, *INFORMATION PROCESSING, *SIGNAL PROCESSING, ATTENTION, CODING, RESPONSE, SELECTION, STIMULI, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A5.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 528 6/4 5/8

CENTRAL INST FOR THE DEAF ST LOUIS MO

(U) Auditory Perception of Complex Sounds.

DESCRIPTIVE NOTE: Final technical rept. 1 Sep 84-31 Aug 87,

OCT 87 18P

PERSONAL AUTHORS: Hirsh, Ira J.

CONTRACT NO. AFOSR-84-0335

PROJECT NO. 2313

TASK NO. A6

MONITOR: AFOSR
TR-87-1772

UNCLASSIFIED REPORT

ABSTRACT: (U) The studies summarized in this report concern auditory perceptual processes that underlie several aspects of complex pattern recognition -- whether of speech, of music, or of environmental sounds. These patterns differ from each other according to the characteristics of individual sound events and also characteristics of the pattern sequences themselves. Among the sound characteristics, we have focussed on pitch, quality and duration. we find that spectral properties of complex tones can be changed to yield changes in both apparent pitch and quality, that individuals differ with respect to relative performance on those dimensions, and that both pitch and quality or timbre can play similar grouping roles in auditory systems. Most of the experimental work has concerned timing of successive sounds in sequences. We find that at slow rates, listeners detect equally well small temporal offsets or jitters at different positions in the sequence. Increasing the frequency of one of the tones, or increasing the duration of one or two of the successive intervals produces changes in performance at or near the changes. Some of these timing effects are also manifest in the rhythmic aspects of spoken sentences.

DESCRIPTORS: (U) *AUDITORY PERCEPTION, *AUDITORY SIGNALS, *PATTERN RECOGNITION, AUDIO TONES, ENVIRONMENTS, HEARING,

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INTERVALS, MUSIC, PATTERNS, PERCEPTION, RATES, SEQUENCES, SIGNAL PROCESSING, SOUND, SPECTRA, SPEECH, WORDS(LANGUAGE), SPEECH RECOGNITION, NOISE(SOUND), SOUND PITCH, SOUND ANALYZERS, SOUND WAVES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A6.

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DTIC REPORT BIBLIOGRAPHY

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GORDON RESEARCH CONFERENCES INC KINGSTON RI

(U) Gordon Research Conferences.

DESCRIPTIVE NOTE: Final technical rept. 1 Apr 85-31 Oct 87,

OCT 87 30P

PERSONAL AUTHORS: Cruickshank, Alexander M.

CONTRACT NO. AFOSR-85-0173

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1771

UNCLASSIFIED REPORT

ABSTRACT: (U) Nineteen Gordon Research Conferences were funded by this Grant. A summary of each conference is provided. This paper discusses The Dynamics of Gas-Surface Interactions; Surface Analysis; Surface Structure; Corrosion; Stress Corrosion; Glass Fibers; Molecular Energy Transfer; Molten Salts and Liquids; Nonlinear Optics; Atomic and Molecular Interactions.

DESCRIPTORS: (U) *INORGANIC CHEMISTRY, *ORGANOMETALLIC COMPOUNDS, *ELECTROCHEMISTRY, CORROSION, DYNAMICS, ENERGY TRANSFER, FUSED SALTS, GAS SURFACE INTERACTIONS, GLASS FIBERS, MOLECULES, NONLINEAR SYSTEMS, STRESS CORROSION, SURFACE ANALYSIS, FIBER OPTICS, SPUTTERING, GLASS, SYMPOSIA.

IDENTIFIERS: (U) PE61102F, WUAFOSR230382.

SEARCH CONTROL NO. EVI12B

AD-A190 526 20/4 14/2

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) Instruments for Use in Experimental Studies of Complex Turbulent Shear Flow - Three Component LDV's.

DESCRIPTIVE NOTE: Final rept. 1 Aug 86-31 Jul 87,

NOV 87 4P

PERSONAL AUTHORS: Johnston, James P.

CONTRACT NO. AFOSR-86-0276

PROJECT NO. 2917

TASK NO. A1

MONITOR: AFOSR TR-87-1770

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of the grant was to enhance the capability of our laboratory to acquire detailed, quantitative, fluid velocity data in three orthogonal directions simultaneously in our two, low speed water flow channels. These facilities are being used to study the turbulence structure of boundary and free mixing layers perturbed by the effects of longitudinal curvature and high levels of free stream turbulence.

DESCRIPTORS: (U) *SHEAR PROPERTIES, *TURBULENT FLOW, *LASER VELOCIMETERS, BOUNDARIES, CURVATURE, EXPERIMENTAL DATA, FLUIDS, FREE STREAM, LAYERS, MIXING, TURBULENCE, VELOCITY, MIXED LAYER(MARINE), DOPPLER EFFECT, THREE DIMENSIONAL FLOW, ARGON LASERS, HELIUM NEON LASERS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 525 21/2 5/9

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) AFRAPT (Air Force Research in Aero Propulsion Technology) Trainee Program.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 86-30 Aug 87,

SEP 87 3P

PERSONAL AUTHORS: Glassman, Irvin

CONTRACT NO. AFOSR-85-0292

PROJECT NO. 3396

TASK NO. A1

MONITOR: AFOSR
TR-87-1766

UNCLASSIFIED REPORT

ABSTRACT: (U) Three AFRAPT trainees were in residence as graduate students at Princeton during the period 1 Sept. 1986 - 30 Aug. 1987. These students spent their summers working at General Electric-Cincinnati, Pratt and Whitney-East Hartford and United Technologies Research Center. All three students have worked in problems related to combustion. One recently completed a M.S.E. thesis and accepted a position at AVCO-Lycoming to continue working in the aircraft jet engine field. Mr. Konopka is now directing his research attention to complex chemical kinetic mechanisms of combustion processes. Mr. Emdee's research topic is the oxidation of aromatic fuels. Mr. Kappelmeier accepted a position at AVCO-Lycoming in Connecticut and will be working on gas turbines. Mr. Robert J. Lawson combustion of heavy fuels. Keywords: Aero propulsion technology trainees; Combustion stability.

DESCRIPTORS: (U) *AIR FORCE RESEARCH, *COMBUSTION, *FUELS, *TRAINEES, AIRCRAFT ENGINES, AROMATIC COMPOUNDS, ATTENTION, CHEMICAL REACTIONS, COMBUSTION STABILITY, CONNECTICUT, GAS TURBINES, HEAVY FUELS, JET AIRCRAFT, OXIDATION, REACTION KINETICS, RESEARCH FACILITIES, STUDENTS.

IDENTIFIERS: (U) PE61102F, WUAFSOR3396A1.

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CENTRAL INST FOR THE DEAF ST LOUIS MO

(U) Auditory-Acoustic Basis of Consonant Perception.

DESCRIPTIVE NOTE: Annual technical rept. 30 Sep 86-29 Sep 87,

OCT 87 14P

PERSONAL AUTHORS: Miller, James D.

CONTRACT NO. AFOSR-86-0335

PROJECT NO. 2313

TASK NO. A6

MONITOR: AFOSR
TR-87-1764

UNCLASSIFIED REPORT

ABSTRACT: (U) Among the most interesting examples of the perception of complex sounds is that of the perception of constants. Here, sequences of changing spectra induce the perception of phonetic entities in a manner that requires an understanding of the role of spectral trajectories, brief silences, the growth and decay of loudness, as well as language learning. An extensive study of the entire set of the consonant sounds of English is designed to elucidate, the sensory and perceptual processes whereby the acoustic waveform of speech is transformed by a series of processes leading to the perception of consonants as phonetic elements. Included is a significant effort in preparing slides, video tapes, and/or films that will illustrate the theoretical structures, both static and dynamic, in three-dimensional displays in both black and white and color. The overall goal of this research program is to extend work now underway on vowels and diphthongs to include all of the phonetic elements of English. This is to provide a detailed account of the auditory-perceptual processes of phonetic perception by the human listener and, at the same time, provides a foundation for phonetically based automatic speech recognition which should be essentially independent of speaker and rate, with unlimited vocabulary in fluent speech. Keywords: Speech recognition, Waveforms.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 524 CONTINUED

DESCRIPTORS: (U) *PHONETICS, *SPEECH RECOGNITION, *AUDITORY PERCEPTION, ACOUSTIC WAVES, AUTOMATIC, DISPLAY SYSTEMS, ENGLISH LANGUAGE, LANGUAGE, LEARNING, LOUDNESS, SENSES(PHYSIOLOGY), SOUND, SPECTRA, SPEECH, STRUCTURES, THREE DIMENSIONAL, TRAJECTORIES, VIDEO TAPES, VOCABULARY, VOWELS, DECAY SCHEMES.

IDENTIFIERS: (U) Consonants, Auditory perceptual theory, PE61102F, WUAFOSR2313A8.

AD-A190 523 11/8

DURHAM UNIV (ENGLAND) DEPT OF CHEMISTRY

(U) A New Approach to Highly Fluorinated Lubricants.

DESCRIPTIVE NOTE: Final rept. 1 Sep 82-31 Aug 87,

OCT 87 33P

PERSONAL AUTHORS: Chambers, Richard D.; Telford, Peter T.; West, Michael W.

CONTRACT NO. AFOSR-82-0084

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1782

UNCLASSIFIED REPORT

ABSTRACT: (U) Perfluorinated polyethers constitute an important class of materials that demonstrate excaptional chemical and thermal stability, amongst organic liquids, and some of these materials show good lubricant properties. Consequently, such materials are of special interest to the U.S.A.F. as lubricants in agressive environments and, particularly, as potential liquid lubricants for high temperature/high efficiency aero engines. The aim of this project is to explore new approaches to the synthesis of perfluorinated ethers because the main problem that limits the wider application of industrially available materials is their high cost, which is an inevitable consequence of the limited methodology available, Keywords: Fluorinated polyethers, Direct fluorination, Polymer modification, Cobalt trifluoride.

DESCRIPTORS: (U) *LUBRICANTS, COBALT, ETHERS, FLUORIDES, FLUORINATION, GREAT BRITAIN, POLYETHERS, THERMAL STABILITY, SYNTHESIS(CHEMISTRY), COST EFFECTIVENESS, MACROMOLECULES, VISCOSITY.

IDENTIFIERS: (U) *Fluorinated lubricants, Perfluorinated polyethers, High performance oils, PE61102F, WUAFOSR2303B2.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 522 20/4 21/2

NATIONAL BUREAU OF STANDARDS GAITHERSBURG MD CENTER FOR FIRE RESEARCH

(U) Chemically Reacting Turbulent Flow.

DESCRIPTIVE NOTE: Final rept. 1 Oct 82-30 Sep 86,

APR 87 68P

PERSONAL AUTHORS: Pitts, William H.; Kashiwagi, Takashi

CONTRACT NO. AFOSR-ISSA-86-00008, $AFOSR-ISSA-85-00012

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-87-1761

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Grants $AFOSR-ISSA-84-00005, $AFOSR-ISSA-83-00012.

ABSTRACT: (U) This report summarizes the research findings of a project which has been jointly funded by the Air Force Office of Scientific Research and the National Bureau of Standards. The goal of the research was to improve the fundamental understanding of chemically reacting turbulent flow. The approach which was taken was to irvestigate mixing in variable density flows in order to better understand the role of local density fluctuations (which result from chemical heat release) on the turbulent mixing behavior. The development of new experimental diagnostics having excellent spatial and temporal resolution is described. These techniques have been utilized to investigate a wide range of mixing properties in variable density flows. These results are summarized along with a discussion of their importance to an improved understanding of chemically reacting flow. Keywords: Concentration fluctuations; Concentration measurement; Density effects; Digital line camera; Flow visualization; Hot wire anemometry; Jet flames; Rayleigh light scattering; Reynolds.

DESCRIPTORS: (U) *JET FLAMES, *TURBULENT FLOW,

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*COMBUSTION, *HEAT TRANSFER, CAMERAS, DENSITY, DIAGNOSIS(GENERAL), DIGITAL SYSTEMS, FLOW, FLOW VISUALIZATION, HOT WIRE ANEMOMETERS, LIGHT SCATTERING, MIXING, RAYLEIGH SCATTERING, VARIABLES, VARIATIONS, CHEMICAL REACTIONS, EXOTHERMIC REACTIONS, JET MIXING FLOW, GASES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A190 522

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CORNELL UNIV ITHACA N Y CENTER FOR APPLIED MATHEMATICS

(U) Symmetry and Global Bifurcation in Nonlinear Solid Mechanics.

DESCRIPTIVE NOTE: Final rept. 1 Aug 86-31 Jul 87,

NOV 87 15P

PERSONAL AUTHORS: Healy, Timothy J.

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR TR-87-1755

UNCLASSIFIED REPORT

ABSTRACT: (U) Applications of tools from group theory and nonlinear analysis to global bifurcation problems from solid mechanics are summarized. These include both topological and computational approaches for problems involving structural frameworks, strings, rods and 3-dimensional elastic bodies. Keywords: Solid mechanics; Bifurcation; Symmetry; Groups; Structures; Nonlinear analysis.

DESCRIPTORS: (U) *BIFURCATION(MATHEMATICS), COMPUTATIONS, GROUPS(MATHEMATICS), MECHANICS, NONLINEAR ANALYSIS, RODS, TOOLS, TOPOLOGY, ELASTIC PROPERTIES, SYMMETRY, GLOBAL, THREE DIMENSIONAL.

IDENTIFIERS: (U) *Solid mechanics, PE61102F, WUAFOSR2304A9.

AD-A190 492 11/6.1

MCDONNELL DOUGLAS RESEARCH LABS ST LOUIS MO

(U) Growth and Deformation Mechanisms of Refractory Alloy Hybrid Materials.

DESCRIPTIVE NOTE: Annual rept. 15 Sep 86-15 Sep 87,

DEC 87 38P

PERSONAL AUTHORS: Sastry, S. M.; Bowden, D. M.; London, B. D.; Lederich, R. J.; O'Neal, J. E.

REPORT NO. MDC-QA002

CONTRACT NO. F49620-86-C-0108

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR TR-87-2040

UNCLASSIFIED REPORT

ABSTRACT: (U) Oxide-dispersion-strengthened and whisker/particulate reinforced titanium and niobium alloys produced by rapid solidification processing are being investigated with the objectives of understanding the mechanisms of formation and growth of the secondary phases and how these factors determine strengthening mechanisms and thermal stability of Ti and Nb alloys. During the first year of the three-year program, Titanium alloys containing Aluminum, Erbium, Boron, and Carbon, and Nb alloys containing Tungsten, Hafnium, Lanthanum, B, and C were prepared by nonconsumbable electrode arc melting and microstructures were characterized. The alloys were rapidly solidified by electron beam melting and splat quenching and the rapidly solidified flakes were characterized by x-ray diffraction, optical metallography, and electron microscopy. The mechanical properties of rapidly solidified Ti alloys containing Er, B, and C were determined by tensile testing of specimens prepared from electron-beam-melted and splat-quenched flakes. Keywords: Hybrid materials, Refractory materials, Oxide dispersions, In-situ composites, Deformation mechanisms, Work hardening.

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DESCRIPTORS: (U) *NIOBIUM ALLOYS, *REFRACTORY METAL ALLOYS, *THERMAL STABILITY, *TITANIUM ALLOYS, *THERMAL STABILITY, ALUMINUM, ARC MELTING, BORON, CARBON, COMPOSITE MATERIALS, DEFORMATION, ELECTRODES, ELECTRON BEAM MELTING, ELECTRON MICROSCOPY, ERBIUM, HAFNIUM, HARDENING, HYBRID SYSTEMS, LANTHANUM, MECHANICAL PROPERTIES, METALLOGRAPHY, MICROSTRUCTURE, OPTICAL ANALYSIS, OXIDES, PARTICULATES, QUENCHING, REINFORCING MATERIALS, SOLIDIFICATION, TENSILE TESTERS, TITANIUM, TUNGSTEN, X RAY DIFFRACTION, WHISKER COMPOSITES, STRENGTH WEIGHT RATIO, METAL MATRIX COMPOSITES, FIBER REINFORCEMENT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A1.

AD-A190 491 12/3

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF MATHEMATICAL SCIENCES

(U) Statistical Inference for Stochastic Processes.

DESCRIPTIVE NOTE: Final rept. 1 Jan 82-31 Dec 86,

OCT 87 40P

PERSONAL AUTHORS: Karr, Alan F.

CONTRACT NO. AFOSR-82-0029

PROJECT NO. 2304

TASK NO. TR-87-2016

MONITOR: AFOSR TR-87-2016

UNCLASSIFIED REPORT

ABSTRACT: (U) Research under this grant resulted in 42 research papers and one book topics of the research included state estimation for Cox processes inference for stationary point processes inference for multiplicative intensity model inference for thinned point processes, inference for 0-1 Markov processes, and inference for stationary random fields. Keywords: Mathematical models; Distributions.

DESCRIPTORS: (U) *STATISTICAL INFERENCE, *STOCHASTIC PROCESSES, ESTIMATES, MATHEMATICAL MODELS, STATIONARY, STATISTICAL DISTRIBUTIONS, POINTS(MATHEMATICS).

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 490 20/4 1/1

DOUGLAS AIRCRAFT CO LONG BEACH CA

(U) Oscillating Airfoils - Achievements and Conjectures.

DESCRIPTIVE NOTE: Final rept. Oct 86-Sep 87,

SEP 87 31P

PERSONAL AUTHORS: Cebeci, Tuncer

REPORT NO. MDC-K0535

CONTRACT NO. F49620-87-C-0004

PROJECT NO. 2307

TASK NO. A3

MONITOR: AFOSR
TR-87-1779

UNCLASSIFIED REPORT

ABSTRACT: (U) Recent developments and applications of an interactive boundary layer procedure for unsteady flows are reviewed. The emphasis is on a model problem corresponding to an oscillating thin airfoil in laminar flows and results are reported for different amplitudes and frequencies of oscillation. The use of the characteristic box scheme, with its stability criterion, are shown to allow the accurate calculation of reverse flows and the interaction procedure removes the singularity to allow calculation through regions of separated flow. Although the current focus of the interactive boundary layer procedure has been on the leading edge region, it has general applicability and, together with models for transition and turbulent flows, it can provide the basis for a method to deal with oscillation airfoils and wings and the rapid movement of fixed wing arrangements at angels of attack up to and beyond those of dynamic stall. Calculations at high angles of attack indicate that the behavior of the unsteady separated leading edge flow has similarities to steady flows down-stream of surface corrugations. The use of linear stability theory in the latter case shows that the locations of the onset of transition moves upstream with severity of corrugation and can move inside the separation bubble. In practice this means that the

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bubbles will be shortened and analogy with unsteady flows suggests that transition may play an important role and preclude the existence of the long separation bubbles determined by the laminar-flow calculations.

DESCRIPTORS: (U) *AIRFOILS, *FLOW SEPARATION, *OSCILLATION, *STALLING, *UNSTEADY FLOW, ANALOGIES, BOUNDARY LAYER, BUBBLES, COMPUTATIONS, FIXED WING AIRCRAFT, FLOW, FREQUENCY, HIGH ANGLES, INTERACTIONS, LAMINAR FLOW, LEADING EDGES, LINEARITY, REDUCTION, REVERSIBLE, STABILITY, THEORY, THINNESS, WINGS, AERODYNAMIC CHARACTERISTICS, ANGLE OF ATTACK, NAVIER STOKES EQUATIONS.

IDENTIFIERS: (U) Interactive boundary layers, PE61102F, WUAFOSR2307A3.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 489 12/2

MARYLAND UNIV COLLEGE PARK

(U) Higher Order Crossings.

DESCRIPTIVE NOTE: Final rept. Jun 82-31 May 87,

MAY 87 4P

PERSONAL AUTHORS: Kedem, B.

CONTRACT NO. AFOSR-82-0187

MONITOR: AFOSR
TR-87-1768

UNCLASSIFIED REPORT

ABSTRACT: (U) A graphical device that is useful as a diagnostic tool for higher order crossings was introduced. The graphical tool is also useful as a descriptive similarity measure for time series models. Higher order crossings analysis has been applied to real data, revealing several known periodicities as well as several previously undiscovered periodicities. The class of strictly oscillatory processes was introduced.

DESCRIPTORS: (U) *TIME SERIES ANALYSIS, CROSSINGS, DIAGNOSTIC EQUIPMENT, GRAPHICS, MATHEMATICAL MODELS, OSCILLATION, AUTOCORRELATION.

IDENTIFIERS: (U) Higher order crossings.

AD-A190 485 7/4 20/4 20/8 21/2

STANFORD UNIV CA HIGH TEMPERATURE GASDYNAMICS LAB

(U) Advanced Diagnostics for Reacting Flows.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 86-30 Sep 87,

OCT 87 53P

PERSONAL AUTHORS: Hanson, R. K.

CONTRACT NO. AFOSR-87-0057

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR
TR-87-1830

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Orginal contains color plates: All DTIC and NTIS reproductions will be in black and white.

ABSTRACT: (U) Progress is reported for the past year of an interdisciplinary program to establish advanced optical diagnostic techniques applicable to combustion and plasma flows. The primary effort is on digital flowfield imaging techniques, which offer significant potential for a wide range of spatially resolved 2-d and 3-d measurements. The imaging is accomplished by recording light scattered from a planar laser-illuminated region using a modern solid-state camera. The scattering process is generally laser-induced fluorescence, though Mie scattering is also used in connection with sizing particles. Activities reported herein include: (1) single-photon fluorescence imaging of molecular oxygen; (2) two-photon fluorescence imaging of CO and H20; (3) photofragmentation-based fluorescence imaging; (4) mutiple particle sizing by imaging of Mie-scattered light; (5) fluorescence-based velocity and pressure imaging; (6) 3-d imaging; (7) laser and solid-state camera development; and (8) processing/display of image data using a specialized image computer. Other diagnostics topics discussed in this report include research on laser wavelength modulation spectroscopy and development of plasma diagnostics based on laser-induced fluorescence and Stark broadening. Finally, initial work to develop a

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laser photolysis shock tube, for fundamental studies of chemical kinetics and spectroscopy in high temperature gases, is described.

DESCRIPTORS: (U) *LASER INDUCED FLUORESCENCE, *MIE SCATTERING, *PLASMA DIAGNOSTICS, *REACTIVE GASES, *COMBUSTION CHAMBER GASES, CAMERAS, COMBUSTION, COMPUTERS, DIAGNOSIS(GENERAL), FLOW, FREQUENCY MODULATION, GASES, HIGH TEMPERATURE, ILLUMINATION, IMAGES, METHODOLOGY, OPTICS, OXYGEN, PARTICLE SIZE, PHOTOLYSIS, PLANAR STRUCTURES, PLASMAS(PHYSICS), PRESSURE, PROCESSING, RANGE(EXTREMES), REACTION KINETICS, SCATTERING, SHOCK TUBES, SOLID STATE ELECTRONICS, SPECTROSCOPY, TUBES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3

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AD-A190 467 20/6

ENVIRONMENTAL RESEARCH INST OF MICHIGAN ANN ARBOR ADVANCED CONCEPTS DIV

(U) Optical Switching and Control Techniques Using Nonlinear Optical Wave Mixing.

DESCRIPTIVE NOTE: Final rept. 15 Sep 85-15 Jun 87,

DEC 87 95P

PERSONAL AUTHORS: Peterson, Lauren M.

REPORT NO. ERIM-175900-12-F

CONTRACT NO. F49620-84-C-0067, $$ARPA Order-4952

MONITOR: AFOSR TR-88-0095

UNCLASSIFIED REPORT

ABSTRACT: (U) We show experimentally that thermooptically induced beam guides and phase grating structures can be used to efficiently switch an optical beam by redirecting its energy in times of 20 and 2 nsec, respectively. Beam guiding was achieved by passing a focused, TEM at infinity laser pulse through an absorbing liquid to which an absorbing dye had been added. Heating of the liquid in the focal region by the Gaussian profile beam changed the refractive index to produce a long cylindrical volume analogous to a graded-index (GRIN) optical fiber. Radiation from a second laser beam not absorbed by the liquid could be coupled into the graded index real-time fiber and redirected by it with in efficiency as high as 90%. The switch-on time was measured to be 20 nsec and persisted without intervention for about 1 millisecond (i.e. optical memory). The rise and decay times are in good agreement with calculations using a simple thermal model which describes the process. The thermo-optically induced phase grating was generated by interfering two beams of laser radiation in an absorbing liquid. Heating of the liquid along the interference pattern produced a sinusoidally varying refractive index pattern or phase grating. This real-time optically generated grating was used to switch (redirect by diffraction) a probing laser beam. For a small crossing angle of 7 deg, a switching time of 2 nsec was measured and was in good agreement with the thermal model,

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as was the measured diffraction efficiency of 15%.

DESCRIPTORS: (U) *INTERFERENCE, *LASER BEAMS, *MIXING, *NONLINEAR SYSTEMS, *PATTERNS, BEAMS(RADIATION), CYLINDRICAL BODIES, DECAY, FIBER OPTICS, FIBERS, GRATINGS(SPECTRA), HEATING, INDEXES, LIQUIDS, MEMORY DEVICES, MODELS, OPTICAL PROPERTIES, OPTICAL STORAGE, OPTICAL SWITCHING, OPTICS, PULSED LASERS, REAL TIME, REFRACTIVE INDEX, STRUCTURES, THERMAL PROPERTIES, VOLUME, WAVES.

IDENTIFIERS: (U) PE61102F.

AD-A190 435 17/7.3 16/2

TEXAS UNIV AT AUSTIN DEPT OF AEROSPACE ENGINEERING AND ENGINEERING MECHANICS

(U) Advanced Guidance Algorithms for Homing Missiles with Bearings-Only Measurements.

DESCRIPTIVE NOTE: Final technical rept.,

NOV 87 87P

PERSONAL AUTHORS: Speyer, Jason L.; Hull, David G.

CONTRACT NO. SAFOSR-84-0371

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-87-1982

UNCLASSIFIED REPORT

ABSTRACT: (U) Homing missile guidance is formulated as an optimal stochastic control problem where the special nonlinear structure of the missile-target engagement is exploited. Since this stochastic control problem assumes a nested information pattern, the filter structure can be developed independently of the guidance scheme. However, the guidance scheme is dependent on and affects filter performance. Significant progress is being made on both the estimation problem and the guidance problem. Investigation of the nonlinear estimators especially tailored to the homing missile problem has produced not only a good deal of insight but responsive and mechanizable schemes. Although these schemes are applicable to active sensors, our emphasis has been on the more difficult passive sensor case where only angles are available. Recently-developed schemes based on coordinate transformations and on a assumed probability density function perform well, but the modified-gain extended Kalman filter has been used as the basis of a stochastic adaptive flight control scheme. Two important current efforts in missile guidance with bearings-only information are in development of the guidance schemes that enhance an information measure by trajectory modulation and in target acceleration detection.

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DESCRIPTORS: (U) *HOMING, ACCELERATION, ALGORITHMS, ANGLES, COORDINATES, DETECTORS, ESTIMATES, FILTERS, GUIDANCE, GUIDED MISSILES, HOMING DEVICES, MODULATION, NONLINEAR SYSTEMS, OPTIMIZATION, PASSIVE SYSTEMS, PATTERNS, PROBABILITY DENSITY FUNCTIONS, PROBLEM SOLVING, STOCHASTIC CONTROL, TARGET DETECTION, GUIDED MISSILE TRAJECTORIES, TRANSFORMATIONS(MATHEMATICS), BEARING(DIRECTION), GUIDED MISSILE TARGETS, KALMAN FILTERING, TARGET ANGLE, ADAPTIVE CONTROL SYSTEMS.

IDENTIFIERS: (U) Bearings only measurements, Passive detectors, PE61102F, WUAFOSR2304A1.

AD-A190 417 20/13

WISCONSIN UNIV-MADISON DEPT OF PHYSICS

(U) Thin Superconducting Film Characterization by Surface Acoustic Waves.

DESCRIPTIVE NOTE: Annual progress rept. 30 Sep 86-30 Sep 87,

OCT 87 15P

PERSONAL AUTHORS: Levy, Moises

CONTRACT NO. AFOSR-84-0350

PROJECT NO. 2306

TASK NO. C1

MONITOR: AFOSR TR-87-1897

UNCLASSIFIED REPORT

ABSTRACT: (U) A dilution refrigerator was installed tested and modified. Several cryogenic probes were fabricated to measure resistivity, ac susceptibility and ultrasonic attenuation in high T superconductors. Ultrasonic attenuation measurements were performed on single crystals of UPt3 and URu2Si2. A maximum in attenuation was found below the superconducting transition temperature TC of URu2Si2. A magnetic field decreased this maximum. The temperature of the attenuation in the normal and superconducting states below Tc was measured in UPt3. The ratio of the attenuation follows a power law dependence indicative of an anisotropic superconducting energy gap. A peak in attenuation was found in the mixed state of UPt3, which may be associated with a phase transition of the flux line lattice.

DESCRIPTORS: (U) *CRYOGENICS, *PHASE TRANSFORMATIONS, *REFRIGERATION SYSTEMS, *SUPERCONDUCTIVITY, *SUPERCONDUCTORS, *THIN FILMS, ACOUSTIC ATTENUATION, ALTERNATING CURRENT, ANISOTROPY, ATTENUATION, DILUTION, ENERGY GAPS, MAGNETIC FIELDS, MEASUREMENT, POWER, PROBES, RATIOS, SEMICONDUCTING FILMS, SURFACE ACOUSTIC WAVES, TRANSITION TEMPERATURE, ULTRASONICS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 417 CONTINUED

IDENTIFIERS: (U) WUAFOSR2306C1, PE61102F.

AD-A190 411 12/2

FLORIDA UNIV GAINESVILLE CENTER FOR MATHEMATICAL SYSTEM THEORY

(U) A Local Theory of Linear Systems with Noncommensurate Time Delays,

84

PERSONAL AUTHORS: Kamen, F. W.; Khargonekar, P. P.; Tannenbaum, A.

CONTRACT NO. DAAG29-85-K-0089, AFOSR-81-0238

MONITOR: ARO, AFOSR
22356.8-MA, TR-88-0089

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Mathematical Theory of Networks and Systems, n58 p521-540 1984.

ABSTRACT: (U) Stability and feedback control of linear neutral (and retarded) time-delay systems with one or more noncommensurate time delays is studied. The theory is based on a pointwise or local approach involving polynomial and rational functions in the complex variables s, z1, z2, ..., zq, with s evaluated at points in the right-half plane and the zi evaluated at points in the unit disc. In terms of this framework, an algebraic notion of stability, called pointwise stability, is defined and studied. Necessary and sufficient conditions are then given for the existence of a stabilizing dynamic output feedback compensator. The problem of stabilization using nondynamic state feedback is also briefly considered in the case when the system's input matrix has constant rank.

DESCRIPTORS: (U) *CONTROL THEORY, *TIME STUDIES, COMPLEX VARIABLES, CONTROL, DELAY, DISKS, FEEDBACK, LINEAR SYSTEMS, POLYNOMIALS, RANK ORDER STATISTICS, RATIONAL FUNCTIONS, REPRINTS, STABILIZATION, THEORY, TIME, TIME INTERVALS, TRANSFER FUNCTIONS, MATRICES(MATHEMATICS).

IDENTIFIERS: (U) Feedback control.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 405 20/4 12/1 21/5

MICHIGAN UNIV ANN ARBOR DEPT OF AEROSPACE ENGINEERING

(U) Unsteady Flow in Supersonic Inlet Diffuser.

DESCRIPTIVE NOTE: Final technical rept. 14 Aug 84-14 Sep 87,

NOV 87 13P

PERSONAL AUTHORS: Adamson, T. C., Jr.; Messiter, A. F.

CONTRACT NO. AFOSR-84-0327

PROJECT NO. 2307

TASK NO. A4

MONITOR: AFOSR TR-87-1887

UNCLASSIFIED REPORT

ABSTRACT: (U) A supersonic inlet diffuser with flow at supercritical conditions has been analyzed using a combination of analytical and numerical methods of solution. Analytical solutions for the flow variables are presented for the inviscid part of the unsteady flow field. Instantaneous displacement thickness distributions found numerically for both separated and unseparated flows allow definition of the effective wall shape for the analytical solutions. An equation describing the unsteady motion of the passages shock caused by variations in back pressure and/or wall shape has been derived. Results have been compared with those found numerically, both for inviscid and viscous flow fields; agreement is excellent in phase and good in amplitude. In example calculations, parameters are varied separately to show how they may cause shock disgorgement (engine unstart) when back pressure oscillations are impressed upon the flow. A mechanism by which shock wave oscillations may be selfsustaining has been proposed and illustrated by example. Parametric effects upon the magnitude and frequency of the self sustained oscillations and upon shock disgorgement are illustrated by numerical examples with given inlet. The work on inlet buzz, although not completed, has led to studies of high resolution schemes for capturing both shock and slip surface discontinuities in numerical algorithms, reported

in two papers. This is still an active area of research.

DESCRIPTORS: (U) *OSCILLATION, *SUPERSONIC DIFFUSERS, *SUPERSONIC INLETS, *UNSTEADY FLOW, ALGORITHMS, BACK PRESSURE, DISPLACEMENT, DISTRIBUTION, EQUATIONS, FLOW FIELDS, FLOW SEPARATION, HIGH RESOLUTION, INLETS, INVISCID FLOW, NUMERICAL METHODS AND PROCEDURES, PARAMETRIC ANALYSIS, SHAPE, SHOCK WAVES, SOLUTIONS(GENERAL), SUPERCRITICAL FLOW, THICKNESS, VARIABLE PRESSURE, VARIABLES, VISCOUS FLOW, WALLS, NUMERICAL ANALYSIS, PHASE, AMPLITUDE, DISCONTINUITIES.

IDENTIFIERS: (U) Shock disgorgement, PE61102F, WUAFOSR2307A4.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 402 7/4 12/4

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Lumped Model Generation and Evaluation: Sensitivity and Lie Algebraic Techniques with Applications to Combustion.

DESCRIPTIVE NOTE: Annual technical rept. 1 Sep 86-1 Oct 87,

OCT 87 170P

PERSONAL AUTHORS: Dryer, F. L.; Rabitz, H.; Yetter, R.

CONTRACT NO. AFOSR-85-0346

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-87-1891

UNCLASSIFIED REPORT

ABSTRACT: (U) This program dealt with the development and application of new approaches for producing and evaluating lumped parameter models of physical processes. Local and global sensitivity analysis procedures were studied for achieving this goal. Specifically, Lie group formalism was developed to address global parameter space mapping issues of temporal kinetics problems and extended to more complex reactive-diffusive problems. Furthermore, Lie group theoretical techniques were also used to gain analytic insight into the solution of nonlinear kinetic systems. Using local gradient methods, the lumpability (or model reduction) of hydrogen/oxygen and carbon monoxide/hydrogen/oxygen kinetic mechanisms were studied in various physical environments. It was found that the presence of strong scaling and self similarity in the sensitivities allowed for kinetic model simplification. Such scaling and similarity was found associated with strong thermal coupling in the systems. Lastly, a general analysis method for the exact lumping of chemical kinetic mechanisms was developed and illustrated by simple.

DESCRIPTORS: (U) *COMBUSTION, *REACTION KINETICS, *MATHEMATICAL MODELS, ALGEBRA, COUPLING(INTERACTION),

AD-A190 402 CONTINUED

GLOBAL, GRADIENTS, HYDROGEN, LIE GROUPS, NONLINEAR SYSTEMS, OXYGEN, PHYSICAL PROPERTIES, THERMAL PROPERTIES, COMBUSTION CHAMBERS, SENSITIVITY, AERONAUTICAL ENGINEERING, MECHANICAL ENGINEERING, OPTIMIZATION, CARBON MONOXIDE.

IDENTIFIERS: (U) Lie algebra, *Chemical kinetics.

AD-A190 402

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 400 22/1 20/11 12/3

WEIDLINGER ASSOCIATES NEW YORK

(U) Vibrations of Structures with Parametric Uncertainties.

DESCRIPTIVE NOTE: Final rept. Jan 84-Sep 87,

OCT 87 75P

PERSONAL AUTHORS: Benaroya, Haym

CONTRACT NO. F49620-84-C-0009

PROJECT NO. 2307

TASK NO. B1

MONITOR: AFOSR
TR-87-1734

UNCLASSIFIED REPORT

ABSTRACT: (U) The focus of this research effort has been the study of structural dynamics with parameter and environmental uncertainties. The motivation for this study rests with the need to understand the dynamics and control of large space structures. Stochastic stability and output stationarity are also studied. Keywords: Stochastic system; Response; Decomposition stability.

DESCRIPTORS: (U) *VIBRATION, *SPACE STATIONS, *STRUCTURAL RESPONSE, DECOMPOSITION, DYNAMICS, SPACECRAFT, STABILITY, STOCHASTIC PROCESSES, STRUCTURAL PROPERTIES, STRUCTURES, STIFFNESS, MASS, DAMPING, STRUCTURAL ANALYSIS, LOAD DISTRIBUTION, RANDOM VARIABLES, MONTE CARLO METHOD.

IDENTIFIERS: (U) Large space structures, Structural dynamics, Uncertainty, PE61102F, WUAFOSR2307B1.

AD-A190 400

AD-A190 399 11/2

ROCKWELL INTERNATIONAL THOUSAND OAKS CA SCIENCE CENTER

(U) Transformation Toughening of Ceramics.

DESCRIPTIVE NOTE: Annual rept. no. 2, 1 Sep 86-31 Aug 87,

OCT 87 124P

PERSONAL AUTHORS: Marshall, D. B.

REPORT NO. SC5444.AR

CONTRACT NO. F49620-85-C-0143

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR
TR-87-1854

UNCLASSIFIED REPORT

ABSTRACT: (U) The mechanical properties of high toughness magnesia partially stabilized zirconia were found to be severely degraded by a single cooling cycle between room temperature and 196 C. In-situ Raman spectroscopy and optical interference measurements, and room temperature x-ray diffraction were used to correlate the changes in mechanical properties with structural changes; cooling to temperatures below approximately -100C caused transformation of most of the tetragonal precipitates that are responsible for toughening to a new phase was stable with heating to 300 C, but at 400 C it transformed back to the tetragonal structure. After heating to 400 C the original high toughness mechanical properties were also restored. A new approach for measuring the nature and distribution of strains within transformation zones surrounding cracks in transformation toughened materials was demonstrated, using Mg-PSZ. The method involves measuring out-of-plane distortions adjacent to a surface-breaking crack and comparing the measurements with computed displacements. The fraction of transformation was found to be strongly varying function of distance from the crack plane.

DESCRIPTORS: (U) *CERAMIC MATERIALS, COOLING, CRACKS, DISTORTION, MAGNESIUM OXIDES, MECHANICAL PROPERTIES,

AD-A190 399

AD-A190 399 CONTINUED

OPTICAL PROPERTIES, RAMAN SPECTROSCOPY, STABILIZATION, STRUCTURAL PROPERTIES, TEMPERATURE, TOUGHNESS, X RAY DIFFRACTION, ZIRCONIUM OXIDES, PHASE TRANSFORMATIONS, MARTENSITE, MAGNESIUM, ZIRCONIUM, MICROSTRUCTURE, RAMAN SPECTROSCOPY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A2.

AD-A190 339 5/2 12/9

UNIVERSITY OF SOUTHERN CALIFORNIA MARINA DEL REY INFORMATION SCIENCES INST

(U) Knowledge Delivery Research.

DESCRIPTIVE NOTE: Final rept.,

OCT 86 14P

PERSONAL AUTHORS: Mann, William C.

REPORT NO. ISI/SR-86-178

CONTRACT NO. F49620-84-C-0100

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR TR-87-2013

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of knowledge delivery research is to create a technology of authorship by computer. Existing technology is all in the laboratory stage, and is limited to very small, rigidly constrained texts. This research project has focused on two kinds of developments intended to overcome theses limits: 1) expanding the notation and practices of knowledge representation so that a wider range of knowledge can be rendered in natural language, and 2) creating a theory of text structure that is suitable as a basis for writing programs that design texts. These goals are being pursued using the methods of Artificial Intelligence, with heavy input from Linguistics. Keywords: Computational linguistics.

DESCRIPTORS: (U) *ARTIFICIAL INTELLIGENCE, *INFORMATION PROCESSING, *COMPUTATIONAL LINGUISTICS, *TEXT PROCESSING, INPUT, LIMITATIONS, NATURAL LANGUAGE, WRITING, COMPUTER APPLICATIONS, GRAMMARS.

IDENTIFIERS: (U) Discourse analysis, PE61102F, WUAFOSR2304A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 338 9/1 20/10 20/3

WISCONSIN UNIV-MADISON

(U) Vortices in Long Josephson Junctions.

DESCRIPTIVE NOTE: Annual rept. 16 Nov 86-14 Nov 87,

NOV 87 9P

PERSONAL AUTHORS: Nordman, James E.; Beyer, James B.

CONTRACT NO. AFOSR-86-0025

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR
TR-87-2042

UNCLASSIFIED REPORT

ABSTRACT: (U) Research during the second year of this grant extended the studies begun during the first year on fabrication and modeling of long Josephson junction structures. The Nb-Pb technology, although reliable, is not versatile enough for proposed multilayer structures and considerable effort was expended in the development of an all Nb and a parallel all NbN technology. This effort is not over but recently we were able to demonstrate an all NbN vortex flow transistor possessing superior properties to the Nb-Pb version. New progress was made toward solution of the problems of high frequency testing of the very low impedance vortex flow transistor and towards determination of its potential for high frequency applications. It was demonstrated that the device exhibits active behavior in the form of a measurable transresistance out of frequencies of about 10% of the theoretical transit time cutoff frequency. Capability of higher frequency testing was developed with the design of novel new impedance matching structures. A new type of distributed amplifier was also proposed and modeled. Modeling of spatially nonuniform long junction structures resistance was necessary in order to obtain realistic simulations. The unusual magnetic field dependence we had seen in certain Nb-Pb VFT configurations is undergoing study with the design of new double junction NbN devices.

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DESCRIPTORS: (U) *DISTRIBUTED AMPLIFIERS, *IMPEDANCE MATCHING, *JOSEPHSON JUNCTIONS, *MAGNETIC FIELDS, *TRANSISTORS, *VORTICES, BEHAVIOR, FLOW, FREQUENCY, HIGH FREQUENCY, JUNCTIONS, LAYERS, STRUCTURES, TEST AND EVALUATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 337 12/6

PURDUE UNIV LAFAYETTE IN DEPT OF PSYCHOLOGICAL SCIENCES

(U) Auditory Pattern Memory: Mechanisms of Tonal Sequence Discrimination by Human Observers.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-31 Aug 87,

SEP 87 46P

PERSONAL AUTHORS: Sorkin, Robert D.

CONTRACT NO. AFOSR-84-0302

PROJECT NO. 2313

TASK NO. A6

MONITOR: AFOSR TR-87-1775

UNCLASSIFIED REPORT

ABSTRACT: (U) A two-process model of pattern discrimination was developed to describe how tonal sequences are processed, stored, and discriminated by the human auditory system. The model was tested in tasks in which subjects were required to discriminate between the frequency patterns encoded in two sequences of tones. The experimental results strongly supported the assumptions of a trace and context coding mechanism and indicated that the trace mechanism is relatively insensitive to temporal transformations made to the stimulus. An attempt to model the pattern discrimination mechanism with specific computational algorithms was less successful. A technique was developed to assess the manner in which information is accumulated from elements of an auditory or visual stimulus. Results indicate that the technique may be useful in the design of display systems. Keywords: Hearing, Sense organs, Algorithms, Auditory patterns, Auditory memory, Temporal uncertainty, Models of auditory signal processing.

DESCRIPTORS: (U) *MEMORY DEVICES, *PATTERN RECOGNITION, ALGORITHMS, AUDIO TONES, AUDITORY SIGNALS, CODING, COMPUTATIONS, DISCRIMINATION, DISPLAY SYSTEMS, FREQUENCY, HEARING, HUMANS, OBSERVERS, PATTERNS, SENSE ORGANS, SEQUENCES, SIGNAL PROCESSING, STIMULI, VISUAL PERCEPTION.

AD-A190 337 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A6.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 336 1/3

PURDUE UNIV LAFAYETTE IND THERMAL SCIENCES AND PROPULSION CENTER

(U) Research as Part of the Air Force in Aero Propulsion Technology (AFRAPT) Program.

DESCRIPTIVE NOTE: Annual summary rept. Aug 86-Aug 87,

AUG 87 5P

PERSONAL AUTHORS: Fleeter, Sanford

CONTRACT NO. AFOSR-86-0305

PROJECT NO. 3396

TASK NO. A1

MONITOR: AFOSR TR-87-1763

UNCLASSIFIED REPORT

ABSTRACT: (U) Seven students participated in the Air Force Research in Aero Propulsion Technology (AFRAPT) program during the 1986-87 academic year. During this year: one new Ph.D. candidate successfully completed his qualifying exams and initiated his thesis research; one continuing M.S.M.E. candidate has nearly completed his experimental thesis research; five new M.S.M.E. candidates have completed most of their course work and have initiated their thesis research. Keywords: Gas turbines, Propulsion, Combustion.

DESCRIPTORS: (U) *AIRCRAFT ENGINES, AIR FORCE, THESES, AIR FORCE RESEARCH, STUDENTS, AIR FORCE, AIR FORCE RESEARCH, STUDENTS.

IDENTIFIERS: (U) AFRAPT(Air Force Research in Aero Propulsion Technology), PE61103F, WUAFOSR3396A1.

AD-A190 336

AD-A190 334 12/9 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Analysis of Adaptive Differential PCM (Pulse-Code Modulation) of a Stationary Gauss-Markov Input.

DESCRIPTIVE NOTE: Technical rept. 1 Oct 86-30 Sep 87,

MAY 87 12P

PERSONAL AUTHORS: Gerr, Neil L.; Cambanis, Stamatis

REPORT NO. TR-22

CONTRACT NO. F49620-85-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1988

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Information Theory, vIT-33 n3 p351-359 May 87. Supersedes Rept. dated Jun 83, AD-A136 518. Presented at International Symposium on Information Theory, Brighton (England), 24-28 Jun 85.

ABSTRACT: (U) An adaptive matched differential pulse-code modulator (AMDPCM) is analyzed. The adaptation of the symmetric uniform quantizer parameter Delta sub n is performed by fixed multipliers assigned to the quantizer output levels. The input is stationary first-order Gauss-Markov. The correlation of the samples is used as the leakage parameter in the matched integrator, with the predictive reconstruction similarly matched For a 4-level quantizer and multipliers 1/gamma; gamma the limiting joint distribution of the prediction error and Delta sub n is derived and the asymptotic sample-point and time-averaged mean-square error (mse) and mean and variance of Delta sub n as functions of gamma is an element of (1,2) are computed and plotted. It is found that asymptotic performance of AMDPCM does not depend on the choice of Delta sub 0 that the increase in mse incurred by using A(M)DPCM instead of (M)DPCM with Delta sub opt is small. with mse (A(M)DPCM approaching min sub Delta mse (M)DPCM)

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 334 CONTINUED

as gamma approaches 1 and that the signal-to-noise ratio of AMDPCM does not depend on the input power.

DESCRIPTORS: (U) *INTEGRATORS, *PULSE CODE MODULATION, *SAMPLING, *SIGNAL TO NOISE RATIO, CORRELATION, DISTRIBUTION, ERRORS, INPUT, LIMITATIONS, MATCHING, MODULATION, OUTPUT, POWER, PREDICTIONS, REPRINTS, SYMMETRY, VARIATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A190 328 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Detection of the Number, Locations and Magnitudes of Jumps.

DESCRIPTIVE NOTE: Technical rept.,

AUG 87 15P

PERSONAL AUTHORS: Yin, Y. Q.

REPORT NO. TR-87-27

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1961

UNCLASSIFIED REPORT

ABSTRACT: (U) Consider a signal x(t) = f(t) + w(t), 0 < or = 1. Here the noise w(t) is an independent process, and f(t) is a function with only finitely many jumps, satisfies a Lipschitz' condition between any two consecutive jumps. This paper gives an algorithm to determine the number, locations and magnitudes of the jumps of f(t. The consistency and speeds of convergence are obtained. Keywords: Stochastic processes; Discontinuities; Estimates; Convergence.

DESCRIPTORS: (U) *DISCONTINUITIES, *ESTIMATES, ALGORITHMS, CONVERGENCE, DETECTION, NOISE, STOCHASTIC PROCESSES, VELOCITY, MULTIVARIATE ANALYSIS.

IDENTIFIERS: (U) *Jumps, PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 327 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Empirical and Hierarchical Bayes Competitors of Preliminary Test Estimators in Two Sample Problems.

DESCRIPTIVE NOTE: Technical rept.,

SEP 87 31P

PERSONAL AUTHORS: Ghosh, Malay; Sinha, Bimal K.

REPORT NO. TR-87-34

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1980

UNCLASSIFIED REPORT

ABSTRACT: (U) Suppose in a laboratory, say Laboratory I, a certain instrument is designed to measure several characteristics, and a number of vector-valued measurements is recorded. The objective is to estimate the unknown population mean. It is known, however, that a similar instrument is used in another laboratory, say Laboratory II for the same purpose, and a number of observations is recorded from the second instrument. It is also suspected that the two population means are equal, in which case, observations recorded in Laboratory II can possibly be used effectively together with those in Laboratory I for estimating the population mean of the first instrument. Thus, the question that naturally arises is whether one should use the sample mean from Laboratory I or the pooled mean from the two laboratories. In problems of this type what is normally sought is a compromise estimator which leans more towards the pooled sample mean when the null hypothesis of the equality of the two population means is accepted, and towards the sample mean from Laboratory I when such a hypothesis is rejected. A very popular way to achieve this compromise is to use a preliminary test estimator (PTE) which uses the pooled mean when the null hypothesis is accepted at a desired level of significance, and uses the sample mean from Laboratory I when opposite is the case. This paper proposes instead an empirical Bayes estimator which achieves the intended compromise.

DESCRIPTORS: (U) *BAYES THEOREM, *ESTIMATES, *MEAN, *STATISTICAL TESTS, HYPOTHESES, INSTRUMENTATION, POPULATION, POPULATION(MATHEMATICS), MINIMAX TECHNIQUE, STATISTICAL SAMPLES.

IDENTIFIERS: (U) PE61102F,WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 326 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Admissible Bayes Tests for Structural Relationship.

DESCRIPTIVE NOTE: Technical rept.,

SEP 87 20P

PERSONAL AUTHORS: Shen, Wei-Hsiung; Sinha, Bimal K.

REPORT NO. TR-87-31

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1959

UNCLASSIFIED REPORT

ABSTRACT: (U) It is an open problem to construct a test for structural relationship among the mean vectors of several multivariate normal populations with known but unequal covariance matrices. In this paper, a class of admissible Bayes tests for the above problem is derived. As a byproduct, in the special case of known and equal covariance matrices, the likelihood ratio test of Rao(1973) is shown to be admissible Bayes. Keywords: Problem solving; Test statistic.

DESCRIPTORS: (U) *STATISTICAL TESTS, *BAYES THEOREM, COVARIANCE, MATRICES(MATHEMATICS), MULTIVARIATE ANALYSIS, PROBLEM SOLVING, POPULATION(MATHEMATICS), CONSTRUCTION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A190 325 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Extreme Value for Dependent Sequences Via the Stein-Chen Method of Poisson Approximation.

DESCRIPTIVE NOTE: Technical rept.,

OCT 87 19P

PERSONAL AUTHORS: Smith, Richard L.

REPORT NO. TR-87-213

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1876

UNCLASSIFIED REPORT

ABSTRACT: (U) In 1970 Stein introduced a new method for bounding the approximation error in central limit theory for dependent variables. This was subsequently developed by Chen for Poisson approximation and has proved very successful in the areas to which it has been applied. Here this document shows how the method can be applied to extreme value theory for dependent sequences, focussing particularly on the nonstationary case. The method gives new and shorter proofs of some known results, with explicit bounds for the approximation error. Keywords Stocastic process; Random variables.

DESCRIPTORS: (U) *POISSON DENSITY FUNCTIONS, *APPROXIMATION(MATHEMATICS), *RANGE(EXTREMES), ERRORS, POISSON DENSITY FUNCTIONS, SEQUENCES, STOCHASTIC PROCESSES, RANDOM VARIABLES, VALUE.

IDENTIFIERS: (U) Stein Chen method, PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 324 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Continuity of Symmetric Stable Processes.

DESCRIPTIVE NOTE: Technical rept. 1 Oct 86-30 Sep 87,

SEP 87 19P

PERSONAL AUTHORS: Nolan, John P.

REPORT NO. TR-200

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1955

UNCLASSIFIED REPORT

ABSTRACT: (U) The path continuity of a symmetric p-stable process is examined in terms of any stochastic integral representation for the process. When 0 < p < 1, we give necessary and sufficient conditions for path continuity in terms of any (every) representation. When 1 < or = p < 2, we extend the know sufficiency condition in terms of metric entropy and offer a conjecture as to the complete solution. Finally, necessary and sufficient conditions for path continuity are given in terms of continuity at a point for 0<p<2.

DESCRIPTORS: (U) *CONTINUITY, *STABILITY, *STOCHASTIC PROCESSES, ENTROPY, INTEGRALS, PATHS, SYMMETRY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

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AD-A190 323 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Estimation of Convolution Tails.

DESCRIPTIVE NOTE: Technical rept. 1 Oct 86-30 Sep 87,

SEP 87 21P

PERSONAL AUTHORS: Willekens, Eric

REPORT NO. TR-208

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1851

UNCLASSIFIED REPORT

ABSTRACT: (U) Several classes of distribution functions (d.f.) are originated by considering distributions whose tailfunctions satisfy special asymptotic relations. A large class sharing this property is provided by a certain subexponential class, in which case the asymptotic relation involves tails of convolution powers. This paper introduces a statistic which estimates the asymptotic behaviour of convolution tails of a given d.f. and it is shown that this statistic is strongly consistent and asymptotically normal under appropriate conditions. Furthermore, the statistic can be used to test the hypothesis that a d.f. is in the exponential class being described.

DESCRIPTORS: (U) *CONVOLUTION, *DISTRIBUTION FUNCTIONS, *ASYMPTOTIC NORMALITY, ESTIMATES, HYPOTHESES, SHARING.

IDENTIFIERS: (U) Statistical outliers, PE61102F, WUAFOSR2304A5.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 322 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Sequential Tests for the Drift of a Wiener Process with a Smooth Prior, and the Heat Equation.

DESCRIPTIVE NOTE: Technical rept.,

OCT 87 18P

PERSONAL AUTHORS: Simon, Gordon; Yao, Yi-Ching; Wu, Xizhi

REPORT NO. TR-212

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1878

UNCLASSIFIED REPORT

ABSTRACT: (U) Methods are described which permit one to work with continuous-time optimal stopping problems, using the heat equation, even when the prior placed on the drift parameter of a Wiener process is not normal. The details of the method are worked out for Chernoff's problem of testing the sign of the drift parameter when the prior is smooth. Keywords: Sequential Bayes; Heat equation; Brownian motion; Asymptotic; Free boundary problems.

DESCRIPTORS: (U) *BOUNDARY VALUE PROBLEMS, *BROWNIAN MOTION, *HEAT, BAYES THEOREM, DRIFT, EQUATIONS, SEQUENCES, SEQUENTIAL ANALYSIS, STATISTICAL TESTS, TEST AND EVALUATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A190 322

AD-A190 320 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Stopping Rules and Observed Significance Levels.

DESCRIPTIVE NOTE: Technical rept.,

SEP 87 14P

PERSONAL AUTHORS: Bather, John

REPORT NO. TR-209

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1013

UNCLASSIFIED REPORT

ABSTRACT: (U) It is well known how to combine the significance levels observed in a number of independent experiments. When this number is a random variable determined by a stopping rule, the observed significance level can still be calculated if there is an acceptable ordering of the points in the extended sample space. But what can be said if the stopping time is ill-defined? This paper obtains explicit lower bounds on the level of significance by considering orderings based on a family of alternative hypotheses. These bounds give some measure of the effect of failing to specify the stopping rule in advance. Keywords: Stochastic processes.

DESCRIPTORS: (U) *STOPPING RULES(MATHEMATICS), *STATISTICAL TESTS, HYPOTHESES, STOCHASTIC PROCESSES, RANDOM VARIABLES, COMPUTATIONS, SEQUENTIAL ANALYSIS, OBSERVATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 319 12/3 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Normed Bellman Equation with Degenerate Diffusion Coefficients and Its Application to Differential Equations.

DESCRIPTIVE NOTE: Technical rept.,

OCT 87 35P

PERSONAL AUTHORS: Fujisaki, Masatoshi

REPORT NO. TR-211

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1817

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this paper is to prove the existence and uniqueness of generalized solution of the normed bellman equation with degenerate diffusion coefficients and also to prove that this unique solution is the cost function of a stochastic control problem associated with the normed Bellman equation. We can apply these results to some interesting degenerate and nonlinear differential equations. Keywords: Normalizing multiplier; Cost function.

DESCRIPTORS: (U) *STOCHASTIC CONTROL, COSTS, DIFFERENTIAL EQUATIONS, DIFFUSION COEFFICIENT, NONLINEAR DIFFERENTIAL EQUATIONS, COEFFICIENTS.

IDENTIFIERS: (U) *Normed Bellman equations, Degenerate equations, PE61102F, WUAFOSR2304A5.

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AD-A190 312 20/4 21/2

MICHIGAN UNIV ANN ARBOR DEPT OF AEROSPACE ENGINEERING

(U) Dense-Spray Structure and Phenomena: Part 2 - Pressure-Atomized Sprays.

DESCRIPTIVE NOTE: Annual rept. 15 Jul 86-14 Jul 87,

AUG 87 69P

PERSONAL AUTHORS: Ruff, G. A.; Faeth, G. M.

CONTRACT NO. AFOSR-85-0244

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-87-2009

UNCLASSIFIED REPORT

ABSTRACT: (U) A theoretical and experimental study of the dense-spray region of pressure-atomized nonevaporating sprays is described, emphasizing operation in the wind-induced and atomization breakup regimes. Experiments involved large-scale (9.5 an 19.1 mm injector diameters) water jets in still air. The flows were visualized using flash photography. In addition, the following measurements were made: mean and fluctuating streamwise velocities at the injector exit, mean liquid volume fraction distributions, and mean entertainment rates. The new measurements were used to assess predictions of flow structure based on the locally-homogeneous-flow approximation, i.e., assuming that interphase transport rates are infinitely fast so that relative velocities between the phases are negligible. Keywords: Multiphase flow, Sprays, Atomization.

DESCRIPTORS: (U) *ATOMIZATION, *MULTIPHASE FLOW, *SPRAYS, *WATER JETS, *TURBULENT FLOW, *COMBUSTION, AIR, FLASHES, LIQUIDS, MEAN, MEASUREMENT, PHASE STUDIES, PHOTOGRAPHY, VELOCITY, INJECTORS, WATER INJECTION, INTERACTIONS, MIXING, FLOW VISUALIZATION, FLOW RATE, COMBUSTORS, FUELS, GASES.

IDENTIFIERS: (U) WUAFOSR2308A2, PE61102F.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 311 12/2

PRINCETON UNIV NJ DEPT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

(U) Efficient Algorithms and Structures for Robust Signal Processing.

DESCRIPTIVE NOTE: Final rept.,

SEP 88 12P

PERSONAL AUTHORS: Dickinson, Bradley W.

CONTRACT NO. AFOSR-84-0381

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1793

UNCLASSIFIED REPORT

ABSTRACT: (U) The research efforts supported by AFOSR Grant AFOSR-84-0381 were directed towards development and analysis of robust estimation techniques for autoregressive (AR) and autoregressive-moving average (ARMA) models. Work on related system theoretic problems associated with parameter estimation problems for times series models and on square-root filtering for least squares state estimation applications was also carried out. Finally, an adaptive estimation technique for a class of piecewise (in time) stationary signals was developed. The motivation for our research arises from applications in signal processing including linear predictive singal modeling, signal detection, dynamic state estimation (Kalman filtering), and spectral analysis. The general goal of this research has been to put together ideas and techniques from statistics, signal processing, and system theory to bring new perspectives to such problems. Our research on various autoregressive modeling problems resulted from a desire to relax some of the assumptions made by previous researchers, in order to broaden the domain of application of the basic technique which has proved to be useful in a range of signal processing tasks. In particular, our efforts have been directed at the goal of obtaining allowing robust estimates in the presence of outliers in the observed

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signal and in modeling of signals whose spectral characteristics change abruptly from time to time.

DESCRIPTORS: (U) *ADAPTIVE SYSTEMS, *ESTIMATES, *KALMAN FILTERING, *MODELS, *SIGNAL PROCESSING, *SPECTRUM ANALYSIS, *STATIONARY, ALGORITHMS, DETECTION, DYNAMICS, EFFICIENCY, MOTIVATION, PARAMETERS, SIGNALS, SPECTRA, THEORY.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 310 21/3

MASSACHUSETTS INST OF TECH CAMBRIDGE PLASMA FUSION CENTER

(U) Plasma-Gas Interaction Studies in a Hybrid Plume Plasma Rocket.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 86-30 Aug 87,

SEP 87 31P

PERSONAL AUTHORS: Chang-Diaz, F. R.; Yang, T. F.

CONTRACT NO. AFOSR-84-0190

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR TR-87-1759

UNCLASSIFIED REPORT

ABSTRACT: (U) This report discusses the progress in the fluid modeling of a hybrid plume plasma rocket and the heating of plasma in a tandem mirror device. In the theoretical area three tasks have been accomplished: 1) A major advance has been made in the development of a numerical method for solving the time dependent fluid equations for both ions and electrons in the plasma. 2) A mathematical model has been formulated for studying the radio frequency heating of the hot plasma in cylindrical geometry. 3) An analysis on the performance characteristics of the hybrid plume rocket has been carried out. Under the funding of the instrumentation program the component fabrication is on progress. The coils have been delivered. Keywords: Plasma propulsion.

DESCRIPTORS: (U) *HYBRID ROCKET ENGINES, *PLASMA ENGINES, COILS, CYLINDRICAL BODIES, FABRICATION, GEOMETRY, HEATING, HIGH TEMPERATURE, INSTRUMENTATION, IONS, MATHEMATICAL MODELS, MIRRORS, NUMERICAL METHODS AND PROCEDURES, PLASMAS(PHYSICS), PLUMES, PROPULSION SYSTEMS, TIME DEPENDENCE, MAGNETIC MIRRORS, RADIOFREQUENCY POWER, HYDRODYNAMIC CODES, ROCKET PROPULSION, HYDROGEN, DIGITAL SIMULATION.

IDENTIFIERS: (U) Tandem mirrors, PE61102F, WUAFOSR2308A1.

AD-A190 310

AD-A190 309 21/3

MASSACHUSETTS INST OF TECH CAMBRIDGE SPACE SYSTEMS LAB

(U) Physical Fluid Mechanics in MPD Thrusters.

DESCRIPTIVE NOTE: Annual rept. 1 May 86-30 Apr 87,

SEP 87 53P

PERSONAL AUTHORS: Martinez-Sanchez, Manuel

CONTRACT NO. AFOSR-86-0119

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR TR-87-1780

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes work done on three areas of MPD research: (a) A rigorous theoretical examination of the one dimensional flow of a self-field accelerated plasma, clarifying the roles of area change, sonic vs. magnetoacoustic chocking, and finite magnetic Reynolds number. (b) Continued development of computational codes for axisymmetric MPD flows, and (c) Results of a first test series on two channels designed to verify productions on the effects of area variation, showing ability to redistribute current by this means. Keywords: Magnetoplasmadynamic thrusters; Electric propulsion; Plasma dynamics.

DESCRIPTORS: (U) *THRUSTERS, *PLASMA ENGINES, *MAGNETOHYDRODYNAMICS, CODING, COMPUTATIONS, DUAL CHANNEL, ELECTRIC PROPULSION, FLUID MECHANICS, MAGNETIC FIELDS, ONE DIMENSIONAL FLOW, PHYSICAL PROPERTIES, PLASMAS(PHYSICS), REYNOLDS NUMBER, VARIATIONS, AXIALLY SYMMETRIC FLOW, CHANNEL FLOW.

IDENTIFIERS: (U) Magnetoplasmadynamics, WUAFOSR2308A1, PE61102F.

AD-A190 309

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 308 12/7

PRINCETON UNIV NJ DEPT OF CHEMISTRY

(U) Microvax Networked Computer System.

DESCRIPTIVE NOTE: Final rept.,

DEC 87 8P

PERSONAL AUTHORS: Rabitz, Herschel

CONTRACT NO. AFOSR-87-0021

PROJECT NO. 2917

TASK NO. A2

MONITOR: AFOSR
TR-87-1958

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report covers the action taken regarding equipment purchases. the funds were for the purpose of purchasing and establishing a network of Microwax computers for research in the area of chemical physics particularly involving dynamics and kinetics phenomena. We have purchased all the original stated items except the line printer and the IBM-PC terminals. These latter items were replaced with the purchase of the extra disk storage deemed important to attain maximal usage from the hardware. Attached is a list of all the items purchased from DEC, their model number and cost. The overall system network is fully on-line and we are finding that the machines make a significant impact on our research. The design of the networked set of computers linked to the Departmental mainframe Vax is proving to be very effective. Additional experience will be needed to finally establish the optimal mode of system operation but we are already finding considerable speed-up in the rate that computations can be performed. The computers are being especially put to use for studying problems in gas-surface dynamics, molecular collisions and related problems in chemical kinetics.

DESCRIPTORS: (U) *DATA PROCESSING EQUIPMENT, *AIR FORCE PROCUREMENT, CHEMICALS, COLLISIONS, COMPUTATIONS, COMPUTERS, COSTS, DYNAMICS, GAS DYNAMICS, GAS SURFACE INTERACTIONS, KINETICS, MAGNETIC DISKS, MEMORY DEVICES,

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MODELS, MOLECULES, NETWORKS, OPERATION, OPTIMIZATION, PHYSICS, PRINTERS(DATA PROCESSING), REACTION KINETICS, UNIVERSITIES, COMPUTER APPLICATIONS.

IDENTIFIERS: (U) *Computer networks, Chemical physics, WUAFOSR2917A2, PE61102F.

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AD-A190 307 21/3

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF MECHANICAL ENGINEERING

(U) Fundamental Studies on MPD Thrusters.

DESCRIPTIVE NOTE: Final progress rept. Apr 85-Dec 86,

SEP 87 258P

PERSONAL AUTHORS: Lawless, J. L.

REPORT NO. 1-52097

CONTRACT NO. AFOSR-83-0033

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR TR-87-2012

UNCLASSIFIED REPORT

ABSTRACT: (U) A theory has been developed which predicts onset and erosion in MPD thrusters. The theory predicts onset currents which are in quantitative agreement with experiment. Erosion rates are predicted for a steady-state hot cathode thruster. This theory is the first to model the viscous and thermal electrode boundary layers in MPD thrusters. Stability criteria for diffuse-mode electrode current conduction have been found. Keywords: Two temperature flow; Electrode plasma interactions, Magnetoplasmadynamic thrusters.

DESCRIPTORS: (U) *THRUSTERS, *PLASMA ENGINES, *MAGNETOHYDRODYNAMICS, AGREEMENTS, BOUNDARY LAYER, CATHODES, ELECTRODES, HIGH TEMPERATURE, INTERACTIONS, PLASMAS(PHYSICS), RATES, STABILITY, STEADY STATE, TEMPERATURE, THERMAL BOUNDARY LAYER, VISCOSITY, PLASMA SHEATHS.

IDENTIFIERS: (U) *Magnetoplasmadynamics, Magnetoplasmadynamic thrusters, WUAFOSR2308A1, PE61102F.

AD-A190 280 9/1

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF ELECTRICAL ENGINEERING

(U) The Algebraic Structure of Convolutional Codes.

DESCRIPTIVE NOTE: Final rept. 15 Jul 85-14 Jul 87,

SEP 87 48P

PERSONAL AUTHORS: Reed, Irving S.

CONTRACT NO. AFOSR-85-0259

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1738

UNCLASSIFIED REPORT

ABSTRACT: (U) A new pruned-trellis search algorithm for high-rate convolutional code is developed. The search time and memory size is significantly reduced from standard search techniques. Some new high-rate systematic optimum convolutional codes of rate up to 7/8 have been found by this new search technique, and with constraint length up to 15. These newly found high-rate convolutional codes can be efficiently decoded using pruned, error-trellis, syndrome decoding. The real advantage of the pruned error-trellis decoding over the conventional Viterbi decoding algorithm is the reduction of the memory size required. Simulation shows that the error trellis performance of pruned error-trellis decoding suffers only a 0.2 dB loss for some systematic high-rate convolutional codes compared with conventional, full trellis decoding. Keywords: Integrated circuits; Architectures; Bibliographics; Abstracts.

DESCRIPTORS: (U) *DECODERS, ALGEBRA, ALGORITHMS, CODING, CONVOLUTION, HIGH RATE, INTEGRATED CIRCUITS, MEMORY DEVICES, SEARCHING, SIMULATION, SIZES(DIMENSIONS), TIME, BIBLIOGRAPHIES, ABSTRACTS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 277 12/1

CALIFORNIA UNIV SAN DIEGO LA JOLLA INST FOR PURE AND APPLIED PHYSICAL SCIENCE S

(U) Baecklund Transformation and the Schwarzian Derivative.

DESCRIPTIVE NOTE: Final rept. 1 Feb 86-31 Jul 87,

NOV 87 9P

PERSONAL AUTHORS: Weiss, John E.

CONTRACT NO. AFOSR-86-0068

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR
TR-87-1795

UNCLASSIFIED REPORT

ABSTRACT: (U) We complete the discussion of the periodic fixed points of Backlund transformations for the Korteweg-de Vries equation. It will be shown that the systems of equations defined by the KdV periodic fixed points are equivalent to the periodic Kac-Van Moerbeke systems. As a consequence, for even order fixed points, the KdV systems are equivalent to the periodic Toda lattice. The periodic fixed points of the Backlund transformation for the Boussinesq equation are found to have a Hamiltonian structure. The integrals of these systems are found.

DESCRIPTORS: (U) *TRANSFORMATIONS(MATHEMATICS), *DERIVATIVES(MATHEMATICS), EQUATIONS, HAMILTONIAN FUNCTIONS, INTEGRALS, POINTS(MATHEMATICS).

IDENTIFIERS: (U) Korteweg de Vires equation, PE61102F, WUAFOSR2304A4.

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AD-A190 274 7/4

EMORY UNIV ATLANTA GA DEPT OF CHEMISTRY

(U) Laser Excitation Spectra for Matrix Isolated IF: Observation of New Low-Lying Electronic States,

SEP 87 10P

PERSONAL AUTHORS: Nicolai, Jean-Philippe; Heaven, Michael C.

CONTRACT NO. AFOSR-87-0197

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-87-1869

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v87 n6 p3304-3312, 15 Sep 87.

ABSTRACT: (U) Laser excitation of matrix isolated IF has been used to characterize three previously unobserved electronic states. Excitation at wavelengths longer than 535 nm resulted in emission from the metastable A cubed pi(2) state. Vibrational analysis of the A -X system gave an approximate value of Te (A) = 13 250 CM to the minus 1 power. The radiative lifetime of IF (A) was found to be about 11 ms. Excitation of IF at wavelengths shorter than 475 nm produced a long-lived (tau = 5 ms) fluorescence in the 720-1500 nm region. This emission originated from a low-lying electronic state (T00 18 040 cm to the minus 1 power) and terminated on the v' = 9 to 22 levels of the ground state. Laser excitation spectra, recorded by scanning the laser wavelength and monitoring this emission system, showed a progression of bands from 474 to 415 nm. Franck-Condon arguments show that the absorbing state is not the emitting state. The excitation spectra provided a T00 value of 21 100 cm to the minus 1 power and a vibrational constant of 500 cm to the minus 1 power for the absorbing state.

DESCRIPTORS: (U) *ELECTRONIC STATES, *EXCITATION, *LASERS, *SPECTRA, EMISSION, FLUORESCENCE, FREQUENCY, GROUND STATE, LOW LEVEL, RADIATION, TIME, VIBRATION.

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IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

AD-A190 247 12/3

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION AND DECISION SYSTEMS

(U) Aggregation and Time Scale Analysis of Perturbed Markov Systems.

DESCRIPTIVE NOTE: Doctoral thesis,

JAN 87 210P

PERSONAL AUTHORS: Rohlicek, Jan R.; Willsky, Alan S.

REPORT NO. LIDS-TH-1641

CONTRACT NO. DAAG29-84-K-0005, $AFOSR-82-0258

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1857

UNCLASSIFIED REPORT

ABSTRACT: (U) Analysis of systems with many time scales is important in many engineering applications. This thesis addresses the approximation and decomposition of Markov processes which exhibit such multiple time scales. An algorithm is presented for the decomposition of explicitly perturbed, finite state, continuous time Markov processes. An approximation of the probability transition function which converges uniformly to zero over T greater than or equal to 0 is obtained. The algorithm extends previous work by providing a straightforward algorithm which has a direct probabilistic interpretation, particularly with respect to the role played by transient states. This result is then extended to consider semi Markov and discrete time Markov processes as well. Decomposition of perturbed positive systems is also addressed. Finally, the Markov process decomposition algorithm is expressed in graphical terms and applied to a problem of determining the multiple time scale structure of a fault-tolerant system model.

DESCRIPTORS: (U) *MARKOV PROCESSES, *PROBABILITY DISTRIBUTION FUNCTIONS, ALGORITHMS, CONTINUOUS PROCESSING,

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

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DECOMPOSITION, FAULTS, GRAPHICS, MODELS, PERTURBATIONS, SCALE, TIME, TIME SERIES ANALYSIS, TOLERANCE, TRANSITIONS, THESES.

IDENTIFIERS: (U) Markov chains, PE61102F, WUAFOSR2304A5.

AD-A190 247

AD-A190 245 20/4 1/1

GRUMMAN CORP BETHPAGE NY CORPORATE RESEARCH CENTER

(U) On the Prediction of Highly Vortical Flows Using an Euler Equation Model. Part 2.

DESCRIPTIVE NOTE: Final rept. 31 Jul 85-31 Jul 87,

OCT 87 137P

PERSONAL AUTHORS: Marconi, Frank

CONTRACT NO. F49620-85-C-0115

PROJECT NO. 2307

TASK NO. A4

MONITOR: AFOSR
TR-87-1910

UNCLASSIFIED REPORT

ABSTRACT: (U) An investigation of the power of the Euler equations in the prediction of conical separated flows is presented. These equations are solved numerically for the highly vortical supersonic flow about simple bodies. Two sources of vorticity are studied: the first is the flow field shock system and the second is the vorticity shed into the flow field from a separating boundary layer. Both sources of vorticity are found to produce separation and vortices. In the case of shed vorticity, the surface point from which the vorticity is shed (i.e., separation point) is determined empirically. At very high angles of attack the only stable separated solution is found to be asymmetric. Solutions obtained with both sources of vorticity are studied in detail, compared with each other and with potential calculations and experimental data. Keywords: Fluid mechanics, Vortex flows, Supersonic flows.

DESCRIPTORS: (U) *FLOW SEPARATION, *SUPERSONIC FLOW, *VORTEX SHEDDING, *DELTA WINGS, BOUNDARY LAYER, DIFFERENTIAL EQUATIONS, EQUATIONS, EXPERIMENTAL DATA, FLOW, FLOW FIELDS, FLUID MECHANICS, HIGH ANGLES, MATHEMATICAL MODELS, SHOCK TESTS, SOLUTIONS(GENERAL), STABILITY, VORTICES, ANGLE OF ATTACK, ASYMMETRY, CROSS FLOW, CANARD CONFIGURATION, SHOCK.

IDENTIFIERS: (U) Conical flow, Euler equations, PE61102F,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 245 CONTINUED

WUAFOSR2307A4.

AD-A190 244 9/3

IOWA UNIV IOWA CITY

(U) Alkali Metal Diffuse Band Lasers.

DESCRIPTIVE NOTE: Final technical rept. 1 Jun 86-31 May 87,

AUG 87 19P

PERSONAL AUTHORS: Stwalley, William C.

REPORT NO. IADBL/3

CONTRACT NO. AFOSR-84-0178

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR TR-87-1738

UNCLASSIFIED REPORT

ABSTRACT: (U) Progress is described on study of a new class of potential excimer lasers based on diffuse bands of the alkali metal vapors. In particular, the violet diffuse bands of sodium vapor and the yellow diffuse bands of potassium vapor have been shown by detailed modeling of single vibrational-rotational level emission to be each composed of overlapping singlet and triplet 'excimer' emission continua of the diatomic molecule. The gain and low absorption loss previously found in the violet and yellow with laser optical pumping of sodium vapor and potassium vapor, respectively, have been quantitatively examined. Prospects for laser oscillation appear to be good at low pressures where quenching is not dominant. Free-bound-free spectra (which include only the triplet portion of the diffuse bands) have been produced and analyzed in sodium, potassium, rubidium and cesium. Keywords: Excimer, Lasers, Singlet.

DESCRIPTORS: (U) *EXCIMERS, *LASERS, CESIUM, DESORPTION, DIATOMIC MOLECULES, DIFFUSION, LASER PUMPING, LOW LOSS, LOW PRESSURE, OPTICAL PUMPING, POTASSIUM, QUENCHING, RUBIDIUM, SODIUM, YELLOW(COLOR), METAL VAPORS, EMISSION SPECTRA, BAND SPECTRA.

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IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1.

AD-A190 243 20/5 7/4 14/2

SAN DIEGO STATE UNIV CA DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Electron Production, Electron Attachment and Charge Recombination Process in High Pressure Gas Discharges.

DESCRIPTIVE NOTE: Final rept. 1 Oct 86-30 Sep 87,

NOV 87 6P

PERSONAL AUTHORS: Lee, Long C.

CONTRACT NO. AFOSR-87-0059

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-87-1735

UNCLASSIFIED REPORT

ABSTRACT: (U) A mass spectrometer system has been purchased by this grant. The purchased equipment were used to construct an apparatus as shown in Fig. 1. This apparatus includes a quadrupole mass analyzer, ion detectors, high vacuum pump system, a vacuum chamber, electronics and power supplies, as well as optical multichannel analyzer and excimer laser. This apparatus is being used to analyze the positive and negative ions produced in electrical discharges. The transient chemical species in electrical discharges (such as radicals and excited ions) are also being investigated using this apparatus. The information obtained from this research are useful for the understanding of discharge mechanisms. Keywords: Electron production, Electron attachment, Charge recombination.

DESCRIPTORS: (U) *ELECTRIC DISCHARGES, *GAS DISCHARGES, *MASS SPECTROMETERS, *ELECTRON TRANSFER, *RECOMBINATION REACTIONS, ANALYZERS, ANIONS, ATTACHMENT, CATIONS, CHEMICALS, DETECTORS, ELECTRONICS, ELECTRONS, EXCIMERS, HIGH PRESSURE, HIGH VACUUM, IONS, LASERS, MASS, MULTICHANNEL, OPTICAL EQUIPMENT, POWER SUPPLIES, PRODUCTION, QUADRUPOLE MOMENT, TRANSIENTS, VACUUM APPARATUS, VACUUM CHAMBERS, VACUUM PUMPS.

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IDENTIFIERS: (U) Electron attachment, PE61102F, WUAFOSR.

AD-A190 242 6/4

LOYOLA UNIV OF CHICAGO IL PARMLY HEARING INST

(U) Binaural Processing of Complex Stimuli.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-31 Aug 87,

87 13P

PERSONAL AUTHORS: Yost, William A.; Dye, R. H., Jr

CONTRACT NO. AFOSR-84-0332

PROJECT NO. 2313

TASK NO. A6

MONITOR: AFOSR
TR-87-1911

UNCLASSIFIED REPORT

ABSTRACT: (U) Sounds produced by acoustic sources are localized and detected on the basis of differences in the time of arrival between the two ears and differences in the levels at the two ears. Most real world sounds are spectrally complex, consisting of energy distributed across many frequencies. In general, the auditory system must make judgments regarding the location of acoustic sources on the basis of these interaural differences, even though their distribution across frequency may be quite complex. This proposal has sought to understand the processes by which the binaural auditory system combines interaural information across the spectrum. The auditory system is spectrally synthetic, averaging information across the frequency domain, when the signal consists of relatively few components. Under these circumstances, the system behaves as though all components arise from the same spatial location.

DESCRIPTORS: (U) *HEARING, *AUDITORY PERCEPTION, *DIRECTION FINDING, ARRIVAL, EAR, FREQUENCY, SOUND, SOUND GENERATORS, SPATIAL DISTRIBUTION, SPECTRA, STIMULI, TIME, SOUND ANALYZERS, AUDITORY SIGNALS, SOURCES, ACOUSTIC SIGNALS, SIGNAL PROCESSING.

IDENTIFIERS: (U) *Binaural processing, PE61102F, WUAFOSR2313A6.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 238 9/3 13/12

BOSTON UNIV MA COLL OF ENGINEERING

(U) Advanced Programming and Control Techniques for Complex Mechanical Systems.

DESCRIPTIVE NOTE: Final rept. 30 Jul 86-29 Jul 87,

OCT 87 15P

PERSONAL AUTHORS: Baillieul, John

CONTRACT NO. AFOSR-86-0273

PROJECT NO. 2917

TASK NO. A5

MONITOR: AFOSR TR-87-1798

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this report was to evaluate spectral protective characteristics of a revised prototype polycarbonate laser protective filter submitted to the Army by the American Optical (AO) Corporation as a material for the ballistic/laser protective spectacles (B/LPS) and to make recommendations necessary to assure the adequacy of the filter for protection of personnel using the B/LPS around 'Lambda 2' laser filter systems. Keywords: Laser safety, Laser hazards, Goggles, Glasses, Light transmission, Monochromatic light, Optical filters.

DESCRIPTORS: (U) *EYEGLASSES, *LASERS, *PROTECTIVE EQUIPMENT, *GOGGLES, *LASER SAFETY, *OPTICAL FILTERS, SPECTRA, LIGHT TRANSMISSION, LASER HAZARDS, PERSONNEL, PROTECTION, DYES, MONOCHROMATIC LIGHT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A5.

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INDIANA UNIV AT BLOOMINGTON DEPT OF COMPUTER SCIENCE

(U) Transformations of Concurrent Algorithms for Highly Parallel Systems: A One Year Project Summary Report.

DESCRIPTIVE NOTE: Final rept. for period ending 1 Oct 87,

OCT 87 6P

PERSONAL AUTHORS: Gannon, Dennis

CONTRACT NO. AFOSR-86-0147

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1737

UNCLASSIFIED REPORT

ABSTRACT: (U) It has become a certainty that Multiple Instruction Stream, Multiple Data Stream (MIMD) parallel architectures are going to play a major role in all aspects of high speed computer design for the foreseeable future. What is not clear is whether we will be able to devise a means to design algorithms and software for these machines that transcends our current ad-hoc, nonportable techniques. In this research project the author has focused on the portability issue from the perspective of parallel algorithm design and how it effects the internal organization of advanced compilers. The eventual goal of the project is to produce an expert system that can help users transform large, complex applications from one highly parallel machine to another. The basic strategy has been to follow the following plan: 1) Build an experimental research laboratory for parallel computation; 2) Design and experimental program of research that would shed light on the problems involved with restructuring parallel programs for different machines; 3) Attempt to provide a mathematical characterization of the properties of the machines and how algorithms must be restructured to run on them; and 4) Attempt to design a model of machine architecture that can be embedded into the inference engine or knowledge base of an expert system for program restructuring.

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DESCRIPTORS: (U) *ALGORITHMS, *COMPUTER ARCHITECTURE, COMPILERS, COMPUTATIONS, COMPUTER PROGRAMS, COMPUTERS, DATA PROCESSING, HIGH RATE, INSTRUCTIONS, MACHINES, MODELS, PARALLEL PROCESSING, ARTIFICIAL INTELLIGENCE, OPTIMIZATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

AD-A190 220 17/5 21/2 21/8

ARIZONA STATE UNIV TEMPE DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Research On Certain Aspects of Laser Diffraction Particle Sizing Relevant to Autonomous Self-Diagnosing Instrumentation.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 86-1 Oct 87,

OCT 87 8P

PERSONAL AUTHORS: Hirleman, E. D.; Dellenback, Paul A.; Koo, Joseph H.

CONTRACT NO. AFOSR-84-0187

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR TR-87-1898

UNCLASSIFIED REPORT

ABSTRACT: (U) The fundamental scientific deficiencies impeding the integration of laser diffraction particle sizing techniques into intelligent sensors for next generation propulsion systems have been identified. The research addressed three relevant areas: inverse scattering algorithms; multiple scattering; and the problems of laser beam deflections due to refractive index gradients in hostile propulsion environments. A generalized eigenfunction approach to the inverse Fraunhofer diffraction particle sizing problem has been developed. Based on an analysis of the eigenvalue spectrum, scaling laws for optimal configuration of the system are proposed. The results are in agreement with an independent analysis of the system based on condition number analysis of the linear system produced by numerical quadrature as reported in a previous annual report. The formulation and scaling laws provide a scheme for determining the optimal number and location of the scattering sensors and the maximum number of pieces of independent information on the particle size distribution which can be reliably extracted from the inversion. Finally, a new concept involving programmable (real time) detector configuration at the transform plane has been

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demonstrated. Keywords: Light scattering, Fraunhofer diffraction, Particle sizing, Optical sensors.

DESCRIPTORS: (U) *INVERSE SCATTERING, *LIGHT SCATTERING, *PARTICLE SIZE, *DIFFRACTION ANALYSIS, *EXHAUST GASES, *OPTICAL DETECTORS, ADVERSE CONDITIONS, ALGORITHMS, DEFICIENCIES, DEFLECTION, DIFFRACTION, DISTRIBUTION, EIGENVALUES, EIGENVECTORS, GRADIENTS, LASER BEAMS, LINEAR SYSTEMS, NUMERICAL QUADRATURE, OPTICAL DETECTORS, OPTIMIZATION, PROPULSION SYSTEMS, REAL TIME, REFRACTIVE INDEX, SCALING FACTORS, SCATTERING, SPECTRA, FARADAY EFFECT, SHUTTERS(OPTICS), MAGNETOOPTICS, LASER APPLICATIONS.

IDENTIFIERS: (U) Fraunhofer diffraction, PE61102F, WUAFOSR2308A3.

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AD-A190 218 6/4 5/8

INDIANA UNIV AT BLOOMINGTON HEARING AND COMMUNICATION LAB

(U) Perception of Complex Auditory Patterns.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-31 Aug 87,

NOV 87 45P

PERSONAL AUTHORS: Watson, Charles S.

CONTRACT NO. AFOSR-84-0337

PROJECT NO. 2313

TASK NO. A8

MONITOR: AFOSR TR-87-1781

UNCLASSIFIED REPORT

ABSTRACT: (U) This project continued and extended a series of experiments on the discrimination and identification of complex auditory patterns. The general purpose of this work is to determine the limits of human listeners' abilities to extract information from complex sounds including, but not limited to, those with temporal and spectral properties approximating speech. Experiments used criterion-controlled psychophysical methods in which listeners were trained until approaching asymptotic performance in various discrimination and identification tasks. Advances were made in the following areas: (A) the spectral and temporal range of selective auditory attention; (b) the time course of auditory perceptual learning; (c) informational limits on pattern discrimination; (d) listeners' abilities to learn to attend to multi-tone targets within longer patterns; (e) individual differences in auditory sensitivity, and (f) the perception of spectrally complex sound, including speech and non-speech sounds.

DESCRIPTORS: (U) *AUDITORY SIGNALS, *PATTERN RECOGNITION, *AUDITORY PERCEPTION, DISCRIMINATION, LEARNING, LIMITATIONS, PATTERNS, SOUND, SPECTRA, SPEECH, TARGETS, PSYCHOPHYSIOLOGY, LEARNING, SOUND ANALYZERS, SPEECH RECOGNITION.

IDENTIFIERS: (U) WUAFOSR2313A8, PE61102F.

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AD-A190 216 20/14 12/1

IOWA STATE UNIV AMES

(U) On Least-Squares Approximations to Compressible Flow Problems,

86

PERSONAL AUTHORS: Chen, Tsu-Fen

CONTRACT NO. AFOSR-84-0252

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR
TR-87-1870

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Numerical Methods for Partial Differential Equations, v2 p207-228 1986.

ABSTRACT: (U) A direct finite-element method for computing solutions of compressible potential flow problems is presented. An analysis of least-squares approximation is given, including optimal order estimates for piecewise polynomial approximation spaces. The model problem considered is that of potential flow past a cylinder. Numerical results for the model problem are given for a shock free subsonic case.

DESCRIPTORS: (U) *COMPRESSIBLE FLOW, APPROXIMATION(MATHEMATICS), ESTIMATES, FINITE ELEMENT ANALYSIS, LEAST SQUARES METHOD, NUMERICAL ANALYSIS, OPTIMIZATION, POLYNOMIALS, POTENTIAL FLOW, CYLINDRICAL BODIES, ORDER STATISTICS, REPRINTS, SUBSONIC FLOW.

IDENTIFIERS: (U) WUAFOSR2304A4, PE61102F.

AD-A190 214 12/4

OHIO STATE UNIV COLUMBUS

(U) Asymptotic Bias of the Product Limit Estimator under Dependent Competing Risks.

DESCRIPTIVE NOTE: Journal article 1 Oct 85-31 Oct 86,

84 9P

PERSONAL AUTHORS: Klein, John P.; Moeschberger, M. L.

CONTRACT NO. AFOSR-82-0307

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1850

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Iapqr Transactions, v9 n1 p1-7 1984.

ABSTRACT: (U) A common assumption made in analyzing competing risk experiments is that the risks are stochastically independently. Under that assumption the product limit estimator is a consistent estimator of the marginal survival function. We show that when the risks are not independent the product limit estimator converges, with probability one, to a survival function which may not be the same as the marginal survival function of interest. Keywords: Reprints.

DESCRIPTORS: (U) *ESTIMATES, *RISK, *BIAS, CONSISTENCY, LIMITATIONS, REPRINTS, SURVIVAL(GENERAL), CONVERGENCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 213 9/1

TEXAS UNIV AT AUSTIN MICROWAVE LAB

(U) Monolithic Phase Shifter Study.

DESCRIPTIVE NOTE: Annual technical rept. Nov 86-Oct 87,

NOV 87 30P

PERSONAL AUTHORS: Neikirk, D. P.; Itoh, T.

REPORT NO. MW-87-P-10

CONTRACT NO. AFOSR-86-0036

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR
TR-87-1739

UNCLASSIFIED REPORT

ABSTRACT: (U) Modeling and preliminary testing of a monolithic coplanar waveguide (CPW) phase shifter using both optical and Schottky-contact control techniques has been performed. Simulation work on a periodically illuminated structure has been completed, showing that some improvement in performance may be possible, although with a reduction in frequency bandwidth. CPW transmission lines have been fabricated on semi-insulating GaAs, on heavily doped epi GaAs, and on an AlGaAs/GaAs heterostructure, and initial electrical characterization has been performed. Optically controlled phase shift has been obtained with the heterostructure device, and Schottky-bias controlled behavior has been seen with the epi sample.

DESCRIPTORS: (U) *MONOLITHIC STRUCTURES(ELECTRONICS), *PHASE SHIFT CIRCUITS, BANDWIDTH, CONTROL, FREQUENCY, ILLUMINATION, METHODOLOGY, OPTICS, SIMULATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR230501.

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AD-A190 210 17/11 14/2 12/9

SRI INTERNATIONAL MENLO PARK CA

(U) Electromagnetic Sensor Arrays for Nondestructive Evaluation and Robot Control.

DESCRIPTIVE NOTE: Final rept. (Annual) 1 Sep 86-31 Aug 87,

OCT 87 43P

PERSONAL AUTHORS: Bahr, A. J.; Rosengreen, A.

CONTRACT NO. F49620-84-K-0011

PROJECT NO. 2306

TASK NO. A3

MONITOR: AFOSR
TR-87-1752

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this research program was to develop the theoretical models, design methodology, and technology needed for optimally applying near field electromagnetic sensor arrays to nondestructive evaluation (NDE) and robot control. This program was a collaborative effort by SRI International and Stanford University. This report summarizes SRI's contribution to the program's third-year research activities. SRI's work on this study has shown that small printed circuit single turn loops exhibit good sensitivity when used as sensors. This technology allows ready fabrication of high resolution arrays. By addressing different elements in the array and suitably processing the resulting signals, different sensing functions can be realized with the same array. In particular, SRI has demonstrated the use of such arrays for edge tracking and ranging (proximity sensing). Keywords: Sensor, Arrays, Nondestructive evaluation, Robotics, Electromagnetic, Imaging, Edge tracking.

DESCRIPTORS: (U) *ARRAYS, *DETECTORS, *MODELS, *NONDESTRUCTIVE TESTING, *ROBOTICS, *TRACKING, CONTROL, EDGES, ELECTROMAGNETIC RADIATION, HIGH RESOLUTION, PRINTED CIRCUITS, ROBOTS, THEORY.

IDENTIFIERS: (U) LPN-SRI-7711, PE61102F, WUAFOSR2306A3.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 207 20/9 20/8 20/3

CALIFORNIA UNIV IRVINE DEPT OF PHYSICS

(U) High Power, High Frequency Radiation from Beam-Plasma Interactions.

DESCRIPTIVE NOTE: Annual rept. 15 Jun 82-14 Jun 87,

JUN 87 44P

PERSONAL AUTHORS: Benford, Gregory

CONTRACT NO. AFOSR-82-0233

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR TR-87-1829

UNCLASSIFIED REPORT

ABSTRACT: (U) A theory has been developed for the probability distribution of the electric field in a highly turbulent plasma environment, Experimental optical studies have been carried out to quantify the distribution function for electrical fields less than 10 kV/cm. Preliminary studies have been conducted of the anisotropy of microwave emission from beam plasma systems. Keywords: Experiment, Turbulence, Electron beams.

DESCRIPTORS: (U) *ELECTRON BEAMS, *PLASMAS(PHYSICS), BEAMS(RADIATION), DISTRIBUTION FUNCTIONS, ELECTRIC FIELDS, EMISSION, EXPERIMENTAL DATA, HIGH FREQUENCY, HIGH POWER, INTERACTIONS, MICROWAVES, RADIATION, TURBULENCE, PROBABILITY DISTRIBUTION FUNCTIONS, MAXWELLS EQUATIONS, HAMILTONIAN FUNCTIONS, RELATIVITY THEORY.

IDENTIFIERS: (U) Debye length, PE61102F, WUAFOSR2301A8.

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RESEARCH TRIANGLE INST RESEARCH TRIANGLE PARK NC

(U) Study of Mean Free Path Effects on Growth of Ultrafine Metallic Aerosols.

DESCRIPTIVE NOTE: Final rept. Jul 86-Sep 87,

NOV 87 66P

PERSONAL AUTHORS: Lawless, Philip A.

CONTRACT NO. F49620-84-C-0017

PROJECT NO. 2306

TASK NO. C4

MONITOR: AFOSR TR-87-1740

UNCLASSIFIED REPORT

ABSTRACT: (U) This is the final report of activities on a study of metallic aerosol growth under reduced pressure conditions. The aersol produced is very complex in shape, and the use of fractal descriptors was investigated. The report details the kind of fractal analysis used. It shows that the particles have fractal characteristics that describes stages of growth and that the pressure under which the particles are grown does influence the growth structure. At very low pressures, the particles fail to form because of chamber size limitations. The conclusions reached in the report show some of the utility of fractal analysis for investigating irregular particle shapes, some of the pressure effects on formation of metallic aerosols of different compositions, and extrapolations of the growth conditions to lower pressures.

DESCRIPTORS: (U) *AEROSOLS, *GROWTH(GENERAL), *METAL VAPORS, *ATMOSPHERIC CHEMISTRY, *ATMOSPHERIC PHYSICS, CHAMBERS, ENVIRONMENTS, EXTRAPOLATION, LIMITATIONS, LOW PRESSURE, MEAN FREE PATH, METALS, PARTICLES, PRESSURE, REDUCTION, SHAPE, SIZES(DIMENSIONS), ULTRAFINES, EXOSPHERE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306C4.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 203 12/5

YALE UNIV NEW HAVEN CONN

(U) Memory-Based Expert Systems.

DESCRIPTIVE NOTE: Final rept. 15 Jan 82-29 Sep 85,

JUN 87 64P

PERSONAL AUTHORS: Schank, R.

CONTRACT NO. F49620-82-K-0010

PROJECT NO. 2304

TASK NO. K1

MONITOR: AFOSR
TR-87-1745

UNCLASSIFIED REPORT

ABSTRACT: (U) There are 3 major areas of accomplishments in recent AFOSR sponsored AI research at Yale. While case-based reasoning is simple in concept, there are of course many subtle and difficult design issues that have to be resolved to make it work. One major achievement in the past two years at Yale has been the development of an explicit structure for the case-based reasoning process, as shown in the slide containing the flowchart entitled 'Case-Based Reasoning'. This process description summarizes results from the JUDGE (Bain 1986) AFOSR project as well as from other projects such as CHEF (Hammond 1986) and COACH (Collins forthcoming). The flow of control in the process (represented by the arrows and boxes) is task-independent, while the particular knowledge bases (represented by the ovals) are task specific. The JUDGE program models the subjective assessment task of judicial sentencing. That is, given a description of an event, such as a fight between two people that ended in a death or serious injury, where someone has been convicted of a criminal act.

DESCRIPTORS: (U) *COMPUTER PROGRAMS, CONTROL, DEATH, FLOW, FLOW CHARTING, MODELS, WOUNDS AND INJURIES, ARTIFICIAL INTELLIGENCE.

IDENTIFIERS: (U) *Expert systems, JUDGE computer program, PE61102F, WUAFOSR2304K1.

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AD-A190 201 12/4

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF MATHEMATICS

(U) Approximation Methods for the Identification and Control of Distributed Parameter Systems.

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 84-30 Sep 87,

NOV 87 43P

PERSONAL AUTHORS: Rosen, I. G.

CONTRACT NO. AFOSR-84-0393

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-87-1980

UNCLASSIFIED REPORT

ABSTRACT: (U) Efforts to develop computational methods for the identification and optimal control of linear and nonlinear systems governed by distributed parameter systems are reported on. Specifically, approximation methods for determining Optimal LQG compensators (feedback control and estimator gains) and functional parameters in linear and nonlinear partial differential equations and hereditary systems were developed, analyzed and tested. The study included theoretical, experimental and numerical components. Covergence theories for spline-based and modal finite element schemes were established and extensive numerical studies on both conventional (serial) and vector supercomputers were carried out. A parameter estimation scheme was tested using experimental data taken from the RPL structure, a laboratory experiment designed to test control algorithms for the large angle slewing of spacecraft with flexible appendages, and other projects involving the identification of flexible structures based upon experimental data were initiated.

DESCRIPTORS: (U) *CONTROL SYSTEMS, *SYSTEMS ANALYSIS, ALGORITHMS, ANGLES, APPENDAGES, CONTROL, DISTRIBUTION, ESTIMATES, EXPERIMENTAL DATA, FEEDBACK, FINITE ELEMENT

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

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ANALYSIS, FLEXIBLE STRUCTURES, LABORATORY TESTS, NONLINEAR SYSTEMS, NUMERICAL ANALYSIS, NUMERICAL METHODS AND PROCEDURES, OPTIMIZATION, PARAMETERS, SLEWING, SPACECRAFT, SUPERCOMPUTERS, VECTOR ANALYSIS, PARTIAL DIFFERENTIAL EQUATIONS, LINEAR DIFFERENTIAL EQUATIONS, NONLINEAR DIFFERENTIAL EQUATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

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AD-A190 197 13/13 20/11

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF MATHEMATICS

(U) Stabilization and Control Problems in Structural Dynamics.

DESCRIPTIVE NOTE: Final rept. 1 Sep 85-31 Aug 88,

SEP 87

PERSONAL AUTHORS: Chen, Goong

CONTRACT NO, AFOSR-85-0253

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-87-1789

UNCLASSIFIED REPORT

ABSTRACT: (U) The most significant research progress and accomplishment in our project is on the modelling, analysis and designs of stabilizing joints for coupled structures. In a series of papers, we have studied second order dynamic structures modelling vibrating strings and cables, and fourth order dynamic structures modelling vibrating beams. We are able to classify all linear dissipative joints into types. Dr. H.H. West of the Civil Engineering Department of the Pennsylvania State University has collaborated with us and completed mechanical designs for all of them. Numerical and experimental verification have also been carried out. Dr. Chen's Ph.D. student M.P. Coleman is now using the Cyber 205 supercomputer to compute eigenfrequencies of a damped plate. Experiments were conducted at the MIPAC Facility of the University of Wisconsin in collaboration with Dr. D.L. Russell.

DESCRIPTORS: (U) *DYNAMICS, *STRUCTURAL PROPERTIES, CIVIL ENGINEERING, COUPLING(INTERACTION), FREQUENCY, JOINTS, NUMERICAL ANALYSIS, OSCILLATION, STABILIZATION, STRUCTURES, VIBRATION, BEAMS(STRUCTURAL), SPACECRAFT, ANTENNA MASTS, COMPUTER AIDED DIAGNOSIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 196 9/5 20/12

MARYLAND UNIV COLLEGE PARK DEPT OF ELECTRICAL ENGINEERING

(U) Repetitive Opening Switches Using Optically Activated Semiconductors.

DESCRIPTIVE NOTE: Final technical rept. 1 Sep 84-31 Aug 87,

OCT 87 58P

PERSONAL AUTHORS: Lee, Chi H.; Rhee, Moon-Jhong

CONTRACT NO. AFOSR-84-0359

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR TR-87-1995

UNCLASSIFIED REPORT

ABSTRACT: (U) This is the final technical report for a research program to study repetitive opening switches using optically activated semiconductors. This program was funded by the Air Force Office of Scientific Research for the period September 1, 1984 to August 31, 1987 under Grant No. AFOSR-84-0359. The goal of this research was to study opening switch characteristics of various semiconductors in conjunction with inductive energy storage systems.

DESCRIPTORS: (U) *ENERGY STORAGE, *OPENING(PROCESS), *SEMICONDUCTORS, *SWITCHES, INDUCED ENVIRONMENTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A7.

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AD-A190 194 12/3 5/1

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Diffusion Approximations and Nearly Optimal Maintenance Policies for System Breakdown and Repair Problems,

JUL 87 40P

PERSONAL AUTHORS: Kushner, Harold J.

REPORT NO. LCDS/CCS-87-31

CONTRACT NO. AFOSR-85-0315

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-87-1991

UNCLASSIFIED REPORT

ABSTRACT: (U) We consider the problem of service deterioration and maintenance when there are only small statistical differences in the quality (or time required) of each produced item when the system is in the different states of deterioration, but where those marginal differences are economically important. This is somewhat analogous to the situation in the modelling of queues in heavy traffic, where the main effects which are dealt with might also be considered to be 'marginal' ones. In our cases, the production of each item takes a random length of time and the deterioration during any production or sampling period can have a fairly general (and state dependent) statistical relation with this time and with the quality of the production. Due to this generality, there are several continuous parameter interpolations (of the sequence of conditional probabilities of the system states, given the observed data) which are appropriate for purposes of the weak convergence, each with its own advantages. (One can work with the 'natural time scales' of the deterioration process, or with that of the sampling process, or with something in between). The diffusion process limit is obtained when the random sequences (time, quality) are appropriately correlated. The limit process is of the

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form of a filtering problem for white noise corrupted observations of a function of a Markov chain, but the limit problem is somewhat non-standard since the effective noise covariance and the signal part of the effective observation might depend on the current conditional probability, due to the nature of the 'scaling'.

DESCRIPTORS: (U) *MAINTENANCE MANAGEMENT, *STATISTICAL ANALYSIS, APPROXIMATION(MATHEMATICS), COVARIANCE, DETERIORATION, DIFFUSION, FILTERS, MAINTENANCE, MARKOV PROCESSES, NOISE, OPTIMIZATION, POLICIES, PRODUCTION, QUALITY, REPAIR, SAMPLING, SCALE, SEQUENCES, TIME, WEAK CONVERGENCE, WHITE NOISE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A190 193 20/12

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Ion Beam Enhanced Grain Growth in Thin Films,

87 11P

PERSONAL AUTHORS: Atwater, Harry A.; Thompson, Carl V.; Smith, Henry I.

CONTRACT NO. AFOSR-85-0154

PROJECT NO. 2308

TASK NO. B2

MONITOR: AFOSR TR-87-1875

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Mat. Res. Soc. Symp. Proc., v74 p499-504 1987.

ABSTRACT: (U) Ion beam enhanced grain growth has been investigated in thin films of germanium. Grain boundary mobilities are greatly enhanced over their thermal equilibrium values and exhibit a very weak temperature dependence. We propose that defects which are generated by the ion beam at or near the grain boundary are responsible for the boundary mobility enhancement. Films of Ge deposited under different conditions, either unsupported or on thermally oxidized silicon exhibit similar normal grain growth enhancement when implanted with 50 keV Ge+. Beam-enhanced grain growth in Ge was also demonstrated using Xe+, Kr+, and Ar+ ions. The variation in growth enhancement with projectile ion mass is in good agreement with the enhanced Frenkel defect population calculated using a modified Kinchin-Pease formula and Monte Carlo simulation of ion transport in thin films. Calculations based on experiments suggest that there is approximately one atomic jump across th grain boundary per defect generated. Also, the grain growth rate for a given beam-generated defect concentration near the boundary is approximately equal to the expected growth rate for the same defect concentration if thermally generated.

DESCRIPTORS: (U) *GERMANIUM, *GRAIN GROWTH,

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*SEMICONDUCTING FILMS, BOUNDARIES, GRAIN BOUNDARIES, GROWTH(GENERAL), HEAT, ION BEAMS, ION EXCHANGE, LOW STRENGTH, MASS, MOBILITY, MONTE CARLO METHOD, OPTIMIZATION, OXIDATION, PROJECTILES, RATES, SILICON, SIMULATION, TEMPERATURE, THERMAL STABILITY, THIN FILMS, REPRINTS, XENON, KRYPTON, ARGON.

IDENTIFIERS: (U) Frenkel defects, Kinchin pease formula, PE61102F, WUAFOSR2306B2.

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AD-A190 169 9/1 20/3

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF ELECTRICAL AND COMPUTER ENGINEERIN G

(U) High Density Ion Implanted Contiguous Disk Bubble Technology.

DESCRIPTIVE NOTE: Annual scientific rept. no. 1, 30 Sep 86-29 Sep 87,

OCT 87 267P

PERSONAL AUTHORS: Kryder, M. H.; Greve, D. W.; Guzman, A.; Jo, S. C.; Ramesh, M.

CONTRACT NO. AFOSR-84-0341

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR TR-87-2044

UNCLASSIFIED REPORT

ABSTRACT: (U) During the past year we have advanced the state-of-the-art in several areas of magnetic bubble technology. The main thrust of our research has been to advance ion implanted contiguous disk devices because these devices offer order of magnitude higher bit density than presently manufactured bubble devices. We succeeded in several regards. Noteworthy accomplishments include demonstration of bubble propagation in devices having 4 sq micron bit cells and exhibiting operating margins equal to those of today's manufactured devices. These devices were demonstrated to operate from 0 C to 120 C, the limits of our present testing capabilities. A major factor in this success was our development of new epitaxial garnet materials which exhibited isotropic magnetostrictive properties -- a feature previously not obtained. In addition to the work on bubble propagation we made significant progress on demonstrating a fully operational contiguous disk chip, complete with bubble generators, transfer gates and stretcher/detectors. All components have now been demonstrated to operate with good overlapping margins and a complete chip has been designed and fabricated. We are in the process of testing it.

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DESCRIPTORS: (U) *BUBBLE MEMORIES, *DETECTORS, *DISKS, *EPITAXIAL GROWTH, *GENERATORS, *IONS, *MAGNETIC FIELDS, *MAGNETOSTRICTION, *PROPAGATION, BUBBLES, CHIPS(ELECTRONICS), DEMONSTRATIONS, GARNET, GATES(CIRCUITS), HIGH DENSITY, ISOTROPISM, STRETCHERS, TRANSFER.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305C1.

AD-A190 149 12/1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Research on Algebraic Manipulation.

DESCRIPTIVE NOTE: Final rept. 1 Sep 85-31 Aug 86,

APR 87 3P

PERSONAL AUTHORS: Moses, Joel

CONTRACT NO. AFOSR-85-0264

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR TR-87-2039

UNCLASSIFIED REPORT

ABSTRACT: (U) The focus of this research was algebraic manipulation or symbolic computation as in MACSYMA. The dilogarithm function was studied to obtain methods for the integration of dilogs in closed form. The work points the way for a generalization of the concept of closed form solutions.

DESCRIPTORS: (U) *LOGARITHM FUNCTIONS, COMPUTATIONS, SYMBOLS, ALGEBRA, NUMERICAL INTEGRATION, IDENTITIES.

IDENTIFIERS: (U) *Dilogarithm functions, PE61102F, WUAFOSR2304A7.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 136 20/4

ARIZONA UNIV TUCSON

(U) Experimental Investigation of a Spanwise Forced Mixing Layer.

DESCRIPTIVE NOTE: Annual rept. 1 Jul 86-30 Jun 87,

NOV 87 39P

PERSONAL AUTHORS: Glezer, A.; Wygnanski, I. J.; Balsa, T. F.

CONTRACT NO. AFOSR-86-0324

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR
TR-87-1903

UNCLASSIFIED REPORT

ABSTRACT: (U) The occurrence of three-dimensional motion within a plane mixing layer results in a significant increase of the internal mixedness (mixing transition). The three-dimensional motion necessary for mixing is induced by streamwise, counter-rotating vortex pairs superimposed on the primary spanwise vortices. While their appearance in the plane mixing layer has been established, their origin and their evolution with increasing streamwise distance remains and enigma. Stability considerations indicate that an instability in the spanwise direction may lead to the generation of streamwise vorticity. This suggests that the flow may be susceptible to low level spanwise periodic forcing. Previous experiments have demonstrated that forcing allows the enhancement of individual instability modes and is an essential step towards understanding the evolution of the natural flow. Furthermore, application of forcing to the flow provides a powerful tool of considerable practical significance for the control of the downstream evolution. We have begun an experimental investigation of a plane mixing layer which is forced independently in the spanwise and streamwise directions. Our objective is to study the evolution of spanwise instability. Its role in the development of the plane mixing layer and possible interaction between the

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streamwise and spanwise instabilities. Forcing is applied by a spanwise line of discrete surface film heaters flush mounted on the flow partition. This technique enables us to study nonlinear interactions between various modes of spanwise and streamwise instabilities. Keywords: Mixing layer, Spanwise forcing, Coherent structures, Hotwires, Schlieren.

DESCRIPTORS: (U) *MIXING, *VORTICES, COHERENCE, COUNTERROTATION, EVOLUTION(GENERAL), INTERACTIONS, LAYERS, LOW LEVEL, NONLINEAR SYSTEMS, ORIENTATION(DIRECTION), RANGE(DISTANCE), STABILITY, STRUCTURES, TRANSITIONS, HOT WIRE ANEMOMETERS, SCHLIEREN PHOTOGRAPHY, FLOW VISUALIZATION, THREE DIMENSIONAL FLOW, FLOW SEPARATION.

IDENTIFIERS: (U) Mixing layers, PE61102F, WUAFOSR2307A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 134 12/4

UNIVERSITY OF SOUTHERN CALIFORNIA DOWNEY

(U) Multiobjective Hierarchical Decision Problems in C3, III.

DESCRIPTIVE NOTE: Final rept. 1 Jun 84-30 Jun 85,

JUN 85 4P

CONTRACT NO. F49620-84-C-0072

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1797

UNCLASSIFIED REPORT

ABSTRACT: (U) Two main lines of research were pursued under the support of this grant. The first one was the study of control laws in the presence of many controllers, each one of which has his own objective and information, the decisions of each one influence the information and objectives of the others and where the controllers ignore several of the parameters involved in the description of the system equation and objectives. The second one concerns two more classical game problem: the optimal shooting policy on a target that tries to escape, and the optimal flashing policies of two opponents involved in a duel. A total of 9 publications, and two invited talks were prepared acknowledging support of this grant.

DESCRIPTORS: (U) , CONTROL THEORY, DECISION MAKING, EQUATIONS, GAME THEORY, POLICIES, ADAPTIVE CONTROL SYSTEMS, OPTIMIZATION, COMMAND AND CONTROL SYSTEMS.

IDENTIFIERS: (U) C3(Command Control and Communications), PE61102F, WUAFOSR2304A5.

AD-A190 130 19/5 20/10 20/12

CALIFORNIA UNIV SAN DIEGO LA JOLLA

(U) Research on Materials and Components for Opto-Electronic Signal Processing and Computing.

DESCRIPTIVE NOTE: Interim rept. 1 Dec 86-30 Nov 87,

SEP 87 28P

PERSONAL AUTHORS: Chang, William S.; Nikki, Shigern; Van Eck, Timothy; Wieder, H. H.; Williams, Andrew

CONTRACT NO. AFOSR-84-0389

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR TR-87-1880

UNCLASSIFIED REPORT

ABSTRACT: (U) Electro-absorption and electro-refraction properties of strained multiple quantum-well structures (QW) in In(x)Ga(1-x)As/GaAs were investigated for spatial modulation applications. A new technique that will allow us to obtain large number of quantum well periods and large depth of modulation has been developed. Optical-optical interaction of a modulator-detector diode pair made form such QW structure had been demonstrated. Optimization of QW structure design has been investigated. Keywords include: III-V Compound Semiconductors, Electro-absorption, Electro-refraction, Quantum Wells, Spatial Light Modulation.

DESCRIPTORS: (U) *ELECTROOPTICS, *MODULATION, *QUANTUM ELECTRONICS, *SEMICONDUCTORS, *SIGNAL PROCESSING, DEPTH, LIGHT, MATERIALS, OPTIMIZATION, QUANTUM THEORY, SPATIAL DISTRIBUTION.

IDENTIFIERS: (U) WUAFOSR2305B1, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 117 12/2

MINNESOTA UNIV MINNEAPOLIS DEPT OF ELECTRICAL ENGINEERING

(U) Non-Euclidian Metrics and the Robust Stabilization of Systems with Parameter Uncertainty,

OCT 85 11P

PERSONAL AUTHORS: Khargonekar, Pramod P.; Tannenbaum, Allen

CONTRACT NO. DAAG29-81-K-0136, $AFOSR-85-0186

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-87-1993

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE (Institute of Electrical and Electronics Engineers) Transactions on Automatic Control, vAC-30 n10 p1005-1013 Oct 85.

ABSTRACT: (U) Abstract-This paper considers, from a complex function theoretic point of view, certain kinds of robust synthesis problems. In particular, we use a certain kind of metric on the disk (the hyperbolic metric) which allows us to reduce the problem of robust stabilization of systems with many types of real and complex parameter variations to an easily solvable problem in non-Euclidian geometry. It is shown that several apparently different problems can be treated in a unified general framework. A new result on the gain margin problem for multivariable plants is also given. Finally, we apply our methods to systems with real zero or pole variations.

DESCRIPTORS: (U) *CONTROL THEORY, GAIN, PARAMETERS, STABILIZATION SYSTEMS, SYNTHESIS, THEORY, VARIATIONS, REPRINTS, MULTIVARIATE ANALYSIS.

IDENTIFIERS: (U) Hyperbolic metric, Robust procedures, Nevanlinna pick method, WUAFOSR2304A1, PE61102F.

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AD-A190 116 7/4

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Photon Driven Charge Transfer Half-Collision: The Photodissociation of CO2.O2+ Cluster Ions with Resolution of the O2 Product Vibrational States,

SEP 87 11P

PERSONAL AUTHORS: Kim, Hyun-Sook; Kuo, Chau-Hong; Bowers, Michael T.

CONTRACT NO. AFOSR-86-0268

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-87-1996

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v87 n5 p2667-2676, 1 Sep 87.

ABSTRACT: (U) The photodissociation process is interesting, from a fundamental point of view, because it brings together the distinct but related phenomena of spectroscopy (photon absorption) and dynamics (subsequent dissociation). From a molecular dynamics point of view the dissociation process can be viewed as a half-collision, where the optical absorption process is used to prepare the complex for dissociation. The advantages of this method are first, control of the angular momentum and thus the impact parameter and, second, the collision geometry is defined by the structure of the complex that absorbs the photon. This process is intellectually related to both laser-induced charge exchange and attempts to directly observe properties of transition states of reactions. Both of these areas of research are currently of great interest. In this manuscript we are concerned with charge transfer half-collisions. The process is schematically represented in Fig.1. A loosely bound (A.BC+) complex absorbs a photon and undergoes intramolecular charge transfer to form (A+.BC). Carbon dioxide, Oxygen.

DESCRIPTORS: (U) *ABSORPTION, *CARBON DIOXIDE, *OXYGEN,

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*PHOTODISSOCIATION, *PHOTONS, *TRANSITIONS, ANGULAR MOMENTUM, CHARGE TRANSFER, COLLISIONS, DISSOCIATION, DYNAMICS, GEOMETRY, IMPACT, LASERS, MOLECULAR PROPERTIES, OPTICAL PROPERTIES, SPECTROSCOPY, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

AD-A190 115 14/2 12/6

STATE UNIV OF NEW YORK AT ALBANY RESEARCH FOUNDATION

(U) Enhancement of Data Acquisition and Numerical Computation Capabilities for Unsteady Fluid Dynamics.

DESCRIPTIVE NOTE: Final rept. 26 May 86-25 May 87,

OCT 87 4P

PERSONAL AUTHORS: George, William K.

CONTRACT NO. AFOSR-86-0209

PROJECT NO. 2917

TASK NO. A1

MONITOR: AFOSR
TR-87-1788

UNCLASSIFIED REPORT

ABSTRACT: (U) A significant improvement in the data acquisition and numerical computation capabilities of the Turbulence Research Laboratory was achieved by: 1) the upgrading of the data acquisition system to a PDP 11/84, 2) the addition of a micro VAX work station, and 3) the upgrading of the central computing array processor. All facilities are linked with Ethernet thereby providing for very high speed data links from the laboratory to the VAX Cluster and Array Processor. Also, the facilities are linked by NYSERNET (59k baud) to the NSF supercomputer network. Keywords: Turbulence free shear flows; Unsteady heat transfer; Gas turbines; Hypersonic vehicles.

DESCRIPTORS: (U) *DATA ACQUISITION, *DATA PROCESSING TERMINALS, *PARALLEL PROCESSORS, CENTRAL PROCESSING UNITS, COMPUTATIONS, FLOW, GAS TURBINES, HYPERSONIC VEHICLES, LABORATORIES, NUMERICAL METHODS AND PROCEDURES, OPTIMIZATION, PROCESSING EQUIPMENT, RESEARCH FACILITIES, SHEAR PROPERTIES, TURBULENCE, UNSTEADY FLOW, COMPUTER COMMUNICATIONS, COMMUNICATIONS NETWORKS.

IDENTIFIERS: (U) PDP-11/84 Computers, Nysernet networks, PE61102F, WUAFOSR2917A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A190 114 25/3 12/7

MASSACHUSETTS UNIV AMHERST

(U) Adaptive Neural Network Architecture.

DESCRIPTIVE NOTE: Final rept. 1 Aug 86-31 Jul 87,

OCT 87 4P

PERSONAL AUTHORS: Barto, Andrew

CONTRACT NO. AFOSR-86-0260

PROJECT NO. 2917

TASK NO. A4

MONITOR: AFOSR
TR-87-1789

UNCLASSIFIED REPORT

ABSTRACT: (U) Sun microsystems computer equipment acquired through Grant AFOSR-86-0260 is being used for research directed toward developing learning methods and architectures for artificial neural networks, or connectionist networks. The equipment is being used to simulate artificial neural networks implementing a variety of learning methods, including the Associative Reward-Penalty method and the Adaptive Critic Algorithm, as well as the error backpropagation method, and various combinations of these learning methods.

DESCRIPTORS: (U) *NEURAL NETS, ADAPTIVE SYSTEMS, ALGORITHMS, LEARNING, COMPUTER ARCHITECTURE, COMMUNICATIONS NETWORKS, COMPUTER COMMUNICATIONS, RESEARCH MANAGEMENT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A4.

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AD-A190 113 7/4 20/5

COLORADO UNIV AT BOULDER

(U) Chromatographic and Mass Spectrometric Separation and Analysis.

DESCRIPTIVE NOTE: Final scientific rept. 1 Apr 84-30 Jun 87,

DEC 87 8P

PERSONAL AUTHORS: Sievers, R. E.; Barkley, R. M.

CONTRACT NO. AFOSR-84-0093

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR
TR-87-1776

UNCLASSIFIED REPORT

ABSTRACT: (U) A final scientific report is given for research in the areas of chromatographic separations and mass spectrometry. A new porous polymer containing cobalt has been synthesized and characterized. It has been found to bind molecular oxygen reversibly. Additional characterization has been made of a symmetrical multidendate ligand, when chelated with a suitable metal ion, potentially may be a new shift reagent for nuclear magnetic resonance spectrometry. Tandem mass spectrometry has been investigated as a new means of characterize various metal chelates. Significant differences have been observed for fragment ions produced by collisionally activated dissociation compared to electron impact ionization. Chromium chelates of a beta-diketone have shown exceptional stability in chromatographic systems, yielding new procedures for separating various chromium species. Experiments with a supercritical fluid chromatograph have indicated the potential to use the device with selective chromatographic detectors and for separations that are difficult to effect by gas chromatography. Keywords: Selective sorbents, chromatographic phases, metal chelates NMR shift reagents, mass spectrometry, tandem mass spectrometry, supercritical fluid chromatography.

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DESCRIPTORS: (U) *CHROMATOGRAPHS, *MASS SPECTROMETRY, *NUCLEAR MAGNETIC RESONANCE, *POLYMERS, ACTIVATION, CHELATE COMPOUNDS, CHEMICAL AGENTS, CHROMATOGRAPHIC ANALYSIS, CHROMATOGRAPHY, CHROMIUM, DETECTORS, DISSOCIATION, ELECTRON IMPACT SPECTRA, IONIZATION, MOLECULAR PROPERTIES, POROUS MATERIALS, SPECTROMETRY.

IDENTIFIERS: (U) *Tandem Mass Spectrometry, PE61102F, WUAFOSR2303A1.

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WISCONSIN UNIV-MILWAUKEE DEPT OF PSYCHOLOGY

(U) Mechanisms Mediating the Perception of Complex Acoustic Patterns.

DESCRIPTIVE NOTE: Annual progress rept. 1 Aug 86-30 Jul 87,

AUG 87 6P

PERSONAL AUTHORS: Warren, Richard M.

CONTRACT NO. AFOSR-85-0260

PROJECT NO. 2313

TASK NO. A6

MONITCR: AFOSR TR-87-1430

UNCLASSIFIED REPORT

ABSTRACT: (U) Three studies dealing with perception of acoustic repetition for long-duration complex sounds have been completed. 1) Repetition of 'frozen' Gaussian noise can be detected for infratonal repetition frequencies from 1 Hz through 20 Hz (repetition frequencies above 20 Hz are tonal). Infratonal repetition might be perceived either through the detection of the reoccurrence of singularities within the acoustic pattern, or through a holistic recognition of the entire pattern. This investigation indicated that a holistic recognition of the complex sound is normally responsible for detection of periodicity. 2) Illusory continuity of interrupted tones (pulsation thresholds) have been used to study peripheral auditory mechanisms. The investigators found that illusory continuity also occurs in the infratonal range, requiring revision of the theories of basilar membrane mechanics based on the pulsation threshold paradigm. 3) The investigators demonstrated that 'frozen' noises repeated at infratonal frequencies at one ear (silence at the other ear) are detected by some listeners with much greater clarity than when the other ear receives the signal. Ear advantages of this nature have not been observed with other types of complex sounds, and this finding has some interesting implications for auditory theory. Keywords: Auditory perception;

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 112 CONTINUED

Infrasonic radiation.

DESCRIPTORS: (U) *AUDITORY PERCEPTION, ACOUSTICS, DETECTION, EAR, FREQUENCY, HEARING, INFRASONIC RADIATION, LONG RANGE(TIME), PATTERNS, PULSES, REPETITION RATE, SOUND, THEORY, THRESHOLD EFFECTS, HEARING, SOUND ANALYZERS, AUDITORY SIGNALS.

IDENTIFIERS: (U) Infratonal frequencies, PE61102F, WUAFOSR2313A8.

AD-A190 111 8/15 8/5

OESTERREICHISCHES FORSCHUNGSZENTRUM SEIBERSDORF G M B H VIENNA

(U) Animal Studies in the Mode of Action of Agents, That Are Antitransformers in Cell Cultures.

DESCRIPTIVE NOTE: Final rept. Jun 84-Aug 87,

OCT 87 114P

PERSONAL AUTHORS: Altmann, Hans

CONTRACT NO. AFOSR-84-390

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR TR-87-1909

UNCLASSIFIED REPORT

ABSTRACT: (U) The ost important results of the animal studies on the mode of action of the antitransformer DADH on short and long term experiments are the following: Combined treatment of DADH and gamma-irradiation generated a decreased incidence of malignant lymphoma compared to gamma-irradiation alone. DADH itself shows some carcinogenic properties. In short term experiments DADH has an immunoprotective effect with respect to gamma-irradiation: a. earlier reconstitution of lymphocyte subsets, b. increase in natural killer cell activity. Higher poly(ADP-ribose)-polymerase activity to a certain extent seems to control replicative DNA synthesis and specific DNA amplification determined by double minutes. Spleen cells with loss of DNArepair increased remarkably with age. At the same time lymphoma incidence is increasing. Nucleotide sedimentation studies showed an oversedimentation phenomena rather than DNA breaks during short and long term experiments, A certain correlation between basic UDS in spleen cells and the occurrance of lymphomas exists. Basic UDS was highest in the combined (gamma + DADH) group. But also after a single irradiation dose of 1 Gy basic UDS was elevated during the whole life time. Poly(ADP-ribose)-polymerase activity parallels athe poly(ADP-ribose) content in spleen and liver cells at the end of the life span of C57 bl mice.

AD-A190 112

AD-A190 111

AD-A190 111 CONTINUED

DESCRIPTORS: (U) *LYMPHOMAS, *CHEMOTHERAPY, *CHEMOTHERAPEUTIC AGENTS, AMPLIFICATION, BIOSYNTHESIS, CANCER, CARCINOGENS, CELLS(BIOLOGY), CULTURES(BIOLOGY), DEOXYRIBONUCLEIC ACIDS, IRRADIATION, LIFE SPAN(BIOLOGY), LIVER, LYMPHOCYTES, MICE, NUCLEOTIDES, SEDIMENTATION, SPLEEN, TIME, GAMMA RAYS, RADIATION DOSAGE.

IDENTIFIERS: (U) Killer cells(biology), *Antitransformers(biology), DADH(Haxane/N-N-Diacetyl-1-6-diamino), Ribose polymerases, PE61102F, WUAFOSR2312A5.

AD-A190 104 20/10 20/5

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Square-Well Potential by an Algebraic Approach,

DEC 88 7P

PERSONAL AUTHORS: Kais, S.; Levine, R. D.

CONTRACT NO. AFOSR-86-0011

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-87-1954

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review A, v34 n6 p4615-4620 Dec 86.

ABSTRACT: (U) This paper provides an algebraic approach to the celebrated quantum-mechanical problem of a particle in a box. There are two primary reasons for such a formulation. The first is that the potential and therefore the spectrum are quite anharmonic. Hence simpler algebraic techniques were the Hamiltonian is one of the group generators, which lead to, at best, a quasiharmonic spectrum, will just not work for this potential. Systematic methods are, in principle, available for handling anharmonic systems. Also, model algebraic Hamiltonians which are bilinear in the generators have recently been extensively employed in both nuclear and molecular physics. It is therefore of interest to see whether these techniques will work for this benchmark problem.

DESCRIPTORS: (U) *MOLECULAR STRUCTURE, *NUCLEAR PHYSICS, *QUANTUM THEORY, ALGEBRA, HAMILTONIAN FUNCTIONS, PARTICLES, REPRINTS, POTENTIAL THEORY, SCATTERING.

IDENTIFIERS: (U) Square well potential, Anharmonic potentials, PE61102F, WUAFOSR2303B3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 103 12/3

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) On the Group-Theoretical Formulation for the Time Evolution of Stochastic Processes,

87 21P

PERSONAL AUTHORS: Levine, R. D.; Wulfman, C. E.

CONTRACT NO. AFOSR-86-0011

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-87-1863

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physica, v141A p489-508 1987.

ABSTRACT: (U) The temporal evolution of stochastic processes is described using a one-parameter group with time as the parameter. The generator of the group is a first order differential operator. This generator determines the time rate of change of physical variables. If these variables are the probabilities of the different possible states of the system then their equation of motion is exactly equivalent to the master equation. However, the very same equation of motion is equally valid for other variables such as expectation values or, in general, functions of the probabilities. The introduction of an equation of motion which is linear in the generators of the group provides a very convenient algebraic tool. For example, constants of the motion and symmetries of dissipative processes can readily be discussed. For many physical situations, a smaller subgroup suffices to describe the time evolution. The formalism is illustrated for two models of energy relaxation by binary collisions in the gas phase. While the models are valid for complementary physical situations, they have a common (two generators) group structure.

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, ALGEBRA, CONSTANTS, DIFFERENTIAL EQUATIONS, DISSIPATION, ENERGY, EQUATIONS OF MOTION, EVOLUTION(GENERAL), MOTION,

AD-A190 103 CONTINUED

OPERATORS(MATHEMATICS), RATES, RELAXATION, SYMMETRY, TIME, VAPOR PHASES, VARIABLES, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

AD-A190 103

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A190 102 11/2

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MATERIALS SCIENCE AND ENGINEERIN G

(U) Crystallization Behavior of Sol-Gel Derived Glasses,

86 8P

PERSONAL AUTHORS: Zelinski, B. J.; Fabes, B. D.; Uhlmann, D. R.

CONTRACT NO. AFOSR-85-0026

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-87-1874

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Non-Crystalline Solids, v82 p307-313 1986.

ABSTRACT: (U) The synthesis of cordierite and anorthite by an all-alkoxide route has been demonstrated. Amorphous gel-derived anorthite powders are shown to exhibit crystallization behavior similar to that of melt-derived glasses. Crystallization of amorphous gel-derived cordierite powders takes place by the formation of a transient, metastable stuffed beta-quartz phase, which converts to cordierite at higher temperatures - similar to the sequence of phase development in melt-derived glasses which are close to cordierite in composition.

DESCRIPTORS: (U) *GLASS, CRYSTALLIZATION, MINERALS, POWDERS, SYNTHESIS(CHEMISTRY), ALUMINUM, MAGNESIUM, CALCIUM, GELS, HEAT OF REACTION, X RAY DIFFRACTION, REPRINTS.

IDENTIFIERS: (U) Cordierite, Anorthite, Tetraelhyl Orthosilicate, PE61102F, WUAFOSR2303A3.

AD-A190 102

AD-A190 101 21/2

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Basic Instability Mechanisms in Chemically Reacting Subsonic and Supersonic Flows.

DESCRIPTIVE NOTE: Annual technical rept. 30 Sep 86-29 Sep 87,

OCT 87 30P

PERSONAL AUTHORS: Toong, Tau-Yi

CONTRACT NO. AFOSR-83-0373

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-87-1889

UNCLASSIFIED REPORT

ABSTRACT: (U) The nature of turbulence-combustion interactions was examined by the use of simultaneous dual-thermocouple velocity and LDV-thermocouple measurements, which showed that the presence of the high-frequency velocity (in a direction normal to the flame brush) and temperature fluctuations within slowly drifting turbulent premixed V-flames was associated with changes in the flame shapes, thicknesses, and propagation speeds. Unlike the RMS normal-velocity fluctuations which assumed maximum values within the reaction zone, the RMS tangential-velocity fluctuations remained almost constant, implying that the flame-generated turbulence was in the normal direction. Furthermore, cross-correlation coefficients of simultaneous velocity and temperature fluctuations remained positive within the flame, with values involving normal velocities higher than those involving tangential components. Keywords: Turbulence, Combustion interactions, Instability mechanisms, Dist turbulent flames.

DESCRIPTORS: (U) *COMBUSTION, *TURBULENCE, *COMBUSTION STABILITY, *FLAME PROPAGATION, COEFFICIENTS, CROSS CORRELATION, FLAMES, HIGH FREQUENCY, INTERACTIONS, SHAPE, STABILITY, SUBSONIC FLOW, SUPERSONIC FLOW, SYNCHRONISM, TANGENTS, TEMPERATURE, THICKNESS, VARIATIONS, VELOCITY,

AD-A190 101

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 101 CONTINUED

OPTICAL DETECTORS, LASER VELOCIMETERS, DOPPLER EFFECT.

IDENTIFIERS: (U) Turbulent combustion, PE61102F, WUAFOSR2308A2.

AD-A190 100 11/2

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Fluoride Glasses from Sol Gels.

DESCRIPTIVE NOTE: Final rept.,

SEP 88 7P

PERSONAL AUTHORS: Uhlmann, D. R.

CONTRACT NO. AFOSR-85-0325

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-87-1726

UNCLASSIFIED REPORT

Availability: Document partially illegible.

ABSTRACT: (U) The use of sol-gel coatings to strengthen oxide glasses has been demonstrated for the case of fused silica. Increases in strength to as much as 2.2 times the strength of uncoated glass have been obtained. The strengthening does not involve the annealing of surface microcracks, but rather the filling-in of such flaws. The strengthening does not depend on coating thickness over the range 2000-10000 Angstroms, but does depend significantly upon the state of hydrolysis of the substrate surface.

DESCRIPTORS: (U) *FLUORIDES, *GLASS, ANNEALING, COATINGS, FUSED SILICA, GELS, HYDROLYSIS, MICROCRACKING, OXIDES, STRENGTH(GENERAL), SUBSTRATES, SYNTHESIS(CHEMISTRY), ZIRCONIUM, BARIUM, LANTHANUM, ALUMINUM, POTASSIUM, MICROSTRUCTURE, PHASE TRANSFORMATIONS.

IDENTIFIERS: (U) *Sol Gels, Zirconium isopropoxide, PE61102F, WUAFOSR2303A3.

AD-A190 099 11/2

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Microstructure of Ceramics Derived from Organo-Metallic Polymers.

DESCRIPTIVE NOTE: Final rept.,

MAR 88 28P

PERSONAL AUTHORS: Uhlmann, D. R.

CONTRACT NO. AFOSR-85-0026

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-87-1727

UNCLASSIFIED REPORT

ABSTRACT: (U) Work during the present period of the grant has been directed to two principal areas: Microstructure of Epoxy Resins; and Ceramics from Organometallic Polymers. The former area of research was substantially completed during the present year; and future attention will be focused on the chemical and kinetic aspects of wet chemical processing of ceramic materials.

DESCRIPTORS: (U) *CERAMIC MATERIALS, *MICROSTRUCTURE, CHEMICALS, EPOXY RESINS, ORGANOMETALLIC COMPOUNDS, POLYMERS, PROCESSING, KINETICS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A190 078 12/3 6/11

OHIO STATE UNIV COLUMBUS

(U) A Comparison of Several Methods of Estimating the Survival Function When There Is Extreme Right Censoring.

DESCRIPTIVE NOTE: Journal artical 1 Oct 85-31 Oct 86,

MAR 85 8P

PERSONAL AUTHORS: Moeschberger, M. L.; Klein, John P.

CONTRACT NO. AFOSR-82-0307

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1957

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Biometrics, v41 p253-259 Mar 85.

ABSTRACT: (U) When there is extreme censoring on the right, the Kaplan-Meier product-limit estimator is known to be a biased estimator of the survival function. Several modifications of the Kaplan-Meier estimator are examined and compared with respect to bias and mean squared error. In human and animal survival studies, as well as in life-testing experiments in the physical sciences, one method of estimating the underlying survival distribution (or the reliability of a piece of equipment) which has received widespread attention is the Kaplan-Meier product-limit estimator (Kaplan and Meier, 1958). For the situation in which the longest time an individual is in a study (or on test) is not a failure time, but rather a censored observation, it is well known that there are many complex problems associated with any statistical analysis (Lagakos, 1979). In particular, the Kaplan-Meier product-limit estimator is biased on the low side (Gros and Clark, 1975). In the case of many censored observations larger than the largest observed failure time, the bias tends to be worse. Estimated mean survival time and selected percentiles, as well as other quantities dependent on knowledge of the tail of the

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 078 CONTINUED

survival function, will also exhibit such biases.

DESCRIPTORS: (U) *STATISTICAL ANALYSIS, *SURVIVAL(GENERAL), *SURVIVAL(PERSONNEL), *MATHEMATICAL MODELS, *TOXICOLOGY, ANIMALS, BIAS, DISTRIBUTION, ESTIMATES, FAILURE, LIFE TESTS, MEAN, PHYSICAL SCIENCES, RELIABILITY, REPRINTS, TIME, PROBABILITY DENSITY FUNCTIONS, STATISTICAL INFERENCE, RANK ORDER STATISTICS, PROBABILITY, CARCINOGENS, NEOPLASMS.

IDENTIFIERS: (U) Censoring, Kaplan-Meier.

AD-A190 078 12/8 20/8 14/2

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF ELECTRICAL ENGINEERING

(U) Study of Microcomputer-Based Real-Time Programmable Optical Signal Processor and Application.

DESCRIPTIVE NOTE: Final rept. 1 Aug 86-30 Sep 87,

NOV 87 129P

PERSONAL AUTHORS: Yu, Francis T.

CONTRACT NO. AFOSR-86-0264

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR TR-87-1802

UNCLASSIFIED REPORT

ABSTRACT: (U) We have, in this period, developed a microcomputer-based optical linear transformation processing technique. The technique utilizes a systolic array processing method to perform various types of linear transformations, such as discrete Fourier transformation, discrete Hilbert transformation, discrete chirp-Z transformation and many others. By partially parallel addressing two magneto-optic spatial light modulators (MOSLM), this proposed system would offer high speed and parallel processing capability of optics and programmability of microcomputer. In this research, we have shown that a color liquid crystal television (LCTV) can be used for color pattern recognition. The grid structure of the display panel together with a specially designed color filter provides spatially isolated polychromatic spectra to enable polychromatic signal detection. We have found a serious drawback of the color LCTV which is the lack of space invariance, even after it has been immersed in a liquid gate. This drawback is primarily due to the inherent color filter in the liquid crystal display and the phase modulation by liquid crystal molecules. A quantitative investigation of space variance of the LCTV, especially the color LCTV, is currently being studied.

AD-A190 078

AD-A190 078

AD-A190 076 CONTINUED

DESCRIPTORS: (U) *COLOR TELEVISION, *LIQUID CRYSTALS, *MICROCOMPUTERS, *OPTICS, *PANELS, *PARALLEL PROCESSING, *PATTERN RECOGNITION, *PHASE MODULATION, *TRANSFORMATIONS(MATHEMATICS), CHIRP RADAR, COLORS, DETECTION, DISCRETE FOURIER TRANSFORMS, FILTERS, FOURIER TRANSFORMATION, GATES(CIRCUITS), GRIDS, ISOLATION, LINEAR SYSTEMS, LIQUIDS, MOLECULES, SIGNALS, SPECTRA, TRANSFORMATIONS.

AD-A190 075 12/3

OHIO STATE UNIV COLUMBUS

(U) Consequences of Departures from Independence in Exponential Series Systems.

DESCRIPTIVE NOTE: Jnl. article 1 Oct 85-31 Oct 86,

AUG 84 9P

PERSONAL AUTHORS: Moeschberger, M. L.; Klein, John P.

CONTRACT NO. AFOSR-82-0307

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1956

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Technometrics, v28 n3 p277-284 Aug 84.

ABSTRACT: (U) This article investigates the consequences of departures from independence when the component lifetimes in a series system are exponentially distributed. Such departures are studied when the joint distribution is assumed to follow a Gumbel bivariate exponential model. Two distinct situations are considered. First, in theoretical modeling of series systems, when the distribution of the component lifetimes is assumed, one wishes to compute system reliability and mean system life. Second, errors in parametric and nonparametric estimation of component reliability and component mean life are studied based on life-test data collected on series systems when the assumption of independence is made erroneously. Systems with two components are studied. Keywords: Competing risks; Component life; Modeling series systems; Robustness studies; System reliability; Gumbel bivariate exponential; Reprints.

DESCRIPTORS: (U) *SERIES(MATHEMATICS), *EXPONENTIAL FUNCTIONS, DISTRIBUTION, ESTIMATES, LIFE TESTS, NONPARAMETRIC STATISTICS, PARAMETRIC ANALYSIS, RELIABILITY, REPRINTS, THEORY, MATHEMATICAL MODELS, BIVARIATE ANALYSIS, BIAS.

AD-A190 076

AD-A190 075

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 072 20/7

NATIONAL BUREAU OF STANDARDS GAITHERSBURG MD

(U) Proceedings of the IEEE Particle Accelerator Conference: Accelerator Engineering and Technology Held in Washington, DC on March 16-19, 1987. Volume 3.

DESCRIPTIVE NOTE: Final rept. 1 Feb-30 Sep 87,

87 691P

PERSONAL AUTHORS: Lindstrom, Eric R.; Taylor, Louise S.

CONTRACT NO. AFOSR-ISSA-87-0007

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR TR-88-0003

UNCLASSIFIED REPORT

Availability: IEEE Service Center, 445 Hoes Lane, Picataway, NJ 08854, HC $140.00, No copies furnished by DTIC/NTIS.

SUPPLEMENTARY NOTE: See also Volume 1, AD-A190 070.

ABSTRACT: (U) Contents: Accelerator Technology; and Accelerator Applications.

DESCRIPTORS: (U) *PARTICLE ACCELERATORS, *PARTICLE ACCELERATOR COMPONENTS, ENGINEERING, SYMPOSIA, MAGNETS, SUPERCONDUCTORS, PROTON ACCELERATORS, PARTICLE BEAM WEAPONS, CONTROLLED NUCLEAR FUSION, QUADRUPOLE MOMENT, RADIOFREQUENCY POWER.

IDENTIFIERS: (U) SSC(Superconducting Super Collider), Strategic defense initiative, PE61102F, WUAFOSR2301A8.

AD-A190 071 20/7

NATIONAL BUREAU OF STANDARDS GAITHERSBURG MD

(U) Proceedings of the IEEE Particle Accelerator Conference: Accelerator Engineering and Technology Held in Washington, DC on March 16-19, 1987. Volume 2.

DESCRIPTIVE NOTE: Final rept. 1 Feb-30 Sep 87,

87 702P

PERSONAL AUTHORS: Lindstrom, Eric R.; Taylor, Louise S.

CONTRACT NO. AFOSR-ISSA-87-0007

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR TR-88-0002

UNCLASSIFIED REPORT

Availability: IEEE Service Center, 445 Hoes Lane, Picataway, NJ 08854, HC $140.00, No copies furnished by DTIC/NTIS.

SUPPLEMENTARY NOTE: See also Volume 2, AD-A190 072.

ABSTRACT: (U) Contents: Instrumentation and Control; Accelerators for Medium Energies and Nuclear Physics; High Current Accelerators; and Beam Dynamics.

DESCRIPTORS: (U) *PARTICLE ACCELERATORS, *PARTICLE ACCELERATOR COMPONENTS, DYNAMICS, ENERGY, HIGH POWER, NUCLEAR PHYSICS, SYMPOSIA, CONTROL SYSTEMS, PROTON ACCELERATORS, BEAM STEERING, QUADRUPOLE MOMENT, ELECTRON ACCELERATORS, ELECTRON OPTICS, BREMSSTRAHLUNG.

IDENTIFIERS: (U) SPS(Super Proton Synchrotrons), Storage rings, Hamilton Jacobi method, LEP accelerator, PE61102F, WUAFOSR2301A8.

AD-A190 070 20/7

NATIONAL BUREAU OF STANDARDS GAITHERSBURG MD

(U) Proceedings of the IEEE Particle Accelerator Conference: Accelerator Engineering and Technology Held in Washington, DC on March 16-19, 1987. Volume 1.

DESCRIPTIVE NOTE: Final rept. 1 Feb-30 Sep 87,

87 745P

PERSONAL AUTHORS: Lindstrom, Eric R.; Taylor, Louise S.

CONTRACT NO. AFOSR-ISSA-87-0007

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR TR-88-0001

UNCLASSIFIED REPORT

Availability: IEEE Service Center, 445 Hoes Lane, Picataway, NJ 08854, HC $140.00, No copies furnished by DTIC/NTIS.

SUPPLEMENTARY NOTE: See also Volume 2, AD-A190 071.

ABSTRACT: (U) Contents: High Energy Accelerators, Colliders, Novel Methods; Free Electron Lasers; Low Energy Accelerators and Ion Sources; Synchrotron Light Sources, Radiation Sources; and Instrumentation and Control.

DESCRIPTORS: (U) *PARTICLE ACCELERATORS, *PARTICLE ACCELERATOR COMPONENTS, FREE ELECTRON LASERS, HIGH ENERGY, ION SOURCES, LIGHT SOURCES, LOW ENERGY, RADIATION, SOURCES, SYMPOSIA, SYNCHROTRONS, ELECTRON ACCELERATORS, LINEAR ACCELERATORS, ELECTRON OPTICS, MAGNETS, SUPERCONDUCTORS, QUADRUPOLE MOMENT, PROTON ACCELERATORS.

IDENTIFIERS: (U) Synchrotron radiation, Tevatron collider accelerator, SPS(Super Proton Synchrotron), PE61102F, WUAFOSR2301A8.

AD-A190 070

AD-A190 044 12/4

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION AND DECISION SYSTEMS

(U) Multiple Time Scale Analysis of Manufacturing Systems.

DESCRIPTIVE NOTE: Technical rept.,

DEC 87 13P

PERSONAL AUTHORS: Willsky, Alan S.; Caromicoli, Adam; Gershwin, Stanley B.

REPORT NO. LIDS-P-1727

CONTRACT NO. AFOSR-88-0032

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-88-0183

UNCLASSIFIED REPORT

ABSTRACT: (U) In this paper the authors use results on the aggregation of singularly perturbed Markov chains to analyze manufacturing systems. The basis for this analysis is the presence in the system of events and processes that occur at markedly different rates -- operations of machines, set-ups, failures, and repairs, etc. The result of the analysis is a set of models, each far simpler that the full model, describing system behavior over different time horizons. In addition, this document presents a new theoretical result on the computation of asymptotic rates of particular events in perturbed Markov processes, where an event may correspond to the occurrence of the one several transitions in the process. We may apply this result to compute effective production rates at different time scales, taking into account the occurrence of setups and failures.

DESCRIPTORS: (U) *MARKOV PROCESSES, *SYSTEMS ENGINEERING, MACHINES, MANUFACTURING, PERTURBATIONS, PRODUCTION RATE, REPAIR, SCALE, TIME, TIME SERIES ANALYSIS, MATHEMATICAL MODELS.

IDENTIFIERS: (U) Markov chains, Ergodic theory, PE61102F,

AD-A190 044

AD-A190 044 CONTINUED

WUAFOSR2304A1.

AD-A190 043 20/11

WISCONSIN UNIV-MADISON

(U) Instrumentation to Provide an Active Control Capability for Distributed Parameter Systems.

DESCRIPTIVE NOTE: Final rept. 30 Jul 86-27 Oct 87,

FEB 88 5P

PERSONAL AUTHORS: Russell, David

CONTRACT NO. AFOSR-86-0254

PROJECT NO. 2917

TASK NO. A5

MONITOR: AFOSR
TR-88-0164

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report describes the purpose and details of the equipment purchased under a University Research Instrumentation Program (URIP) grant. Equipment includes instruments for remote sensing of vibrations, for modal analysis of vibrating structures, and for active vibration suppression of viscoelastic beams.

DESCRIPTORS: (U) *INSTRUMENTATION, *REMOTE DETECTORS, *STRUCTURES, *VIBRATION, CONTROL, DISTRIBUTION, UNIVERSITIES.

IDENTIFIERS: (U) WUAFOSR2917A5, PE61102F.

AD-A190 042 7/3

NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) New Approaches to the Synthesis of Novel Organosilanes.

DESCRIPTIVE NOTE: Final rept. 1 Nov 83-31 Oct 87,

JAN 88 21P

PERSONAL AUTHORS: Boudjouk, Philip

CONTRACT NO. AFOSR-84-0008

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0178

UNCLASSIFIED REPORT

ABSTRACT: (U) The objectives of this program for the period 11/1/84 - 10/31/87 were 1) to continue to extend our research on ultrasonically accelerated reaction; 2) to continue to develop the new chemistry for low temperature generated silylenes containing large groups on the silicon atom; 3) to develop routes to silylenium ions in solution and investigate their chemistry; 4) to develop the chemistry of spiropentasilane derivatives; 5) to initiate programs in the syntheses of novel silicon-chalcogenide and silicon-transition metal compounds; and, 6) to investigate the electrochemistry of functionalized organosilanes. In this report we summarize the results obtained in trying to meet these objectives. Keywords: Ultrasound, Sonochemistry, Silicon, Organosilanes, Organoselenium, Hydrosilation, Silylenes, Silacenium.

DESCRIPTORS: (U) *ORGANIC COMPOUNDS, *SILANES, *SILICON, ACCELERATED TESTING, ATOMS, CHEMISTRY, ELECTROCHEMISTRY, IONS, RESPONSE, SYNTHESIS(CHEMISTRY).

IDENTIFIERS: (U) WUAFOSR2302B2, PE61102F.

AD-A190 041 7/4

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Sequential Excitation Preparation of Molecular Energy Levels with Special Structural and Chemical Properties.

DESCRIPTIVE NOTE: Final rept. 1 Oct 84-31 Oct 87,

DEC 87 28P

PERSONAL AUTHORS: Field, Robert W.; Kinsey, James L.

CONTRACT NO. AFOSR-85-0381

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-88-0166

UNCLASSIFIED REPORT

ABSTRACT: (U) Research Objectives: (1) Apply the Stimulated Emission Pumping (SEP) technique to highly excited vibrational levels of H2CO and D2CO. (2) Discover whether the rotation-vibration levels of H2CO/D2CO remain well organized at chemically significant levels of vibrational excitation. (3) Develop new multiple resonance spectroscopic techniques capable of measuring rotational energy transfer rates (RET) in highly excited vibrational levels of H2CO. (4) Develop statistical diagnostics for quantum ergodicity which are applicable to real SEP spectra of H2CO/D2CO. Keywords: Spectroscopy, Vibrational structure, Optical-optical double resonance, Molecular dynamics, Anharmonic vibrational constants, Electric dipole moment, Coriolis perturbations.

DESCRIPTORS: (U) *CHEMICAL PROPERTIES, *DIAGNOSIS(GENERAL), *MOLECULAR ENERGY LEVELS, *MOLECULAR PROPERTIES, *VIBRATION, CONSTANTS, CORIOLIS EFFECT, DIPOLES, DYNAMICS, ELECTRIC MOMENTS, EMISSION, ERGODIC PROCESSES, EXCITATION, PERTURBATIONS, PREPARATION, PUMPING, QUANTUM THEORY, SEQUENCES, SPECTROSCOPY, STATISTICS, STIMULATION(GENERAL), STRUCTURAL PROPERTIES.

IDENTIFIERS: (U) WUAFOSR2303B1, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 040 20/6 20/10

PURDUE RESEARCH FOUNDATION LAFAYETTE IN

(U) Theory of Interactions of Intense Light with Nonlinear, Inhomogeneous, and Periodic Structures and Its Applications to Optical Bistability, Optic Gyroscopes, Nonlinear Spectroscopy, Radiation Protection, X-Ray Emission, and Related Fields.

DESCRIPTIVE NOTE: Final rept. 1 Nov 84-31 Aug 87,

OCT 87 14P

PERSONAL AUTHORS: Kaplan, Alexander E.

CONTRACT NO. AFOSR-85-0006

PROJECT NO. 2305

TASK NO. B2

MONITOR: AFOSR
TR-88-0162

UNCLASSIFIED REPORT

ABSTRACT: (U) During the grant period, a number of new theoretical results were obtained in the field of nonlinear optics and quantum electronics. Progress was made in the search of novel principles and effects in the field of superfast optical switching, optical bistability, new sources of X-ray radiation, optic gyroscopes, general nonlinear optics, as well as in the development of a new fundamental field of quantum and nonlinear optics of single particles.

DESCRIPTORS: (U) *QUANTUM ELECTRONICS, *QUANTUM THEORY, *OPTICAL SWITCHING, *OPTICAL EQUIPMENT, EMISSION, GYROSCOPES, INTENSITY, LIGHT, NONLINEAR SYSTEMS, OPTICS, PARTICLES, RADIATION, RADIATION PROTECTION, SPECTROSCOPY, STRUCTURES, X RAYS, BISTABLE DEVICES, FAR ULTRAVIOLET RADIATION.

IDENTIFIERS: (U) Four wave mixing, Nonlinear optics, *Quantum optics, Optical bistability, Superlattices, WUAFOSR230582, PE61102F.

AD-A190 040

AD-A190 039 11/4

UTAH UNIV SALT LAKE CITY DEPT OF MECHANICAL AND INDUSTRIAL ENGINEERING

(U) An Investigation of the Failure Response of Laminates under Biaxial Stress.

DESCRIPTIVE NOTE: Final rept. 1 Apr 86-31 Mar 87,

SEP 87 34P

PERSONAL AUTHORS: Swanson, Stephen R.

CONTRACT NO. AFOSR-86-0115

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFOSR
TR-88-0194

UNCLASSIFIED REPORT

ABSTRACT: (U) Advanced fiber composites are often used in laminate form in strength critical applications. However the ultimate strength of laminates is very poorly understood, primarily because of a lack of valid experimental data. A biaxial test specimen for laminates based on a tubular geometry was developed and used to determine the failure mechanics of two laminates. The results showed a failure process that includes matrix cracking, but this matrix cracking does not appear to directly affect fiber failure. Fiber failure in the laminate studied determines ultimate strength, and can be predicted based on either a maximum fiber stress of fiber strain criterion applied on a ply level. Keywords: Composite materials, Laminate failure, Biaxial stress.

DESCRIPTORS: (U) *FAILURE(MECHANICS), *FIBER REINFORCED COMPOSITES, BIAXIAL STRESSES, COMPOSITE MATERIALS, CRACKING(FRACTURING), EXPERIMENTAL DATA, FAILURE, FIBERS, LAMINATES, MATRIX MATERIALS, RESPONSE, STRENGTH(GENERAL), STRESSES, TUBULAR STRUCTURES, BIAXIAL STRESSES, MICROCRACKING, SYMPOSIA.

IDENTIFIERS: (U) Fiber failure, Matrix cracks, WUAFOSR2302B2, PE61102F.

AD-A190 039

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 038 20/12 9/1

STANFORD UNIV CA DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) Fundamental Studies of the Mechanical Behavior of Microelectronic Thin Film Materials.

DESCRIPTIVE NOTE: Annual rept. 1 Nov 86-31 Oct 87,

DEC 87 37P

PERSONAL AUTHORS: Nix, William D.

CONTRACT NO. AFOSR-86-0051

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR TR-88-0161

UNCLASSIFIED REPORT

ABSTRACT: (U) A fundamental program of research on the mechanical properties of microelectronic thin film materials is underway at Stanford University. The work is being supported under AFOSR Grant No. 86-0051. In this interim Scientific Report, some of the progress made during the second year of the program is reviewed. We have made rapid progress since starting this development of new experimental techniques for measuring mechanical properties of thin films. That work led to several publications and to an equal number of invited oral presentations, both of which are listed at the end of this report. Now much of our work involves the use of these techniques to study mechanical properties of thin film materials of interest in microelectronics.

DESCRIPTORS: (U) *MATERIALS, *MICROELECTRONICS, *THIN FILMS, EXPERIMENTAL DESIGN, MEASUREMENT, MECHANICAL PROPERTIES, METHODOLOGY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A1.

AD-A190 038

AD-A190 037 22/5 20/11

WEA CAMBRIDGE MA

(U) Wave Propagation and Dynamics of Lattice Structures.

DESCRIPTIVE NOTE: Final rept. 1 Sep 85-30 Sep 87,

OCT 87 40P

PERSONAL AUTHORS: Williams, James H., Jr

CONTRACT NO. F49620-85-C-0148

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR TR-88-0082

UNCLASSIFIED REPORT

ABSTRACT: (U) One of the most attractive structural configurations for large space structures (LSS) for outer space applications is the repetitive lattice concept. Achieving the operational requirements of such structures will necessitate considerable knowledge of the dynamics, control, materials and nondestructive evaluation (NDE) of these structural systems. Wave propagation analyses provide potentially valuable perspectives from which to consider this broad range of analysis, design and synthesis issues. The theoretical and experimental results of a two-year research program on the wave propagation and dynamics of LSS are briefly reviewed. Potential benefits of wave propagation analyses in the vibration, parameter identification, dynamic failure, control and NDE of lattice structures have been identified and are summarized in this report. Keywords include: Wave propagation, Dynamic failure, Lattice structures, and Large space structures.

DESCRIPTORS: (U) *DYNAMICS, *SPACE TECHNOLOGY, *WAVE PROPAGATION, *LATTICE DYNAMICS, BENEFITS, FAILURE, IDENTIFICATION, NONDESTRUCTIVE TESTING, OUTER SPACE, REQUIREMENTS, SPACECRAFT, STRUCTURAL PROPERTIES, STRUCTURES, VIBRATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B1.

AD-A190 037

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 036 12/1

WASHINGTON UNIV ST LOUIS MO DEPT OF SYSTEMS SCIENCE AND MATHEMATICS

(U) Development and Application of the p-Version of the Finite Element Method.

DESCRIPTIVE NOTE: Final rept. 30 Sep 85-30 Sep 87,

DEC 87 30P

PERSONAL AUTHORS: Katz, I. N.; Szabo, Barna A.; Greensfelder, A. P.

CONTRACT NO. AFOSR-82-0315

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-88-0149

UNCLASSIFIED REPORT

ABSTRACT: (U) The p-version of the finite element method is a new, important, computationally efficient, approach to finite element analysis. It is more robust than the conventional h-version and its rate of convergence, for domains with corners and for other singularity problems, is twice that of the h-version. Hierarchic elements which implement the p-version efficiently have been formulated so as to enforce C superscript 0 or C superscript 1 continuity in the planar case, and so as to enforce C superscript 0 continuity in three dimensions. Recent research accomplishments include: 1. Development of an algorithm that finds all roots of an analytic function in a finite domain. 2. Preprocessing procedures to restrict the search in unbounded domains which contain roots to bounded domains. 3. A reliable numerical argument principle algorithm to compute number of zeros within a closed contour. 4. Formulation of equations which determine the nature of stress singularity at a corner of a plate composed of n isotropic materials. All of the above are used in the extraction method for p-version finite element analysis of composite materials with corners.

DESCRIPTORS: (U) *FINITE ELEMENT ANALYSIS, ALGORITHMS,

AD-A190 036

AD-A190 036 CONTINUED

COMPOSITE MATERIALS, CONVERGENCE, EQUATIONS, EXTRACTION, FORMULATIONS, PREPROCESSING, RATES, STRESSES, EIGENVALUES.

IDENTIFIERS: (U) WUAFOSR2304A3, PE61102F.

AD-A190 036

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 035 20/5 7/4

COLORADO UNIV AT BOULDER

(U) Electronic Energy Transfer Processes in the Alkali/ Alkaline Earth Metal Vapors.

DESCRIPTIVE NOTE: Final rept. 5 Aug 84-15 Jan 88,

JAN 88 20P

PERSONAL AUTHORS: Leone, Stephen R.; Gallagher, Alan C.

CONTRACT NO. AFOSR-84-0272

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-88-0167

UNCLASSIFIED REPORT

ABSTRACT: (U) Collisional energy transfer rates from highly excited 1P states to nearby 3P, 1D, 3D, and F states of Ca and Sr and fine-structure mixing within the metastable 3P state of Sr have been studied. Several collisional and stimulated population-transfers between the lowest 1P, 3P, 1D, and 3D, states Sr have been isolated, and energy-pooling in collisions between pairs of these energy storage states has been studied. These processes interconnect the excited-state populations and produce energy leakage during high energy density storage in these metastable states. During the course of these studies, several multiphoton excitation and stimulated Raman population processes have been discovered. Cross sections for electronic state-changing collision. Large and remarkably selective alignment effects have been observed for energy transfer processes in both calcium and strontium upon collisions with rare gases and with some molecules revealing a new level of detail about the precise curve crossings and electronic potentials. Keywords: Electronic energy transfer, Laser, Alkali, Alkaline earth atoms, Metal vapor.

DESCRIPTORS: (U) *ALKALINE EARTH METALS, *ENERGY LEVELS, *ENERGY STORAGE, *ENERGY TRANSFER, *ATOMIC ENERGY LEVELS, COLLISIONS, CROSS SECTIONS, ELECTRON ENERGY, ELECTRONICS, EXCITATION, GRAPHS, HIGH DENSITY, HIGH ENERGY, LASERS,

AD-A190 035 CONTINUED

METAL VAPORS, METASTABLE STATE, PHOTONS, PRECISION, RAMAN SPECTRA, RARE GASES, STRONTIUM, ELECTRON DENSITY, NEODYMIUM LASERS, YAG LASERS, CALCIUM, STRONTIUM, HELIUM.

IDENTIFIERS: (U) *Electronic energy transfer, WUAFOSR2303B1, PE81102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 034 7/3 7/5 7/4 20/5

COLUMBIA UNIV NEW YORK

(U) Molecular Dynamics of Materials Possessing High Energy Content.

DESCRIPTIVE NOTE: Final rept. 1 Nov 85-31 Oct 87,

JAN 88 17P

PERSONAL AUTHORS: Turro, Nicholas J.

CONTRACT NO. AFOSR-84-0040

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-88-0168

UNCLASSIFIED REPORT

ABSTRACT: (U) The accomplished research has centered about the construction of new instrumentation for the investigation of transient high energy materials and the exploration of how the chemistry of transient high energy materials and the dynamics of these species respond to systematic variations in structure, environments, and experimental variables. Particular emphasis has been given to reactions in microheterogeneous environments and interfaces provided by micelles, polymers and porous solids, using resonance Raman spectroscopy, Nuclear magnetic resonance spectroscopy, electron spin resonance spectroscopy, optical absorption and optical emission. The use of external magnetic fields on the reactivity of carbenes, of radical pairs and of biradicals, and of adsorption of reactive intermediates at interfaces has been explored as methods which may be capable of extending the lifetimes of these transient species. Keywords: Micelles; Polymers; Porous solids; Biradicals; Ylides; Carbenes; Radical pairs; Optical absorption; ESR spectroscopy; NMR spectroscopy.

DESCRIPTORS: (U) *CARBENES, *COLLOIDS, *MOLECULAR PROPERTIES, *POLYMERS, *ENERGETIC PROPERTIES, *REACTION KINETICS, ABSORPTION, ADSORPTION, CHEMISTRY, CONSTRUCTION, DYNAMICS, ELECTRON SPECTROSCOPY, ELECTRON SPIN RESONANCE, EMISSION, EXTERNAL, HIGH ENERGY, INSTRUMENTATION,

AD-A190 034 CONTINUED

MAGNETIC FIELDS, MATERIALS, NUCLEAR MAGNETIC RESONANCE, NUCLEAR RADIATION SPECTROSCOPY, OPTICAL PROPERTIES, POROUS MATERIALS, RAMAN SPECTROSCOPY, REACTIVITIES, RESONANCE, SOLIDS, SPECTROSCOPY, TRANSIENTS, VARIABLES, CHEMICAL RADICALS, PHOTOCHEMICAL REACTIONS, DEXTRINS, CYCLIC COMPOUNDS, NITRILES, KETONES, OXIDATION, COMBUSTION.

IDENTIFIERS: (U) *Molecular dynamics, Ylides, Chemical intermediates, PE61102F, WUAFOSR2303BL.

AD-A190 034

AD-A190 033 22/2

CALIFORNIA UNIV LOS ANGELES SCHOOL OF ENGINEERING AND APPLIED SCIENCE

(U) Optimal Control and Identification of Space Structures.

DESCRIPTIVE NOTE: Final rept. 15 Aug 84-14 Dec 87,

DEC 87 84P

PERSONAL AUTHORS: Gibson, J. S.

CONTRACT NO. AFOSR-84-0309

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-88-0173

UNCLASSIFIED REPORT

ABSTRACT: (U) The focus of this research was to develop theoretical and computational tools for optimal control and adaptive parameter identification and control and adaptive parameter systems, primarily large flexible space structures. Approximations results for optimal control of infinite-dimensional systems were drived along with numerical results. Also developed was an approximation theory for discrete-time optimal regulator problems, which included problems with flexible structures as a particular example.

DESCRIPTORS: (U) *ADAPTIVE CONTROL SYSTEMS, *ARTIFICIAL SATELLITES, *FLEXIBLE STRUCTURES, APPROXIMATION(MATHEMATICS), COMPUTATIONS, CONTROL, DISCRETE DISTRIBUTION, IDENTIFICATION, INFINITE SERIES, NUMERICAL ANALYSIS, OPTIMIZATION, REGULATORS, SIZES(DIMENSIONS), TIME, RICCATI EQUATION, NONLINEAR PROGRAMMING.

IDENTIFIERS: (U) Large space structures, Linear quadratic gaussian compensators, Boundary control problem, WUAFOSR2304A1, PE61102F.

AD-A190 033

AD-A190 032 12/9 14/1 12/5

YALE UNIV NEW HAVEN CONN

(U) Rapid Feature Extraction via the Radon Transform.

DESCRIPTIVE NOTE: Final rept. 1 Oct 85-1 Dec 87,

FEB 88 33P

PERSONAL AUTHORS: Gmitro, Arthur F.; Gindi, Gene R.

CONTRACT NO. AFOSR-85-0344

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR TR-88-0172

UNCLASSIFIED REPORT

ABSTRACT: (U) The investigators explored the area of neural-net associative memories and their optical implementations. The problem of organizing an associative memory to reflect known structure in the pattern is addressed; because the structure is encoded as a model in the memory, the memory differs considerably from simple pattern matchers where an iconic version of the pattern is stored. Early work concentrated on the idea of encoding a compositional hierarchy within the memory. Though this worked well, the theory was inadequate to explain the behavior of the memory. An optimization approach was adopted in which the goal of the computation could be stated in a mathematical objective function. The ideas of compositional and inheritance hierarchies were encoded directly into the objective function. A simulator was completed that demonstrated these ideas. Optical implementation was concerned with the problem of implementing ever more general interconnect patterns. The investigators began with the construction of a system that computed Radon Transforms of the input object. This demonstrated the necessary first step of an optical connection scheme to transform objects to parameter spaces. A more complex system was built that demonstrated discrete space-invariant connection patterns. This worked satisfactorily. The current work involves designs for holographic space-variant connection patterns.

AD-A190 032

AD-A190 032 CONTINUED

DESCRIPTORS: (U) *ASSOCIATIVE PROCESSING, *MEMORY DEVICES, *OPTICAL STORAGE, *IMAGE PROCESSING, *HOLOGRAPHY, COMPOSITION(PROPERTY), COMPUTATIONS, HIERARCHIES, INPUT, OPTIMIZATION, PATTERNS, NEURAL NETS.

IDENTIFIERS: (U) Feature extraction, Scene analysis, Radon transforms, WUAFOSR2305B1, PE61102F.

AD-A190 031 13/13 20/11

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF MATHEMATICS

(U) Pointwise Stabilization for Coupled Quasilinear and Linear Wave Equations.

DESCRIPTIVE NOTE: Rept. for 1 Sep 85-31 Aug 86,

JAN 88 26P

PERSONAL AUTHORS: Chen, Goong; Wang, Han-Kun

CONTRACT NO. AFOSR-85-0253

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-88-0146

UNCLASSIFIED REPORT

ABSTRACT: (U) A large structure is formed by the coupling of simple structural elements. This paper considers the simplest type of such structures which is made up of two coupled strings modelled by quasilinear or linear wave equations. Two stabilizers are installed: one at the left boundary and one at an in-span point. The exponential stability property of this coupled dynamic structure is studied. The method of characteristics, and a frequency domain theorem due to F.L. Huang are used. For the quasilinear case, one can determine various parameters so that the system is exponentially stable for sufficiently small data. For the linear case, installing a stabilizer at a boundary point is robust for the exponential stability of the system.

DESCRIPTORS: (U) *STABILIZATION SYSTEMS, *STRUCTURAL MEMBERS, BOUNDARIES, COUPLING(INTERACTION), DYNAMICS, LINEAR ALGEBRAIC EQUATIONS, LINEAR SYSTEMS, LINEARITY, WAVE EQUATIONS, WAVES, BOUNDARY VALUE PROBLEMS.

IDENTIFIERS: (U) Structural stability, Frequency domain, WUAFOSR2304A1, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A190 030 9/5

VERAC INC SAN DIEGO CA

(U) Optical Conceptual Computing and Associative Memory (OCCAM).

DESCRIPTIVE NOTE: Final rept. 1 Jun 86-1 Jun 87.

SEP 87 38P

REPORT NO. R-088-87

CONTRACT NO. F49620-86-C-0070

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR
TR-88-0148

UNCLASSIFIED REPORT

ABSTRACT: (U) The Optical Conceptual Computing and Associative Memory (OCCAM) Program applied the techniques of neural-network dynamical systems analysis and fuzzy theory to problems in conceptual computing. Key contributions are detailed in the ten technical papers included in the Appendix. Three fundamental results were: the development of bidirectional associative memories (BAMs), a fuzzy knowledge combination scheme that allows arbitrarily many neural (casual) network 'expert systems' from experts with arbitrary credibility to be naturally synthesized into a single, representative associative knowledge network, and the development of pure fuzzy associative memories (FAMs). UCSD focused on the theory and application of optical neurocomputing. Four fundamental research thrusts were: the design and implementation of optical neural networks, especially optical BAMs, the investigation of physical properties important to neural network implementations, the application of optics to fuzzy knowledge processing and to fuzzy computing (approximate reasoning) in general, and the application of neural network principles to optical pattern recognition. Several holographic and nonholographic BAM systems were devised, with emphasis on volume holography. A backpropagation (hierarchial supervised learning) network was taught to perform rotation-invariant pattern recognition.

AD-A190 030

AD-A190 030 CONTINUED

DESCRIPTORS: (U) *OPTICAL PROCESSING, *COMPUTATIONS, ASSOCIATIVE PROCESSING, COMPUTATIONS, HOLOGRAPHY, LEARNING, NETWORKS, NEURAL NETS, OPTICAL PROCESSING, OPTICAL PROPERTIES, OPTICS, PATTERN RECOGNITION, PHYSICAL PROPERTIES, REASONING, THEORY, SYSTEMS ANALYSIS.

IDENTIFIERS: (U) OCCAM(Optical Conceptual Computing and Associative Memory), Fuzzy theory, WUAFOSR2305B1, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12R

AD-A190 029 12/4 12/5

CALIFORNIA UNIV DAVIS GRADUATE SCHOOL OF ADMINISTRATION

(U) Numerical Methods for Linear and Nonlinear Optimization.

DESCRIPTIVE NOTE: Final rept. 1 Jul 86-30 Jun 87,

SEP 87 9P

PERSONAL AUTHORS: Shanno, David F.

CONTRACT NO. AFOSR-86-0170

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR
TR-88-0174

UNCLASSIFIED REPORT

ABSTRACT: (U) Three major objectives were completed during the year. The first demonstrates how to directly use rank-one updates to a Cholesky factorization of the required inverse for Karmarkar projections while fully exploiting sparsity. This can significantly improve computational speed when only a few variables are changing significantly at each step. The second demonstrates a new method for adding new variables to a quasi-Newton Hessian approximation which preserves problem scale and positive definiteness of the Hessian. Numerical results show the method to be preferable to known methods. The third examines a variety of ways of implementing a sequential quadratic programming code, and uses numerical testing to indicate a suitable merit function and good algorithms for updating Lagrange multiplier and Hessian approximations. Recent new results for updating Hessians for unconstrained problems are currently being studied to determine if better Hessian approximations can be obtained.

DESCRIPTORS: (U) *NUMERICAL METHODS AND PROCEDURES, *OPTIMIZATION, ALGORITHMS, CODING, COMPUTATIONS, COMPUTER PROGRAMMING, NONLINEAR SYSTEMS, NUMERICAL ANALYSIS, RATES, TEST AND EVALUATION, VARIABLES, QUADRATIC PROGRAMMING, APPROXIMATION(MATHEMATICS).

AD-A190 029 CONTINUED

IDENTIFIERS: (U) Karmarkar algorithm, PE61192F, WUAFOSR2304A8.

AD-A190 029

AD-A190 029

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 984 7/3

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) Pyridine Complexes of Chlorine Atoms,

87 3P

PERSONAL AUTHORS: Breslow, Ronald; Brandl, Michael; Hunger, Juergen; Turro, Nicholas; Cassidy, Karen

CONTRACT NO. AFOSR-84-0040

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1858

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of American Chemical Society, v109 n23 p7204-7205 1987.

ABSTRACT: (U) Chlorine atom complexes with pyridine, with methyl nicotinate, and with methyl isonicotinate have been studied by three techniques. The effect of the pyridine derivatives on the selectivity of free radical chlorination of 2,3-dimethylbutane was examined at various concentrations. The kinetics of reaction of chlorine complexes of these pyridine derivatives with 2,3-dimenthylbutane and with cyclohexane was examined by nanosecond time-resolved laser spectroscopy; the same technique was used to determine the spectra of the complexes. Finally, high level molecular orbital calculations were performed on the pyridine/chlorine atom complex to determine the optimum geometry and the predicted spectrum. All of these measurements indicate that the pyridine/Cl. complex has a long three-el-ctron sigma bond between N and Cl. This contrasts with the structure of related radicals in which a hydrogen or an alkyl group is fully bonded to the nitrogen of pyridine, producing a pi-type aromatic radical. Keywords: Chlorine, Pyridine, Laser spectroscopy, Molecular orbital calculations.

DESCRIPTORS: (U) *ALKYL RADICALS, *ATOMS, *CHLORINE, *PYRIDINES, CHLORINATION, COMPUTATIONS, CYCLOHEXANES, FREE RADICALS, GEOMETRY, HYDROGEN, LASERS, MOLECULAR

AD-A189 984

AD-A189 984 CONTINUED

ORBITALS, NITROGEN, OPTIMIZATION, SPECTROSCOPY, TIME.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A189 983 12/3

PITTSBURGH UNIV PA

(U) Multivariate Analysis and Its Application.

DESCRIPTIVE NOTE: Final rept. 1 Oct 84-30 Sep 87,

SEP 87 59P

PERSONAL AUTHORS: Krishnaiah, P. R.; Rao, C. R.

CONTRACT NO. F49820-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1967

UNCLASSIFIED REPORT

ABSTRACT: (U) Some important contribution by this project were made to several areas of multivariate analysis, with applications in manufacturing technology, signal processing, automation, expert systems, pattern recognition, and machine intelligence .

DESCRIPTORS: (U) *MULTIVARIATE ANALYSIS, *BIBLIOGRAPHIES, ARTIFICIAL INTELLIGENCE, PATTERN RECOGNITION, SIGNAL PROCESSING, ABSTRACTS, APPLIED MATHEMATICS, AUTOMATION, MANUFACTURING, DEPARTMENT OF DEFENSE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A189 982 11/4 11/2.1

JOHNS HOPKINS UNIV BALTIMORE MD

(U) Nonlinear Elasticity of Strong Fibers,

87 5P

PERSONAL AUTHORS: Jiang, H.; Arsenovic, P.; Eby, R. K.; Liu, John M.; Adams, W. W.

CONTRACT NO. AFOSR-87-0320

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-87-1937

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Polymer Preprints, v38 nos5-10 pE10-E13 1987.

ABSTRACT: (U) Laser-generated ultrasound is used to determine Young's modulus of a series of fibers processed in different ways from poly (paraphenylene benzobisthiazole) (PBT) and carbon. The modulus is shown to vary systematically with applied tensile stress, temperature, and processing conditions, possible structure and ultrastructural mechanism. Keywords: Nonlinear elasticity.

DESCRIPTORS: (U) *FIBERS, *POLYPHENYLENES, *THIAZOLES, *CARBON FIBERS, *MODULUS OF ELASTICITY, ELASTIC PROPERTIES, LASERS, NONLINEAR SYSTEMS, TENSILE STRESS, ULTRASONICS, PROCESSING, STRENGTH(MECHANICS), COMPOSITE MATERIALS, THERMAL PROPERTIES, REPRINTS.

IDENTIFIERS: (U) Youngs modulus, PBT(Poly(P-ParaPhenylenebenzobisthiazole)), PolyPhenylenebenzobisthiazoles, PE61102F, WUAFOSR2303A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 981 12/9 4/2

BOSTON UNIV MA CENTER FOR ADAPTIVE SYSTEMS

(U) Instrumentation for Scientific Computing in Neural Networks, Information Science, Artificial Intelligence, and Applied Mathematics.

DESCRIPTIVE NOTE: Final progress rept. 30 Jul 86-29 Jul 87,

OCT 87 5P

PERSONAL AUTHORS: Grossberg, Stephen

CONTRACT NO. AFOSR-86-0282

PROJECT NO. 2917

TASK NO. A5

MONITOR: AFOSR
TR-87-1966

UNCLASSIFIED REPORT

ABSTRACT: (U) This was an instrumentation grant to purchase equipment of support of research in neural networks, information science, artificial intelligence, and applied mathematics. Computer lab equipment, motor control and robotics lab equipment, speech analysis equipment and computational vision equipment were purchased.

DESCRIPTORS: (U) *LABORATORY EQUIPMENT, *ARTIFICIAL INTELLIGENCE, APPLIED MATHEMATICS, COMPUTATIONS, VISION, INFORMATION SCIENCES, NEURAL NETS, ROBOTICS, CONTROL, MOTORS, PROCUREMENT, SPEECH ANALYSIS, COMPUTERS, WAVEFORMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A5.

AD-A189 981

AD-A189 980 21/2 20/4

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) An Investigation of Flow Structure, Mixing and Chemical Reaction in Combusting Turbulent Flows.

DESCRIPTIVE NOTE: Annual technical rept. 1 Sep 86-31 Aug 87,

AUG 87 7P

PERSONAL AUTHORS: Bowman, Craig T.; Cantwell, Brian J.

CONTRACT NO. AFOSR-84-0373

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-87-1890

UNCLASSIFIED REPORT

ABSTRACT: (U) An experimental investigation of the relationship between flow structure and chemical reaction in turbulent reacting flows is in progress. The principal objective of the research is to examine the spatial structure of the unsteady reaction process as it relates to the unsteady velocity field. The configuration chosen for study is a co-flowing, non-premixed jet flame. A small perturbation in the fuel jet velocity, produced acoustically, is used to create a very periodic and controllable flame, suitable for conditional sampling. Initial measurements of the unsteady velocity field in the flame have been obtained using laser anemometry. In addition, flow visualization experiments have been conducted using direct and schlieren photography and Mie scattering from the seed particles introduced into the flow. Planar laser-induced fluorescence images of the OH radical, which provide spatially and temporally resolved information on the instantaneous location of the reaction zone, have been obtained. A particle tracking technique to facilitate acquisition of velocity field data has been developed, and is being used to provide velocity field data to be overlaid on the reaction field data to reveal the flame-flow interaction. Keywords: Combustion, Diagnostics, Turbulent flow.

AD-A189 980

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A189 980 CONTINUED

DESCRIPTORS: (U) *COMBUSTION, *TURBULENT FLOW, *JET FLAMES, ACQUISITION, CHEMICAL REACTIONS, FLAMES, FLOW, FLOW VISUALIZATION, IMAGES, LASER ANEMOMETERS, LASER INDUCED FLUORESCENCE, MIE SCATTERING, PARTICLES, PERTURBATIONS, SAMPLING, SCHLIEREN PHOTOGRAPHY, SPATIAL DISTRIBUTION, TEST METHODS, TRACKING, FLAME PROPAGATION, JET FLOW, HYDROXYL RADICALS, HELIUM, FLOW FIELDS, VELOCITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A189 978 12/3

MARYLAND UNIV COLLEGE PARK DEPT OF MATHEMATICS

(U) A Method for Online Testing by HOC (Higher Order Crossings)-Processes,

NOV 87 46P

PERSONAL AUTHORS: Berger, Mordechai; O'Connell, Julie A.; Kedem, Benjamin; Troendle, James F.

CONTRACT NO. AFOSR-82-0187

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-87-1879

UNCLASSIFIED REPORT

ABSTRACT: (U) The dynamic process by which a stationary time series produces its HOC sequentially in time is examined and applied in white noise tests. Probability limits which contain the sample paths of Higher Order Crossing-processes are derived. An hypothesis is rejected if the observed HOC paths exit the bounds. The power of the test is obtained by computer simulation. Keywords: Convergence; Probability bounds; Test for white noise; Variance.

DESCRIPTORS: (U) *TIME SERIES ANALYSIS, *WHITE NOISE, COMPUTERIZED SIMULATION, CROSSINGS, DYNAMICS, EXITS, HYPOTHESES, LIMITATIONS, ON LINE SYSTEMS, PATHS, POWER, PROBABILITY, STATIONARY, TEST AND EVALUATION, TEST METHODS, COVARIANCE, CORRELATION TECHNIQUES.

IDENTIFIERS: (U) Higher order crossing processes.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 975 7/2

SOUTHAMPTON UNIV (ENGLAND) DEPT OF CHEMISTRY

(U) High Temperature Photoelectron Spectroscopy: Al2O and Al,

86 12P

PERSONAL AUTHORS: Dyke, J. M.; Feher, M.; Hastings, M. P.; Morris, A.; Paul, A. J.

CONTRACT NO. AFOSR-83-0283

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-87-1867

UNCLASSIFIED REPORT

Availability: Document partially illegible.

SUPPLEMENTARY NOTE: Pub. Molecular Physics, v58 n1 p161-171 1986.

ABSTRACT: (U) The vapor phase HeI photoelectron spectra (Aluminum 2 oxide) and (Aluminum) have been recorded using a new multidetector, high temperature photoelectron spectrometer. Ab initio molecular orbital calculations which include the effects of electron correlation show that the ground electronic state of Al2O has a (D alpha H equilibrium geometry and, as a result, the four observed photoelectron bands are assigned to ionization from the outermost 5 sigma sub u, 6 sigma sub g, 2 pi sub u and 4 sigma sub u molecular orbitals. For atomic aluminium, three bands have been recorded and measurement of their relative intensities allows the Al 3s:3p photoionization cross-section ratio to be measured as (0.36 + or - 0.04) : 1 at the HeI photon energy. This result has proved useful in interpreting the relative band intensities in the Al2O spectrum.

DESCRIPTORS: (U) *ALUMINUM, *HIGH TEMPERATURE, *PHOTOELECTRON SPECTRA, *PHOTOELECTRONS, COMPUTATIONS, CORRELATION, BANDS(STRIPS), ELECTRONIC STATES, ELECTRONS, ENERGY, GROUND STATE, IONIZATION, MOLECULAR ORBITALS, PHOTONS, SPECTROMETERS, VAPOR PHASES.

AD-A189 975

AD-A189 974 12/1

IOWA STATE UNIV AMES

(U) Inequalities between Dirichlet and Neumann Eigenvalues,

86 18P

PERSONAL AUTHORS: Levine, Howard A.; Weinberger, Hans F.

CONTRACT NO. AFOSR-84-0252

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR TR-87-1872

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Archive for Rational Mechanics and Analysis, v94 n3 p193-208 1986.

ABSTRACT: (U) Some new inequalities between Dirichlet and Neumann eigenvalues are presented for the Laplace operator. These inequalities are improvements of the inequality mu sub k < lambda sub k for orbitrary domains where mu sub k < lambda sub k are the kth Neuman and Dirichlet Eigenvalue respectively.

DESCRIPTORS: (U) *INEQUALITIES, LAPLACE TRANSFORMATION, REPRINTS, OPERATORS(MATHEMATICS), EIGENVALUES.

IDENTIFIERS: (U) Dirichlet problem, Neumann problem, Smoothing, PE61102F, WUAFOSR2304A4.

AD-A189 974

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 970 12/1

IOWA STATE UNIV AMES DEPT OF MATHEMATICS

(U) Finite Element Approximation of a Reaction-Diffusion Equation. Part 2. Approximation of the Spontaneous Bifurcation and Error Estimates Uniform in Time,

87

PERSONAL AUTHORS: Khalsa, Sat Nam S.

CONTRACT NO. %AFOSR-84-0252

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR TR-87-1871

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Transactions of The Army Conference on Applied Mathematics and Computing (4th), p1157-1172.

ABSTRACT: (U) The initial boundary value problems for a reaction diffusion equation (*) u sub t = u sub xx - G(L, u), 0<x<1, u(u,t) = u(1,t)=0, t>0; G(L,u)= 4 (L-sq)u(u-b) (u-1), 0<b<1/2 was recently analyzed. The large time behavior is studied for the semidiscrete finite element approximations, with interpolation of the coefficients in the nonlinear terms. This paper approximates the spontaneous bifurcation (with L as a parameter) for the steady state problem. For the semidiscrete approximations of (*) Error estimates are established that hold uniformly on the infinite time internal (t sub 0 infinity) t sub 0 >0, for nonsmooth or incompatible initial data.

DESCRIPTORS: (U) *BOUNDARY VALUE PROBLEMS, *DIFFUSION, *FINITE ELEMENT ANALYSIS, COEFFICIENTS, EQUATIONS, ERROR ANALYSIS, ESTIMATES, INTERPOLATION, NONLINEAR SYSTEMS, STEADY STATE, TIME.

IDENTIFIERS: (U) Bifurcation theory, Initial value problems, PE61102F, WUAFOSR2304A4.

AD-A189 967 20/6

TEXAS TECH UNIV LUBBOCK OPTICAL SYSTEMS LAB

(U) Space-Variant Optical Systems.

DESCRIPTIVE NOTE: Final technical rept. 30 Sep 84-30 Sep 87,

DEC 87 24P

PERSONAL AUTHORS: Walkup, John F.; Krile, Thomas F.

CONTRACT NO. AFOSR-84-0382

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR TR-87-1860

UNCLASSIFIED REPORT

ABSTRACT: (U) Analytical and experimental investigations of 1-D and 2-D space-variant optical processors have been conducted. Areas investigated have included: (1) measures of the degree of invariance of linear optical system; (2) a real-time holographic CCD recording technique for preserving phase information; (3) a fast, highly parallel architecture for optical multiplication; and (4) a complete analytical and experimental investigation of the bilinear transform and its applications. Keywords: Optical computing; Optical signal processing, Optical interconnection networks.

DESCRIPTORS: (U) *ARCHITECTURE, *CIRCUIT INTERCONNECTIONS, *LINEAR SYSTEMS, *MULTIPLICATION, *OPTICAL PROCESSING, *SIGNAL PROCESSING, COMPUTATIONS, INVARIANCE, NETWORKS, OPTICAL EQUIPMENT, OPTICAL PROPERTIES, PARALLEL ORIENTATION, RECORDING SYSTEMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A189 947 6/1 6/4

CALIFORNIA UNIV IRVINE DEPT OF PHYSIOLOGY AND BIOPHYSICS

(U) Cell Calcium and the Control of Membrane Transport. Annual Symposium of the Society of General Physiologists (40th) Held in Woods Hole, Massachusetts on September 3-7, 1986.

DESCRIPTIVE NOTE: Final rept. 1 Aug 86-31 Jul 87,

86 319P

PERSONAL AUTHORS: Mandel, Lazaro J.; Eaton, Douglas C.

CONTRACT NO. AFOSR-86-0325

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR
TR-87-1855

UNCLASSIFIED REPORT

ABSTRACT: (U) This book is a compendium of the written contributions submitted by the invited speakers to the 40th Annual Meeting of the Society of General Physiologists. There were also 118 abstracts of contributed papers submitted to this meeting, which have been published in the December 1986 issue of The Journal of General Physiology. Partial Contents: Regulation of Cytosolic Free Calcium, The Plasma Membrane in the Control of the Signaling Function of Calcium, Calcium-permeable Channels in Vascular Smooth Muscle: Voltage-activated, Receptor-operated, and Leak Channels, Calcium and Magnesium Movements in Cells and the Role of Inositol Trisphosphate in Muscle, Receptor-mediated Changes in Intracellular Calcium, Mechanisms Involved in Receptor-mediated Changes of Intracellular Ca2 + in Liver, The Role of Phosphatidylinositides in Stimulus-Secretion Coupling in the Exocrine Pancreas, Modulation of Membrane Transport by Intracellular Calcium, The Role of Cyclic AMP-dependent Phosphorylation in the Maintenance and Modulation of Voltage-activated Calcium Channels, Multiple Roles for Calcium and Calcium-dependent Enzymes in the Activation of Peptidergic Neurons of Aplysia, Calcium Involvement in Intracellular Events, The

AD-A189 947

AD-A189 947 CONTINUED

Relationship Between the Cytosolic Free Calcium Ion Concentration and the Control of Pyruvate Dehydrogenase, Membrane and Microfilament Organization and Vasopressin Action in Transporting Epithelia.

DESCRIPTORS: (U) *CALCIUM, *MEMBRANES(BIOLOGY), ACTIVATION, APLYSIA, CARDIOVASCULAR SYSTEM, CELLS(BIOLOGY), CONTROL, DEHYDROGENASES, FILAMENTS, LIVER, MODULATION, MUSCLES, NERVE CELLS, PHYSIOLOGISTS, PLASMAS(PHYSICS), PYRUVATES, SYMPOSIA, TRANSPORT, ION PUMPS, ION EXCHANGE.

IDENTIFIERS: (U) Ion transport, Calcium channels, PE61102F, WUAFOSR2312A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 945 12/1

EMORY UNIV ATLANTA GA

(U) New Methods for Numerical Solution of One Class of Strongly Nonlinear Partial Differential Equations with Applications.

DESCRIPTIVE NOTE: Final technical rept.,

AUG 87 8P

PERSONAL AUTHORS: Oliker, V. I.; Waltman, P.

CONTRACT NO. AFOSR-84-0285

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-87-1729

UNCLASSIFIED REPORT

ABSTRACT: (U) The physical phenomena described by nonlinear partial differential equations have become at present the central theme of investigation by many researchers. A good understanding of most physical processes requires accounting for nonlinear effects and, consequently, methods for studying nonlinear equations have to be developed. Among nonlinear equations the Dirichlet problem for the Monge-Ampere equation is the model case for fully nonlinear equations.

DESCRIPTORS: (U) *NONLINEAR DIFFERENTIAL EQUATIONS, *PARTIAL DIFFERENTIAL EQUATIONS, *NUMERICAL METHODS AND PROCEDURES, DIRICHLET INTEGRAL, NONLINEAR ALGEBRAIC EQUATIONS, NUMERICAL ANALYSIS, MATHEMATICAL MODELS, SOLUTIONS(GENERAL).

IDENTIFIERS: (U) Monge Ampere equation, PE61102F, WUAFOSR2304A3.

AD-A189 945

AD-A189 944 12/3

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Almost Sure L(Gamma)-Norm Convergence for Data-Based Histogram Density Estimates.

DESCRIPTIVE NOTE: Technical rept. for Aug 87,

AUG 87 27P

PERSONAL AUTHORS: Zhao, L. C.; Krishnaiah, P. R.; Chen, X. R.

REPORT NO. TR-87-30

CONTRACT NO. F49620-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1843

UNCLASSIFIED REPORT

ABSTRACT: (U) Let X1,...,Xn be i.i.d. samples drawn from a d-dimensional distribution with density f. Partition the space R subscript d into a union of disjoint intervals I sub l = I(l,X1,...,Xn) with the form I sub l = (x = (x(1),...,x(d): - infinity < a sub li < or = x(i) <or = b sub li < infinity, i = 1,...,d). Define the database histogram estimate of f(x) based on this partition as fn(x) = The number of X1,...,Xn falling into I sub l + n times the volume of I sub l, for x is an element of I sub l, l = 1,2... For given constant r > or = 1 we obtain the sufficient condition for limit as n approached infinity of the Integral over the R subscript d of the absolute value of (f sub n)(x) - f(x) to the rth power dx = 0. The results give substantial improvements upon existing results. Keywords: Data based; Density estimator; Empirical distribution; Histogram.

DESCRIPTORS: (U) *SEQUENCES(MATHEMATICS), *PROBABILITY DENSITY FUNCTIONS, DATA BASES, DENSITY, ESTIMATES, HISTOGRAMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A189 944

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 940 21/3

R AND D ASSOCIATES ALEXANDRIA VA

(U) MPD (Magnetoplasmadynamic) Thrust Chamber Flow Dynamics.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 86-30 Sep 87.

SEP 87 60P

REPORT NO. RDA-TR-144200

CONTRACT NO. F49620-86-C-0117

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR TR-87-1883

UNCLASSIFIED REPORT

ABSTRACT: (U) Performance characteristics of Magnetoplasmadynamic(MPD) arcjets depend on proper matching of electromagnetic and fluid mechanical constraints within the thrust chamber. Experimental measurements of internal flow conditions during MPD arcjet operation are needed to guide developement of flow models and to assess the validity of theoretical predictions. Efforts are continuing in a corporative effort to apply an array of diagnostic techniques including time-, space-, and spectrally-resolved photography to examine MPD arcjet internal flows. Experimental elucidation of the internal flow structure is used to develop predictive models for optimal geometries and operating parameters. Probes have been used to map the current and voltage distributions within uniform height and flared annular channels. This work is concerned with the effect of thruster channel variations on the current conduction regions of the MPD internal flow. Other aspects of the internal flow structure that have been modeled involve the transition of the input mass flow from neutral gas to electrically-conducting plasma. Scale sizes for the transition region were estimated in terms of the electrical and thermodynamic properties of the propellant gas (e.g., argon). These estimates indicate that the electrical conductivity of the flow can be established in distances that are small compared to the characteristic dimension for current conduction near the entrance to the arcjet thrust chamber.

AD-A189 940 CONTINUED

DESCRIPTORS: (U) *MAGNETOHYDRODYNAMICS, *ARC JET ENGINES, *PLASMA ENGINES, ARGON, CHANNELS, DIAGNOSIS(GENERAL), DISTRIBUTION, DYNAMICS, ELECTRIC CONDUCTORS, ELECTRICAL PROPERTIES, EXPERIMENTAL DATA, FLOW, INPUT, INTERNAL, MEASUREMENT, METHODOLOGY, MODELS, OPTIMIZATION, PLASMAS(PHYSICS), PREDICTIONS, PROPELLANTS, SCALE, SIZES(DIMENSIONS), THEORY, THERMODYNAMIC PROPERTIES, THRUST CHAMBERS, VALIDATION, VOLTAGE, ELECTRICAL CONDUCTIVITY.

IDENTIFIERS: (U) *Magnetoplasmadynamics, Internal flow, PE61102F, WUAFOSR2308A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A189 937 7/4

SOUTHAMPTON UNIV (ENGLAND) DEPT OF CHEMISTRY

(U) High-Temperature Photoelectron Spectroscopy.

87 12P

PERSONAL AUTHORS: Dyke, John M.; Ellis, Andrew M.; Feher, Miklos; Morris, Alan; Paul, Alan J.

CONTRACT NO. AFOSR-83-0283

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-87-1826

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Society, Faraday Translation 2, v83 n8 p1555-1565 1987.

ABSTRACT: (U) The HE I photoelectron spectra of NbO and TaO have been recorded. In both cases four main bands were observed which can be attributed to ionization of the isolated metal monoxide molecule. Bands associated with other oxides or the metal were not observed. Assignment of the photoelectron spectra of NbO and AaO was made with the aid of Hartree-Fock-Slater (HFS) calculations and by comparison with the known photoelectron spectrum of VO. The first adiabatic ionization energies of NbO and TaO have been measured as 7.91 + or - 0.2 eV and 8.61 + or - 0.02 eV, respectively. Suggestions are made to explain the poor agreement between previous mass-spectrometric values for the first ionization energy of each oxide. Niobium, Tantalum.

DESCRIPTORS: (U) *HIGH TEMPERATURE, *NIOBIUM, *PHOTOELECTRON SPECTRA, *TANTALUM, ADIABATIC CONDITIONS, BANDS(STRIPS), ENERGY, IONIZATION, ISOLATION, MASS SPECTROMETRY, METAL COMPOUNDS, MOLECULES, MONOXIDES, OXIDES, PHOTOELECTRONS, SPECTRA, REPRINTS.

IDENTIFIERS: (U) PE61102F.

AD-A189 865 12/3

ALBERTA UNIV EDMONTON DEPT OF STATISTICS AND APPLIED PROBABILITY

(U) The Existence of Smooth Densities for the Prediction Filtering and Smoothing Problems.

DESCRIPTIVE NOTE: Rept. for 30 Sep 86-30 Sep 87,

NOV 87 28P

PERSONAL AUTHORS: Elliott, Robert J.

CONTRACT NO. AFOSR-86-0332

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-87-1847

UNCLASSIFIED REPORT

ABSTRACT: (U) Using a simple martingale representation result a conditional version of the Malliavin calculus is developed. Under Hormander's conditions on the coefficient vector fields the filtering, smoothing and prediction problems are shown to have C subscript infinity density solutions.

DESCRIPTORS: (U) *MATHEMATICAL FILTERS, *STOCHASTIC PROCESSES, CALCULUS, COEFFICIENTS, DENSITY, PREDICTIONS, SOLUTIONS(GENERAL), VECTOR ANALYSIS, MATHEMATICAL PREDICTION, INEQUALITIES, DIFFERENTIAL EQUATIONS.

IDENTIFIERS: (U) Martin Gales, Malliavin calculus, Jump processes, Hormander condition, Smoothing, Stochastic differential equations, PE61102F, WUAFOSR2304A1.

AD-A189 861 11/4 13/8

AMERICAN SOCIETY FOR COMPOSITES DAYTON OH

(U) Proceedings of the American Society for Composites: Biotechnology Aided Synthesis of Aerospace Composite Resins Held in Dayton, Ohio 25-26 August 1987.

DESCRIPTIVE NOTE: Final rept.

AUG 87 110P

CONTRACT NO. AFOSR-87-0245

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-87-1884

UNCLASSIFIED REPORT

ABSTRACT: (U) This report stems form a two-day workshop on Biotechnology Aided Synthesis of Aerospace Composite Resins held August 25th and 26th, 1987 at the Stouffer Dayton Plaza Hotel. This workshop was sponsored by the American Society for Composites with support from the Air Force Office of Scientific Research (AFOSR) and the Air Force Wright Aeronautical Laboratories/Materials Laboratory. This workshop was attended by personnel from government and industry representing both aerospace materials and biotechnology communities.

DESCRIPTORS: (U) *BIOTECHNOLOGY, *COMPOSITE MATERIALS, *AEROSPACE INDUSTRY, AERONAUTICAL LABORATORIES, AEROSPACE SYSTEMS, AIR FORCE, MATERIALS LABORATORIES, POLYMERS, INDUSTRIAL PRODUCTION, MATRIX MATERIALS, CARBON, MOLECULAR STRUCTURE, EPOXY RESINS, HYDROCARBONS, POLYPHENYLENES, CHEMICAL ENGINEERING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A189 861

AD-A189 856 12/5 12/8 23/2

MARYLAND UNIV COLLEGE PARK SYSTEMS RESEARCH CENTER

(U) The Mobile Remote Manipulator System Simulator,

DEC 88 9P

PERSONAL AUTHORS: Sinha, Velu

CONTRACT NO. AFOSR-87-0073

MONITOR: AFOSR
TR-87-1437

UNCLASSIFIED REPORT

ABSTRACT: (U) During the spring of 1988 a group of students at the University of Maryland under the leadership of Dr. P.S. Krishnaprasad designed a Mobile Remote Manipulator System for the Space Station In order to test the MRMS design, a simulator was constructed on a Iris 2400 series graphics workstation. The MRMS Simulator allowed the Iris to play the role of the MRMS, and at the same time allow the user to view the MRMS from the perspective which was best suited to the task being viewed. The MRMS Simulator also made extensive use of distributed processing to simulate the actual distributed, wide-spread environment in which the actual MRMS control would occur. The simulation was divided into the following tasks: Command Systems - the user interface to the simulation tasks, as well as the individual MRMS controls; Control System - controlling the kinematics of the MRMS. Dealing also with collision avoidance, safety, etc.; and Display System - a graphical representation of the MRMS with a moveable view-point, allowing for the MRMS to be viewed from any position in its universe.

DESCRIPTORS: (U) *CONTROL SYSTEMS, *MANIPULATORS, *REMOTE CONTROL, COLLISION AVOIDANCE, DISPLAY SYSTEMS, DISTRIBUTED DATA PROCESSING, GRAPHICS, INTERFACES, KINEMATICS, LEADERSHIP, MARYLAND, MOBILE, REMOTE SYSTEMS, SIMULATION, SPACE STATIONS, STUDENTS, USER NEEDS, COMPUTERIZED SIMULATION, COMPUTER ARCHITECTURE, COMMAND AND CONTROL SYSTEMS.

AD-A189 856

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 852 7/4

STATE UNIV OF NEW YORK AT BUFFALO AMHERST

(U) Quantum Theory of Atomic Fluorescence near a Metal Surface,

OCT 87 12P

PERSONAL AUTHORS: Arnoldus, Henk F.; George, Thomas F.

CONTRACT NO. F49620-86-C-0009

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-87-1877

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v87 n8 p4263-4272, 15 Oct 87.

ABSTRACT: (U) Quantum electrodynamics of an atom near a surface is a timely problem in current theoretical research. It appears, however, that a full dynamical theory, which includes both the time evolution of the atomic density operator and the details of the fluorescence radiation (temporal photon distribution) has never been formulated. In this paper the quantum theory of an atom near a perfect conductor is presented, and it is indicated how the formalism can be modified to account for more realistic optically-active substrates. An expression is derived for the atomic spontaneous-decay Liouville operator from the Hamiltonian, which recovers the familiar results for the lifetimes and energy shifts. Furthermore, the emitted power is calculated as a function of time from the explicit expression for the radiation field. Comparison of the atomic-decay rates with the power of the emitted radiation shows the consistency of the theory, as far as the properties of the fluorescence are concerned. An unusual energy interference in the fluorescence, which is emitted by a multilevel atom, is predicted. Similarities and discrepancies with other theories are pointed out, and it is shown that especially the mirror theory has a very restricted applicability. Keywords: Reprints; Atomic fluorescence; Quantum electrodynamics; Perfect

AD-A189 852

AD-A189 852 CONTINUED

conductivity; Interference; Mirror theory.

DESCRIPTORS: (U) *FLUORESCENCE, *METALS, *SURFACES, ATOMS, CONSISTENCY, DYNAMICS, ENERGY, EVOLUTION(GENERAL), HAMILTONIAN FUNCTIONS, INTERFERENCE, MIRRORS, QUANTUM ELECTRODYNAMICS, QUANTUM THEORY, RADIATION, REPRINTS, SHIFTING, THEORY, TIME, TIMELINESS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

AD-A189 852

AD-A189 827 7/4

COLORADO UNIV AT BOULDER

(U) The Effect of Orbital Alignment on the Forward and Reverse Electronic Energy Transfer Ca(4s5p 1P1) + M Yields Ca(4s5p 3P sub j) + M with Rare Gases.

OCT 87 12P

PERSONAL AUTHORS: Bussert, Wolfgang; Neuschaefer, Dieter; Leone, Stephen R.

CONTRACT NO. AFOSR-84-0272

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-87-1907

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v87 n7 p3833-3842, 1 Oct 87.

ABSTRACT: (U) Effects of orbital alignment on the relative cross sections for electronic energy transfer are determined for the near resonant transfer between Ca(4s5p 1p1) and Ca(4s5p 3p sub j) states with rare gas collision partners. The experiments are carried out by pulsed laser excitation in a crossed beam. The results for the forward direction, 1P to 3P, formulated in terms of the ratio of the maximum to minimum transfer probability are: Helium 3 1.61 + or - 0.05; Helium 1.60 + or - 0.03; Neon 1.55 + or - 0.10; Argon 1.52 + or - 0.21; for Krypton, transfer occurs, but no preference is distinguishable within 1 + or - 0.2; Xenon 1.44 + or - 0.06. The results for He, Ne, and Ar indicate a clear preference in the transfer for the initially prepared molecular Pi state. For Xe the molecular sigma state is dominant. The energy transfer is also carried out in the reverse direction, 3P1, to 1P, for He and Xe. Analysis of the state preparation suggests that the reverse direction favors the asymptotic molecular sigma state for He and the molecular pi state for Xe. These alignment results provide a first experimental determination of the dominant electronic states involved in a collisional energy transfer process.

AD-A189 827

AD-A189 827 CONTINUED

DESCRIPTORS: (U) *ENERGY TRANSFER, *KRYPTON, *RARE GASES, ALIGNMENT, COLLISIONS, CROSS BEAM DEVICES, CROSS SECTIONS, ELECTRON ENERGY, ELECTRONIC STATES, EXCITATION, MOLECULES, ORBITS, ORIENTATION(DIRECTION), PREPARATION, PROBABILITY, PULSED LASERS, RATIOS, REPRINTS, RESONANCE, REVERSIBLE, TRANSFER.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A189 825 7/2 7/4

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF CHEMISTRY

(U) On the Radiative Lifetimes of the b 1 Sigma(+) and a 1 Delta States in NCl.

FEB 87 3P

PERSONAL AUTHORS: Yarkony, David R.

CONTRACT NO. AFOSR-86-0110

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-88-0121

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v86 n3 p1842-1843, 1 Feb 87.

ABSTRACT: (U) Recently there has been considerable experimental and theoretical interest in, and controversy concerning, the spin-forbidden transitions b 1 sigma (+) yields X 3 sigma (-) and a 1 delta yields x 3 sigma (-) in the nitrogen halides. Much of this interest may be attributed to the work of Coombe and Van Benthem (CVB) on the b 1 sigma (+) yields x 3 sigma (-) transition in Nitrogen Chloride and Nitrogen Bromide. It is the goal of this work to resolve these discrepencies in the b 1 sigma (+) and a 1 delta radiative rates in Nitrogen chloride.

DESCRIPTORS: (U) *CHLORIDES, *HALIDES, *NITROGEN, *NITROGEN COMPOUNDS, ALLOYS, DATA BASES, LABORATORY TESTS, LIFE SPAN(BIOLOGY), MACHINABILITY, MACHINING, MANUFACTURING, MATERIALS, METAL MATRIX COMPOSITES, PROCUREMENT, PRODUCTION, RADIATION, TITANIUM, LIFE SPAN(BIOLOGY), RADIATION, REPRINTS, HALOGEN COMPOUNDS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

AD-A189 825

AD-A189 824 7/4

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Photodissociation of Weakly Bound Ion-Molecule Clusters: Kr.SO2(+).

86 9P

PERSONAL AUTHORS: Kim, Hyun-Sook; Jarrold, Martin F.; Bowers, Michael T.

CONTRACT NO. AFOSR-86-0288

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-87-1999

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in The Jnl. of Physical Chemistry, v90 n16 p3584-3590 1986.

ABSTRACT: (U) A photodissociation study of Krypton Sulfurdioxide (+) is presented. Kr-SO2(+) was formed by three-body recombination of SO2(+) with Kr in a high pressure ion source. Two ionic products, Kr(+) and SO2(+) were observed when the ion beam was crossed with a focused laser beam. Wavelengths of 458, 488, 514, and 585 nm were used. Product relative kinetic energy distributions, product angular distributions (asymmetry parameters), and product branching ratios were obtained. A statistical phase space calculation was carried out for the SO2(+) Kr product channel. These results suggest either the SO2(+) product is both vibrationally and was electronically excited or a new electronic state of SO2 (+) at approx 1.5 eV is formed. Product relative kinetic energy distributions and angular distributions suggest the Kr(+) ionic product is produced nonstatistically, probably via direct transition to a repulsive state(s) that correlate to Kr(+)(2P 3/2)/SO2(+) products. The Kr(+) /SO2 and SO2(+)/Kr products come from two noninterconverting sets of photoexcited states.

DESCRIPTORS: (U) *KRYPTON, *PHOTODISSOCIATION, *SULFUR OXIDES, ANGLES, ASYMMETRY, CHANNELS, CLUSTERING, DISTRIBUTION, FOCUSING, HIGH PRESSURE, ION BEAMS, ION

AD-A189 824

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 824 CONTINUED

SOURCES, IONS, LASER BEAMS, MOLECULES, TRANSITIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

AD-A189 817 12/3

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) Approximations in Extreme Value Theory.

DESCRIPTIVE NOTE: Rept. for Sep 87-Aug 88,

SEP 87 35P

PERSONAL AUTHORS: Smith, Richard L.

REPORT NO. TR-205

CONTRACT NO. F49620-85-C-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-87-1848

UNCLASSIFIED REPORT

ABSTRACT: (U) Following a survey of rates of convergence in extreme value theory, a new class of approximations is developed and compared with existing approximations based on the extreme value distributions. Convergence in *Hellinger distance* is established, this distance measure being chosen because of its statistical applications. Numerical examples confirm the superiority of the new approximation. Keywords: Extreme value theory, Generalised extreme value distribution, Generlised Pareto distribution, Hellinger distance, Rates of convergence, Regular variation with reminder, Total variation distance.

DESCRIPTORS: (U) *CONVERGENCE, *STOCHASTIC PROCESSES, APPROXIMATION(MATHEMATICS), DISTRIBUTION, MEASUREMENT, RANGE(DISTANCE), RATES, STATISTICS, THEORY, VARIATIONS.

IDENTIFIERS: (U) *Extreme value theory, Distance measure, Pareto distributions, PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 815 20/12 20/3 9/3

ROCKWELL INTERNATIONAL THOUSAND OAKS CA SCIENCE CENTER

(U) Laser Evaporation Studies.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-31 Aug 87,

OCT 87 64P

PERSONAL AUTHORS: Sankur, H. O.

REPORT NO. SC5411.FR

CONTRACT NO. F49620-84-C-0091

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR
TR-87-1928

UNCLASSIFIED REPORT

ABSTRACT: (U) The physics of vaporization of matter under pulsed CO2 laser evaporation was studied. Analysis of the nature of the vapor plume in several materials indicated the presence of numerous excited species, neutral as well as ionized species, and ions with high kinetic energies. High quality films of refractory metal oxides and epitaxial films of Ge were deposited. The oxide materials were dense and crystalline and had high refractive index values, even when deposited on room temperature substrates. Ge films were epitaxial and single crystalline when deposited on Si substrates at 300 C. Study of the relationship of deposition conditions and film properties clearly indicated the beneficial role of the energetic ions in the film deposition. Special emphasis was given to the solution of the problem of particulates in the films. Keyword: Germanium, Silicon, Laser deposition.

DESCRIPTORS: (U) *EVAPORATION, *LASER APPLICATIONS, *VAPOR DEPOSITION, *THIN FILMS, CRYSTALS, ENERGETIC PROPERTIES, EPITAXIAL GROWTH, FILMS, GERMANIUM, HIGH DENSITY, HIGH ENERGY, IONIZATION, IONS, KINETIC ENERGY, LASERS, MATERIALS, OXIDES, PARTICULATES, PHYSICS, PLUMES, REFRACTIVE INDEX, REFRACTORY MATERIALS, REFRACTORY METALS, ROOM TEMPERATURE, SILICON, SINGLE CRYSTALS, SUBSTRATES,

AD-A189 815 CONTINUED

VAPORIZATION, VAPORS, CARBON DIOXIDE LASERS, DIELECTRIC FILMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306B1.

AD-A189 815

AD-A189 813 21/2

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Numerical Simulation of Turbulent Flames using Vortex Methods.

DESCRIPTIVE NOTE: Annual rept. no. 3, 1 Sep 86-31 Aug 87,

OCT 87 126P

PERSONAL AUTHORS: Ghoniem, Ahmed F.

CONTRACT NO. AFOSR-84-0356

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-87-1853

UNCLASSIFIED REPORT

ABSTRACT: (U) Th vortex element method and the transport element method are developed for the numerical simulation of the Navier Stokes equations and the energy and species conservation equations, accurate simulation of the governing equations at high Reynolds and Peclet numbers, without resorting to turbulence modelling. Finite rate chemical reactions, finite compressibility and finite heat release rates are also considered in the formulations of the numerical schemes. To validate these methods, we are obtaining solutions for reacting shear layers, both homogenous and heterogeneous, under various idealizations, and comparing the numerical results with experimental data. The solutions are also analyzed to investigate the mechanisms of turbulence combustion interactions. Keywords: Turbulent combustion.

DESCRIPTORS: (U) *COMBUSTION, *FLAMES, *TURBULENCE, *VORTICES, CHEMICAL REACTIONS, COMPRESSIVE PROPERTIES, CONSERVATION, EQUATIONS, EXPERIMENTAL DATA, HEAT, INTERACTIONS, LAYERS, MATHEMATICAL MODELS, NAVIER STOKES EQUATIONS, NUMERICAL ANALYSIS, RATES, RELEASE, REYNOLDS NUMBER, SHEAR PROPERTIES, SIMULATION, TRANSPORT, DIGITAL SIMULATION.

IDENTIFIERS: (U) *Turbulent combustion, Vortex element method, Damkohler number, WUAFOSR2308A2, PE61102F.

AD-A189 813

AD-A189 809 7/4 20/12

CALIFORNIA UNIV LOS ANGELES DEPT OF CHEMISTRY AND BIOCHEMISTRY

(U) Determination of Electronic Species in Electroactive Polymers by Reversible Electrochemical Doping,

87 3P

PERSONAL AUTHORS: Reiss, Howard

CONTRACT NO. F49620-86-C-0060

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-87-1947

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v91 p5164-5165 1987.

ABSTRACT: (U) Methods are illustrated for distinguishing among electronics species (polarons, bipolarons, etc.) in doped conducting polymers, through an analysis of the dependences of spectral absorbance and conductivity on electrode potential reversible electrochemical doping. These methods are an extension of those which have been used to great advantage in solid-state chemistry, solid-state electrochemistry, and, in a tentative manner, the study of vapor absorption isotherms in conducting polymers.

DESCRIPTORS: (U) *DOPING, *POLYMERIC FILMS, *ELECTRICAL CONDUCTIVITY, *ELECTRONS, *PHONONS, ABSORPTION, DETERMINATION, ELECTROCATALYSTS, ELECTROCHEMISTRY, ELECTRONICS, ISOTHERMS, POLYMERS, REVERSIBLE, VAPORS, SOLID STATE CHEMISTRY, REPRINTS.

IDENTIFIERS: (U) *Polarons, *Bipolarons.

AD-A189 809

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A189 805 20/3

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Tunneling and Dynamic Tunneling by an Algebraic Approach,

86 9P

PERSONAL AUTHORS: Levine, R. D.

CONTRACT NO. AFOSR-86-0011, $AFOSR-81-0030

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-87-1949

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Tunneling, p1-8 1986.

ABSTRACT: (U) Seemingly tunneling is intimately related to a geometrical approach. That however is not always the case as shown by our first example where tunneling connects regions of phase space which are not separated by a potential yet are disjoint in classical mechanics. This example shows that an algebraic approach can handle dynamic tunneling in a bound state system. Recent work has also considerably firmed the geometric interpretation of the algebraic approach. Hence even such traditional problems as barrier penetration can be discussed. To obtain the tunneling rates we discuss the use of non-unitary representations. Towards the extension of the algebraic approach to unbound states in multidimensional systems, the simpler case of an unbound one dimensional motion is discussed and possible generalizations are indicated.

DESCRIPTORS: (U) *ALGEBRA, *TUNNELING(ELECTRONICS), BARRIERS, DYNAMICS, GEOMETRY, MOTION, ONE DIMENSIONAL, PENETRATION, RATES, REPRINTS, ANHARMONIC OSCILLATORS.

IDENTIFIERS: (U) Nonunitary representation, PE61102F, WUAFOSR2303B3.

AD-A189 805

AD-A189 800 9/3

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Coupled High Power Waveguide Laser Research.

DESCRIPTIVE NOTE: Final rept. 1 Jul 86-30 Jun 87,

SEP 87 48P

PERSONAL AUTHORS: Cantor, A. J.; Hart, R. A.; Kennedy, J. T.; Newman, L. A.

REPORT NO. UTRC/R87-927184

CONTRACT NO. F49620-85-C-0108

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR TR-87-1747

UNCLASSIFIED REPORT

ABSTRACT: (U) The experimental and theoretical progress that has been made in the coupled high power waveguide laser research program is reported. A problem has been encountered with the hollow-bore ridge waveguide laser array approach in which multimode operation occurs when the array is increased to above three elements. Alternative waveguide geometries were explored with the objective of achieving both phase locked operation and mode discrimination for an array size of 5 elements. Three new waveguide geometries were investigated. Of these new geometries, a modified hollow-bore ridge waveguide, utilizing a staggered ridge, has been used successfully to obtain single mode operation. This array, with a gain volume equivalent to six waveguide lasers, produced an output of 68 watts. The theoretical effort has resulted in the development of a theoretical method for calculating the modes and frequencies of two coupled rectangular waveguides separated by an infinitely thin partition with a gap in it.

DESCRIPTORS: (U) *WAVEGUIDES, *OPTICAL WAVEGUIDES, *CARBON DIOXIDE LASERS, ARRAYS, BORES, DISCRIMINATION, GAIN, LASERS, MULTIMODE, PHASE LOCKED SYSTEMS, RECTANGULAR BODIES, RIDGES, SIZES(DIMENSIONS), THINNESS,

AD-A189 800

AD-A189 800 CONTINUED

VOLUME, WAVEGUIDE COUPLERS, HIGH POWER, ARRAYS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1.

AD-A189 798 20/13

STATE UNIV OF NEW YORK AT BUFFALO AMHERST DEPT OF MECHANICAL AND AEROSPACE EN GINEERING

(U) Thermal Runaway Due to Strain-Heading Feedback,

MAY 85 27P

PERSONAL AUTHORS: Wan, K. T.; Cozzarelli, F. A.; Inman, D. J.

CONTRACT NO. AFOSR-85-0220

MONITOR: AFOSR
TR-87-1482

UNCLASSIFIED REPORT

ABSTRACT: (U) A one-dimensional, dynamic, thermomechanical model, which includes nonlinear inelastic deformation, internal heat generation (strain-heating), temperature dependent material properties, thermal expansion and thermoelastic coupling, is considered for a uniform thin bar subjected to mechanical or thermal disturbances. A nonlinear Maxwell material is examined in this model and special attention is focused on the temperature change. By solving a nonlinear problem, it is found that a thermal instability, called thermal runaway, may result due to the mutual feedback between strain-heating and the temperature dependent inelastic material properties. Neglecting this important phenomenon may lead to unexpected material failure.

DESCRIPTORS: (U) *THERMAL INSTABILITY, *THERMOMECHANICS, *STRAIN(MECHANICS), COUPLING(INTERACTION), DEFORMATION, DYNAMICS, ELASTIC PROPERTIES, FAILURE, FEEDBACK, HEAT, INTERNAL, MATERIALS, MECHANICAL PROPERTIES, MODELS, NONLINEAR ANALYSIS, NONLINEAR SYSTEMS, PRODUCTION, TEMPERATURE, THERMAL EXPANSION, THERMAL PROPERTIES, THINNESS, THERMODYNAMICS, HEATING.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 791 11/7 20/11

APPLIED RESEARCH ASSOCIATES INC SOUTH ROYALTON VT NEW ENGLAND DIV

(U) Experimental and Theoretical Response of Multiphase Porous Media to Dynamic Loads.

DESCRIPTIVE NOTE: Annual rept. no. 2, 1 Jul 86-30 Jun 87,

SEP 87 308P

PERSONAL AUTHORS: Kim, Kwang J.; Blouin, Scott E.; Timian, David A.

REPORT NO. ARA-5967-87

CONTRACT NO. F49620-85-C-0102

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR
TR-87-1825

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes results of a combined theoretical and experimental investigation of wave propagation and liquefaction from high intensity dynamic loading of saturated porous media. This work presents results obtained during the second year of a three year research effort. Theoretical derivations describing undrained hydrostatic and uniaxial strain loadings were obtained and incorporated into a numerical code (NKOCP) which models the two-phase undrained response of saturated soils and rocks. Numerical calculations of the response of saturated rock and soil compare very well with laboratory data in which both the soil and rock are liquefied during the unload portion of the cycle. Theoretical and numerical solutions for the speed and damping of waves of the first and second kind in fully coupled two phase media are also presented. Parameter studies of the influence of frequency and variations in material properties on wavespeed and damping are performed.

DESCRIPTORS: (U) *DYNAMIC LOADS, *NUMERICAL ANALYSIS, *POROUS MATERIALS, *ROCK, COMPUTATIONS,

AD-A189 791

AD-A189 791 CONTINUED

COUPLING(INTERACTION), DAMPING, EXPERIMENTAL DATA, HIGH RATE, INTENSITY, LIQUEFACTION, PHASE, RESPONSE, SATURATION, SOILS, SOLUTIONS(GENERAL), THEORY, WAVE PROPAGATION, WAVES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303C1.

AD-A189 787 12/3

ALBERTA UNIV EDMONTON DEPT OF STATISTICS AND APPLIED PROBABILITY

(U) The Partially Observed Stochastic Minimum Principle.

DESCRIPTIVE NOTE: Rept. for 30 Sep 86-30 Sep 87,

NOV 87 20P

PERSONAL AUTHORS: Baras, John; Elliott, Robert J.; Kohlmann, Michael

CONTRACT NO. AFOSR-86-0332

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-87-1039

UNCLASSIFIED REPORT

ABSTRACT: (U) The focus of this research is the filtering jump processes. To investigate the filtering of manifold valued processes, their approximation by random walks and Markov chains was studied. The object was to approximate a signal process by a finite-state jump process for which a finite dimensional filter is available. The Partially Observed Stochastic Minimum Principle: A minimum principle for a partially observed diffusion can be obtained by differentiating the statement that a control u* is optimal. The results on stochastic flows enable us to compute in an easy and explicit way the change in the cost due to a strong variation of an optical control. The only technical difficulty is the justification of the differentiation.

DESCRIPTORS: (U) *STOCHASTIC CONTROL, *OPTIMIZATION, COSTS, FLOW, MARKOV PROCESSES, SIGNAL PROCESSING, STOCHASTIC PROCESSES, MATHEMATICAL FILTERS, APPROXIMATION(MATHEMATICS), OPEN LOOP SYSTEMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A189 786 12/2

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF COMPUTER SCIENCE

(U) Numerical Methods for Singularly Perturbed Differential Equations with Applications.

DESCRIPTIVE NOTE: Annual rept. 1 Jun 86-31 May 87,

MAY 87 12P

PERSONAL AUTHORS: Flaherty, Joseph E.

CONTRACT NO. AFOSR-85-0158

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1828

UNCLASSIFIED REPORT

ABSTRACT: (U) Research was continued on the development and applications of adaptive numerical methods for singularly perturbed initial-boundary value problems for partial differential equations. Analysis is made of mesh moving schemes, examined local refinement methods, and developed a posteriori error estimation technique for none-and-two-dimensional hyperbolic and parabolic problems. Development has begun on parallel versions of some adaptive procedures. These methods are applied to several interesting physical problems, that arise in, e.g. , elastic-plastic deformation, combustion, and fluid mechanics.

DESCRIPTORS: (U) *NUMERICAL METHODS AND PROCEDURES, *PARTIAL DIFFERENTIAL EQUATIONS, *PERTURBATIONS, ADAPTATION, ADAPTIVE SYSTEMS, BOUNDARY VALUE PROBLEMS, COMBUSTION, ELASTIC PROPERTIES, ERRORS, ESTIMATES, FLUID MECHANICS, MESH, MOTION, PARABOLAS, PHYSICAL PROPERTIES, PLASTIC PROPERTIES, PLASTIC DEFORMATION, TWO DIMENSIONAL, FINITE ELEMENT ANALYSIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A189 785 7/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) A New Preparation of Ketenes for Intramolecular Cycloadditions,

APR 87 4P

PERSONAL AUTHORS: Brady, William T.; Marchand, Alan P.; Giang, Y. F.; Wu, An-Hsiang

CONTRACT NO. AFOSR-84-0085

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1838

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Synthetic Organic Chemistry, n4 p395-396 Apr 87.

ABSTRACT: (U) A new preparation of ketenes for intramolecular cycloadditions involves a one-pot synthesis from the appropriate carboxylic acid to the ketene cycloaddition product. A tosylate leaving group rather than the conventional halide ion provides several advantages. Keywords: Ketenes, Intramolecular cycloadditions, Tosylates, Keytones, Alkenes.

DESCRIPTORS: (U) *ALKENES, *KETENES, *PREPARATION, CARBOXYLIC ACIDS, HALIDES, IONS, REPRINTS.

AD-A189 784 5/8 8/4

DUKE UNIV DURHAM NC DEPT OF PSYCHOLOGY

(U) On Categorizing Sounds.

DESCRIPTIVE NOTE: Final technical rept. 1 Aug 85-31 Jul 87,

NOV 87 19P

PERSONAL AUTHORS: Lockhead, Gregory R.

CONTRACT NO. AFOSR-85-0302

PROJECT NO. 2313

TASK NO. A8

MONITOR: AFOSR TR-87-1912

UNCLASSIFIED REPORT

ABSTRACT: (U) Judgements of sounds depend on context. How a sound is labeled depends on the sounds that just occurred (sequence effects) and the sounds that might occur (set effects or range effects). These dependencies are sufficiently large that they sometimes predict performance better that the stimulus itself. This report summarizes studies of context conducted during two years of AFOSR support. These studies of sound classification evaluated features of a memory model constructed to account for univariate judgments. The data show how response variability depends on stimulus variability, and demonstrate the importance of experimental details such as whether feedback is given and whether an identification function is present. It is concluded that three variables are needed to describe the collection of results. These are the stimulus itself, the stimulus or response (depending on feedback) on the just prior trial, the stimulus or response (depending on feedback) on the just prior trial, and an average (called a memory pool) of the stimuli on each of several earlier trials.

DESCRIPTORS: (U) *CLASSIFICATION, *PSYCHOACOUSTICS, *JUDGEMENT(PSYCHOLOGY), COLLECTION, IDENTIFICATION, MODELS, RESPONSE, SEQUENCES, SOUND, STIMULI, VARIABLES, VARIATIONS, MEMORY(PSYCHOLOGY), SEQUENTIAL ANALYSIS.

AD-A189 785

AD-A189 784

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A189 784 CONTINUED

IDENTIFIERS: (U) Univariate analysis.

AD-A189 782 6/4 20/1 23/3

LOYOLA UNIV OF CHICAGO IL PARMLY HEARING INST

(U) Complex Sound Processing: An Interdisciplinary Approach.

DESCRIPTIVE NOTE: Final rept. 1 Oct 86-1 Oct 87,

NOV 87 4P

PERSONAL AUTHORS: Yost, William A.; Fay, Richard R.; Shofner, William

CONTRACT NO. AFOSR-87-0054

PROJECT NO. 2917

TASK NO. A4

MONITOR: AFOSR TR-87-1931

UNCLASSIFIED REPORT

ABSTRACT: (U) Complex sounds describe most of the sounds that are perceived in our everyday life. However, most of our present knowledge is required about the neural process studying simple sounds. More knowledge is required about the neural processing of complex signals and about how animals process similar complex sounds. This proposal was to purchase two real-time, high-speed data acquisition computers similar to the one used for the human perception research at the Parmly Hearing Institute. These computers, MASSCOMPs, will be used to generate stimuli and to analyze behavioral and neurophysiological response. The research in these projects involves the human perception of complex stimuli, and combined animal behavior and neurophysiological measures of some of these stimuli, and combined animal behavior and neurophysiological measures of some of these stimuli. The physiological studies include measurements within the eighth nerve and at the level of the cochlear nucleus of the auditory system. In order to relate these measures to the animal's ability to process these stimuli a series of animal behavioral studies are described. The addition of these computer was essential for the full benefit of a multidisciplinary study of the processing of complex sounds. Keywords: Complex sound processing, Hearing, Psychophysics, Physiology.

AD-A189 784

AD-A189 782

AD-A189 782 CONTINUED

DESCRIPTORS: (U) *HEARING, *BIONICS, *AUDITORY SIGNALS, *AUDITORY PERCEPTION, ANIMALS, BEHAVIOR, COCHLEAR NERVE, COMPUTERS, DATA ACQUISITION, HIGH VELOCITY, HUMANS, MEASUREMENT, NERVOUS SYSTEM, NEUROPHYSIOLOGY, NUCLEI(BIOLOGY), PERCEPTION(PSYCHOLOGY), PHYSIOLOGICAL EFFECTS, PHYSIOLOGY, PROCESSING, PROCUREMENT, PSYCHOPHYSICS, REAL TIME, RESPONSE(BIOLOGY), SIGNALS, SOUND, STIMULI, AUDITORY NERVE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A4.

AD-A189 781 6/4

YALE UNIV NEW HAVEN CONN SCHOOL OF MEDICINE

(U) Laboratory Equipment Update.

DESCRIPTIVE NOTE: Final rept. 1 Sep 86-31 Aug 87,

OCT 87 14P

PERSONAL AUTHORS: Hirsch, Joy

CONTRACT NO. AFOSR-86-0308

PROJECT NO. 2917

TASK NO. A4

MONITOR: AFOSR
TR-87-1728

UNCLASSIFIED REPORT

ABSTRACT: (U) We have digitized the cone centers of a primate and a human photoreceptor lattice and have determined that the Nyquist limit predicts visual resolution out to nearly two degrees of retinal eccentricity. Beyond 2 degrees lattice disorder appears to have a deleterious factors between cone density and aperture size. A developing model of lattice structure and design strategies reflects complex principles involved in the evolution of human spatial vision. We are currently exploring a bottom up model of human vision where sampling limitations are propagated along the spatial vision processing hierarchy. The observations that this model addresses include a new class of two dimensional spatial discriminated more accurately than the bisection of two points of comparable separation. This discovery has led to the development of two additional lines of research, area discrimination and dot density discrimination. We have identified a fundamental similarity between spatial frequency discrimination and vernier acuity that demonstrates that Weber's Law applied similarity to both tasks. Further, we have shown that two-dot vernier discrimination falls off within two degrees of retinal eccentricity similarly to changes in retinal sampling. These findings contribute to a model of spatial discriminations that includes limits imposed at the sampling level of the visual process.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 781 CONTINUED

DESCRIPTORS: (U) *VISION, *PHOTORECEPTORS, *ANATOMICAL MODELS, ACUITY, APERTURES, CONICAL BODIES, DENSITY, DISCRIMINATION, ECCENTRICITY, FREQUENCY, HIERARCHIES, HUMANS, LABORATORY EQUIPMENT, LIMITATIONS, MODELS, PROCESSING, RETINA, SAMPLING, SEPARATION, SIZES(DIMENSIONS), SPATIAL DISTRIBUTION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A4.

AD-A189 772 20/6

BDM CORP MCLEAN VA

(U) Applications of Optical Computing to Problems with Symbolic Computations.

DESCRIPTIVE NOTE: Quarterly rept. no. 7, 1 Aug 86-1 Nov 87,

OCT 87 · 5P

PERSONAL AUTHORS: Kushner, Brian G.

CONTRACT NO. F49620-86-C-0030

PROJECT NO. 4952

TASK NO. 02

MONITOR: AFOSR
TR-87-1743

UNCLASSIFIED REPORT

ABSTRACT: (U) This report, experimentally demonstrates digital all-optical Compare and Energy circuits based on our original designs. The circuits uses ZnS bistable optical devices in novel operational modes such as bidirectional and latching logic. These modes are central to the low complexity of the implementation. In addition, the experimental demonstration utilizes polarization multiplexing and filtering to reduce crosstalk, losses and feedback in the optical system. The capabilities of optical interconnection networks are generally useful in parallel processing and specifically useful in sorting.

DESCRIPTORS: (U) *BISTABLE DEVICES, *CIRCUIT INTERCONNECTIONS, *COMPUTATIONS, *LATCHES, *MULTIPLEXING, *OPTICAL CIRCUITS, *OPTICAL EQUIPMENT, *OPTICAL PROCESSING, *PARALLEL PROCESSING, ARIZONA, CIRCUITS, CROSSTALK, ENERGY, LOGIC, NETWORKS, OPTICAL PROPERTIES, OPTICS, POLARIZATION, SYMBOLS.

IDENTIFIERS: (U) WUAFOSR495202, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 765 5/8 6/4 14/2

WISCONSIN UNIV-MILWAUKEE DEPT OF PSYCHOLOGY

(U) Mechanisms Mediating Perception of Complex Acoustic Patterns.

DESCRIPTIVE NOTE: Final rept. 1 Aug 86-30 Jul 87,

NOV 87 4P

PERSONAL AUTHORS: Warren, Richard M.

CONTRACT NO. AFOSR-86-0304

PROJECT NO. 2917

TASK NO. A4

MONITOR: AFOSR TR-87-1636

UNCLASSIFIED REPORT

ABSTRACT: (U) Five items of equipment were acquired under this instrumentation grant: a filter system for audio waveforms, a two channel audio synthesizer, a two track recorder, a two channel FFT system, and a sound spectrograph. All are used in a laboratory devoted to the relationship between acoustic features and auditory perception. Keywords: Human hearing; Psychophysics; Instrumentation.

DESCRIPTORS: (U) *AUDITORY PERCEPTION, *HEARING, *PSYCHOACOUSTICS, *LABORATORY EQUIPMENT, ACOUSTICS, DUAL CHANNEL, FILTERS, HUMANS, PATTERNS, PSYCHOPHYSICS, RECORDING SYSTEMS, SOUND, SPECTROGRAPHS, SYNTHESIS, WAVEFORMS, TAPE RECORDERS, FREQUENCY SYNTHESIZERS, FAST FOURIER TRANSFORMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A4.

AD-A189 765

AD-A189 763 20/12

COLORADO STATE UNIV FORT COLLINS DEPT OF ELECTRICAL ENGINEERING

(U) Gas Source MBE (Molecular Beam Epitaxy).

DESCRIPTIVE NOTE: Final rept. 1 Oct 86-10 Sep 87,

NOV 87 12P

PERSONAL AUTHORS: Robinson, Gary Y.

CONTRACT NO. AFOSR-87-0028

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR TR-87-1742

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes the equipment acquired and the research performed under the DoD University Research Instrumentation Program grant for 'Gas Source MBE' at Colorado State University. The objective of the research supported by the grant is to grow epitaxial III-V semiconductor films using gaseous materials for molecular beam epitaxy (MBE). The grant provided the critical equipment items needed to customize the existing commercial MBE system and allow growth of heteroepitaxial structures that can not be fabricated by other techniques. The resulting gas source MBE materials could provide the optoelectronic device technology required for the high data rate signal processing of the vast quantities of input data expected in future DoD space and ground-based sensing systems. Keywords: Molecular beam epitaxy.

DESCRIPTORS: (U) *EPITAXIAL GROWTH, *SEMICONDUCTING FILMS, CRITICAL ASSEMBLIES, DATA RATE, DETECTION, ELECTROOPTICS, GASES, GROUND LEVEL, GROUP III COMPOUNDS, GROUP V COMPOUNDS, GROWTH(GENERAL), HIGH RATE, INPUT, MATERIALS, MOLECULAR BEAMS, QUANTITY, SIGNALS, SOURCES, STRUCTURES, TEST EQUIPMENT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A3.

AD-A189 763

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 762 7/4

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF CHEMISTRY

(U) On the Characterization of the Dipolar Spin-Spin Interaction in Molecular Systems: A Symbolic Matrix Element Approach.

NOV 87 7P

PERSONAL AUTHORS: Jensen, James O.; Yarkony, David R.

CONTRACT NO. AFOSR-86-0110

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-88-0052

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v141 n5 p391-396, 20 Nov 87.

ABSTRACT: (U) A procedure for constructing H(ss)C(1) using the symbolic matrix method introduced by Liu and Yoshimine has been developed. Here H(ss) is the dipolar spin-portion of the Breit-Pauli interaction and C(I) satisfies H(0)-E(I)(0) C(I) where H is the non-relativistic electronic Born-Oppenheimer Hamiltonian. This approach permits, for the first time, treatment of H(ss) in the large configuration state function (CSF) spaces (100,000-1,000,000 terms) presently used in the context of direct CI methods for the characterization of a non-relativistic wavefunction. For systems containing only light atoms, relativistic effects are well characterized by the Breit-Pauli interaction (H(BP)). Recently there has been considerable interest in the characterization of phenomena originating as a result of this interaction using post Hartree-Fock, ab initio electronic structure techniques . These investigations have concentrated principally on the spin-orbit part (H(so) of (H(BP) with the aim of characterizing non-adiabatic spin forbidden chemical reactions (involving singlet and triplet potential energy surfaces), spin forbidden radiative transitions and fine structure splittings.

AD-A189 762

AD-A189 762 CONTINUED

DESCRIPTORS: (U) *ATOMS, *DIPOLES, *HARTREE FOCK APPROXIMATION, *INTERACTIONS, *SPINNING(MOTION), CHEMICAL REACTIONS, ELECTRONICS, LIGHT, MOLECULAR STRUCTURE, RADIATIVE TRANSFER, SPLITTING, TRANSITIONS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 761 20/2 7/2

PITTSBURGH UNIV PA SURFACE SCIENCE CENTER

(U) The Epitaxial Formation of Adsorbed Multilayers as Studied by ESDIAD: NH3 Adsorption on Top of Chemisorbed CO on Nickel Crystal Surfaces,

87 15P

PERSONAL AUTHORS: Lanzillotto, Ann-Marie; Dresser, Miles J.; Alvey, Mark D.; Yates, John T., Jr

CONTRACT NO. AFOSR-82-0133

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR TR-88-0016

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Surface Science, v191 p15-27 1987.

ABSTRACT: (U) The epitaxial growth of an adsorbed layer of NH3 on top of chemisorbed CO on Ni(111) and Ni(110) surfaces was studied using ESDIAD. A strong interaction yielding an activation energy for NH3 desorption of 12 kcal/mol was observed. This interaction, possibly involving hydrogen bonding, between the adsorbed NH3 and adsorbed CO causes a tilting of the NH3 molecules on the CO-covered Ni surfaces. For the NH3/CO/Ni(110) system, the two-fold symmetry of the underlying Ni substate is transmitted through the CO spacer layer to the NH3 overlayer. This symmetry transfer was not observed for the NH3/CO/Ni(111) system at the current resolution of our ESDIAD detection system. Keywords: Chemisorption, Multilayers, Epitaxy, Ammonia, Nickel, Carbon, Monoxide.

DESCRIPTORS: (U) *AMMONIA, *CHEMISORPTION, *EPITAXIAL GROWTH, *NICKEL, ACTIVATION ENERGY, CARBON MONOXIDE, CRYSTALS, DETECTORS, HYDROGEN BONDS, RESOLUTION, SURFACES, SYMMETRY, TWO DIMENSIONAL, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A2.

AD-A189 761

AD-A189 760 7/4 7/2

PITTSBURGH UNIV PA SURFACE SCIENCE CENTER

(U) The Direct Observation of Hindered Rotation of a Chemisorbed Molecule: PF3 on Ni(111),

DEC 87 9P

PERSONAL AUTHORS: Alvey, Mark D.; Yates, John T., Jr.; Uram, Kevin J.

CONTRACT NO. AFOSR-88-0107

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR TR-88-0054

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v87 n12 p7221-7228, 15 Dec 87.

ABSTRACT: (U) By using the bond direction imaging capabilities of the electron stimulated desorption ion angular distribution (ESDIAD) technique, we have observed a thermally induced azimuthal disorder effect due to the thermal population of unbound hindered rotor states in chemisorbed PF3 on Ni(111). The six beam F+ ESDIAD patterns observed for PF3 on Ni(111) are interpreted as evidence for a weak barrier that hinders the rotation of isolated PF molecules on the Ni(111) surface. At a coverage of approx 0.04 PF3/Ni, a barrier to rotation of approx.80 + or - 20 per cm is estimated from the observed temperature dependence of the F+ ESDIAD patterns using a two-dimensional hindered rotor model. The PF3 coverage dependence of the thermally induced azimuthal disorder effect indicates that intermolecular forces are responsible for an increase in the hindering potential at high PF3 coverages. Keywords: Hindered rotor; Chemisorption; Nickel; Phosphorus compounds; Fluorides.

DESCRIPTORS: (U) *BONDING, *CHEMISORPTION, *NICKEL, *PHOSPHORUS COMPOUNDS, BARRIERS, FLUORIDES, IMAGES, LOW STRENGTH, MODELS, MOLECULES, OBSERVATION, ROTORS, TEMPERATURE, REPRINTS.

AD-A189 760

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 760 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2302A2.

AD-A189 756 7/2

PITTSBURGH UNIV PA SURFACE SCIENCE CENTER

(U) Interaction between NH3 and CO on the Ni(111) and (110) Surfaces: A Study by ESDIAD,

87 15P

PERSONAL AUTHORS: Dresser, Miles J.; Lanzillotto, Ann-Marie; Alvey, Mark D.; Yates, John T., Jr

CONTRACT NO. AFOSR-82-0133

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR TR-88-0011

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Surface Science, v191 p1-14 1987.

ABSTRACT: (U) The interaction between adsorbed NH3 and adsorbed CO molecules on two Ni single crystal planes has been investigated using ESDIAD and temperature programmed desorption (TPD). Interactions have been observed on both surfaces which influence the ESDIAD patterns of both adsorbed species. Evidence for long distance azimuthal orientation interactions of NH3 with CO on Ni(110) is observed, whereas shorter distance interactions are observed on Ni(111). In the case of the short distance CO. ..NH3 interactions on Ni(111), a tipping of the C3v axis of NH3 away from the normal is seen. The role of the substrate crystal structure is shown to be important in determining the character of the intermolecular interactions on the two surfaces. Keywords: Chemisorption, Adsorbate interactions, Adsorbate structure, Hydrogen bonding, Ammonia, Nickel, Carbon monoxide.

DESCRIPTORS: (U) *AMMONIA, *CARBON MONOXIDE, *MOLECULE MOLECULE INTERACTIONS, ADSORPTION, CHEMISORPTION, COMPUTER PROGRAMMING, CRYSTAL STRUCTURE, DESORPTION, HYDROGEN BONDS, NICKEL, SINGLE CRYSTALS, SUBSTRATES, CRYSTAL LATTICES, MOLECULAR ENERGY LEVELS, CHEMICAL BONDS, ISOTROPISM, REPRINTS.

AD-A189 760

AD-A189 756

AD-A189 756 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A2.

AD-A189 755 12/4

FLORIDA UNIV GAINESVILLE DEPT OF MATHEMATICS

(U) On the Regulator Problem with Internal Stability,

84

PERSONAL AUTHORS: Khargonekar, Pramod P.; Oezgueler, A. B.

CONTRACT NO. DAAG29-81-K-0136, AFOSR-81-0238

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR, ARO
TR-88-0013, 22356.9-MA

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Mathematical Theory of Networks and Systems, Lecture Notes in Control and Information Sciences, n58 p563-573 1984. Sponsored in part by Grant NSF-ECS82-00607.

ABSTRACT: (U) The regulator problem with internal stability is one of the central problems in linear control theory. This problem is motivated by the fact that a typical control system is usually required to track a prescribed signal. Assuming that the disturbances can be modeled as output of a linear, finite-dimensional, time-invariant system (and quite often this is a fair assumption), output stabilization using dynamic compensation is known as the regulator problem. It is well known that the problem of tracking cal also be regarded as a regulator problem by viewing tracking error as the output. A fundamental additional requirement in a regulator problem is the internal stability of the overall feedback system consisting of the plant and the dynamic compensator. This is known as the regulator problem with internal stability (RPIS). In this conference paper, we present certain results obtained in 1982. Here we define RPIS in transfer matrix terms and present a necessary and sufficient solvability condition in terms of skew-primeness of polynomial matrices.

DESCRIPTORS: (U) *CONTROL THEORY, *REGULATORS, COMPENSATION, COMPENSATORS, CONTROL SYSTEMS, DYNAMICS, ERRORS, FEEDBACK, INTERNAL, INVARIANCE, LINEAR SYSTEMS,

AD-A189 756

AD-A189 755

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 755 CONTINUED

OUTPUT, SIGNALS, STABILITY, STABILIZATION, TIME, TRACKING, VIEWERS, TRANSFER FUNCTIONS, MATRICES(MATHEMATICS), REPRINTS.

IDENTIFIERS: (U) Internal stability, PE61102F, WUAFOSR2304A1.

AD-A189 742 4/1

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) A Proposal for the Establishment of a Center of Excellence in Theoretical Geoplasma Research.

DESCRIPTIVE NOTE: nual rept. no. 1, 1 Oct 86- 30 Sep 87, NOV 87

PERSONAL AUTHORS: Chang, Tom

CONTRACT NO. F49620-86-C-0128

PROJECT NO. 3484

TASK NO. A2

MONITOR: AFOSR TR-87-1882

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: All DTIC/NTIS reproductions will be in black and white.

ABSTRACT: (U) Research topics considered include: ionosphere-magnetosphere coupling, high-latitude ionospheric turbulence, charged particle acceleration and heating, nonclassical polar wind, double layers, magnetic reconnection, strong MHD turbulence, plasma radiations induced by moving conducting objects in the low-altitude ionosphere, and F region subvisual polar arcs. Partial Contents: Transverse Acceleration and Heating of Ionospheric Ions and the Formation of Ion Conics: Transverse Heating of Ionospheric Ions along: Auro rl Field Lines by Intense Electromagnetic; Turbulence in the Ion Cyclotron Range of Frequencies; Acceleration of Ionospheric Ions by Lower Hybrid Waves in the Boundary Plasma Sheet; Two-Dimensional Particle-in-Cell Plasma Simulation of High-Latitude Lower Hybrid Turbulence and Charged Particle Acceleration; Ionospheric-Magnetosphere-S olar Wind Coupling Processes; Study of Detailed Particle Distribution and Pitch Angle Scattering in the Diffuse Aurora; A New Nonclassical Polar Wind Theory; and Plasma Radiations in the Low-Altitude Ionosphere; Due to Moving Conducting Objects.

DESCRIPTORS: (U) *AURORAE, *MAGNETOHYDRODYNAMICS,

AD-A189 755

AD-A189 742

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 742 CONTINUED

*MAGNETOSPHERE, *IONOSPHERIC DISTURBANCES, ACCELERATION, ANGLES, BOUNDARIES, CHARGED PARTICLES, CYCLOTRONS, DIFFUSION, DISTRIBUTION, HEATING, HIGH LATITUDES, HYBRID SYSTEMS, IONOSPHERE, IONS, LAYERS, LOW ALTITUDE, PARTICLES, PITCH(INCLINATION), PLASMAS(PHYSICS), POLAR REGIONS, SCATTERING, SHEETS, THEORY, TRANSVERSE, TURBULENCE, WIND, SYMPOSIA, DIGITAL SIMULATION, MONTE CARLO METHOD, PLASMA WAVES.

IDENTIFIERS: (U) Ion conics, Plasma sheets.

AD-A189 739 12/3

MASSACHUSETTS INST OF TECH CAMBRIDGE LAB FOR INFORMATION AND DECISION SYSTEMS

(U) Structural Decomposition of Multiple Time Scale Markov Processes,

OCT 87 11P

PERSONAL AUTHORS: Rohlicek, J. R.; Willsky, A. S.

REPORT NO. LIDS-P-1711

CONTRACT NO. AFOSR-82-0258

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-87-1852

UNCLASSIFIED REPORT

ABSTRACT: (U) A straightforward algorithm for the multiple time scale decomposition of singularly perturbed Markov processes has been presented. That algorithm provides a uniform approximation of the probability transition function over the interval t > or = 0 through the construction of a sequence of aggregate models valid at successively slower time scales. When only the structure of these models is desired, the algorithm can be expressed simply in terms of graphs associated with each of the aggregated models. The major computation then becomes computing shortest paths in these graphs. This representation of the algorithm furthermore allows analysis of more complex systems where there are multiple perturbation parameters with unknown relative orders of magnitude. Keywords: Markov processes; Singular perturbation; Multiple time scales; Graph theory.

DESCRIPTORS: (U) *MARKOV PROCESSES, ALGORITHMS, DECOMPOSITION, GRAPHS, MODELS, PERTURBATIONS, PROBABILITY DISTRIBUTION FUNCTIONS, SCALE, SEQUENCES, STRUCTURAL PROPERTIES, THEORY, TIME, TRANSITIONS.

IDENTIFIERS: (U) Graph theory, PE61102F, WUAFOSR2304A1.

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AD-A189 739

AD-A189 737 7/2 11/8.1 7/4

RHODE ISLAND UNIV KINGSTON

(U) Summary of the 1987 Gordon Research Conference on Corrosion.

DESCRIPTIVE NOTE: Final rept. 19-24 Jul 87,

JUL 87 15P

PERSONAL AUTHORS: Meier, G. H.

CONTRACT NO. AFOSR-87-0314

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR
TR-87-1732

UNCLASSIFIED REPORT

ABSTRACT: (U) The 1987 Gordon Research Conference on Corrosion covered a cross-section of important areas in the field of high temperature corrosion: transport in oxide films, microchemical analysis of oxide films, stresses in oxide films and film adherence, effects of erosion and applied stresses on oxidation, hot corrosion, oxidation of titanium and the refractory metals, and oxidation of silicon and silicon-containing alloys. In addition to the lectures a significant number of poster papers (list attached) were also presented.

DESCRIPTORS: (U) *ALLOYS, *CORROSION, *OXIDATION, *SILICON, *METALS, CHEMISTRY, EROSION, FILMS, HIGH TEMPERATURE, MICROANALYSIS, OXIDES, REFRACTORY METALS, SILICON COMPOUNDS, STRESSES, TITANIUM, SYMPOSIA.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A2.

AD-A189 737

AD-A189 736 7/4

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) On the Born and Markov Approximations: Phonon Relaxation and Coherent Excitation of Adsorbed Molecules,

NOV 87

PERSONAL AUTHORS: Van Smaalen, Sander; George, Thomas F.

CONTRACT NO. F49620-86-C-0009

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-87-1934

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub in Jnl. of Chemical Physics, v87 n9 p5504-5511, 1 Nov 87.

ABSTRACT: (U) The phonon relaxation of the vibrational adbond of an adsorbed molecule and a phonon damped adbond irradiated by a laser are studied. Approximations are made within the Zwanzig projection operator formalism to arrive at a master equation for the reduced density operator of a small subsystem (the adbond) in contact with a reservoir (the phonons). The conditions of validity for the Born and Markov approximations are derived. It is shown that the master equation is only valid for times tau sub c, where tau sub c is the characteristic time of the reservoir. These results are applied to the phonon relaxation of the vibrational adbond of physisorbed molecules. It is shown that for carbon monoxide adsorbed on nickel or copper (a strongly-bound physisorbed system) argon on tungsten, numerical results show that these approximations can be made. Finally, an adbond interacting with both laser radiation and lattice vibrations is considered. This system can be regarded as a subsystem (the adbond) in contact with two reservoirs, where the conditions for validity of the Markov approximation are then seen to be more severe than when each reservoir is considered independently. For the phonons, these conditions can never be matched. For an initial state given by an adbond in equilibrium with the

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A189 736 CONTINUED

lattice vibrations, the conditions for validity of the approximation prove to be the same as for the phonons and the laser considered independently.

DESCRIPTORS: (U) *ADSORPTION, *APPROXIMATION(MATHEMATICS), *LASERS, *MARKOV PROCESSES, *MOLECULES, *PHONONS, ARGON, CARBON MONOXIDE, COHERENCE, COPPER, DENSITY, EQUATIONS, EXCITATION, LASER BEAMS, NICKEL, NUMERICAL ANALYSIS, OPERATORS(PERSONNEL), REDUCTION, RELAXATION, REPRINTS, RESERVOIRS, TUNGSTEN, VALIDATION.

AD-A189 736

AD-A189 735 7/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Lewis Acid Promoter Reaction of Pentacyclo(5.4.0.0(2,6).0(3,10).0(5,9))undecane-8,11-dione with Ethyl Diazoacetate: A Synthetic Entry into the Pentacyclo(6.5.0.0(4,12).0(5,10).0(9,13)tridecane Ring System,

87

PERSONAL AUTHORS: Marchand, Alan P.; Arney, Benny E., Jr.; Gilardi, Richard; Flippen-Anderson, Judith L.

CONTRACT NO. AFOSR-84-0085

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-87-1839

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub in Jnl. of Organic Chemistry, v52 p3455-3457 1987.

ABSTRACT: (U) Reaction of pentacyclo(5.4.0.(2),(6).0(3),(10).0(5,9)undecane-8,11-dione with ethyl diazoacetate (2 equivalents) in the presence of boron trifluoride etherate affords a single 2:1 adduct, diethyl pentacyclo-(6.5.0.0(4,12).0(5,10).0(9,13)tridecane-3.6-dione-2-7-dicarboe (3a, 45% yield). The structure of 3a was established via single crystal X ray structural analysis. When 3a was refluxed with aqueous sulfuric acid or heated with sodium chloride in dimethylsulfoxide, hexacyclo(6.5.0.0(3,7).0(5,10).0(9,13)-tridecane--one (4) was produced in 70% and 97% yield, respectively. Reaction of 4 with phosphorus pentachloride afforded diethyl 3,6-dichloropentacyclo(6.5.0.0(4,12).0(5,10).0(9,12)tridecane-2.6-diene-2.7-dicate (5, 36%). Compound 5 could not be photocyclized to the corresponding homohexaprisamne, 6. Keywords: Pentacycloundecanes, Ring expansion, Cyclic compounds, Ethyl diazoacetate, Boron trifluoride etherate.

DESCRIPTORS: (U) *CYCLIC COMPOUNDS, *DECANES, BORON COMPOUNDS, CHLORIDES, ETHERS, FLUORIDES, LIQUIDS, PHOSPHORUS, SODIUM CHLORIDE, SULFURIC ACID, SYNTHESIS(CHEMISTRY), CATALYSTS, CATALYSIS, ETHYL

AD-A189 735

AD-A189 735 CONTINUED

RADICALS, DIAZO COMPOUNDS, ACETATES, REPRINTS.

IDENTIFIERS: (U) Lewis acids, Acetate/Ethyl diazo, Decane(tri)/Pentacyclo, Etherate/Boron trifluoride, WUAFOSR2303B2, PE61102F.

AD-A189 734 14/4 20/5 14/2

NORTHWESTERN UNIV EVANSTON IL DEPT OF MATERIALS SCIENCE

(U) Correlation Analysis of Structure Images,

87 3P

PERSONAL AUTHORS: Buckett, M. I.; Marks, L. D.; Luzzi, D. E.

CONTRACT NO. AFOSR-86-0344

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR TR-87-1933

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub in Proceedings of the Annual Meeting of the Electron Microscopy Society of America (45th), p752-753 1987.

ABSTRACT: (U) A typical high resolution structure image contains a large amount of intensity information which is masked by both statistical and amorphous noise. One useful method of quantifying such images is to employ correlation techniques. When one seeks to quantify the atom column positions, correlation techniques can be used to decompose the image into separate motifs (of specific peak amplitudes and positions - each motif corresponding to a single column of atoms), thereby reducing the data to a more manageable form. We have tested the use of cross-correlation to determine atom column positions in high resolution structure images using SEMPER routines implemented on an Apollo 660 work station. A number of image conditions were tested using simple Gaussians as test objects. Our results show that: 1) Provided the motifs are well separated, simple cross-correlation of the motif and the picture gives the peak positions and the peak heights to a very high accuracy even at high noise levels.

DESCRIPTORS: (U) *CORRELATION TECHNIQUES, *HIGH RESOLUTION, *IMAGE PROCESSING, *ATOMIC STRUCTURE, ACCURACY, AMORPHOUS MATERIALS, AMPLITUDE, ATOMS, CORRELATION, CROSS CORRELATION, HIGH RATE, IMAGES,

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 734 CONTINUED

INTENSITY, LEVEL(QUANTITY), NOISE, PEAK VALUES, REPRINTS, SEPARATION, STATISTICS, ELECTRON MICROSCOPY.

IDENTIFIERS: (U) SEMPER computer program, WUAFOSR2303A2, PE61102F.

AD-A189 729 12/4

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J

(U) Controllability and Linearized Regulation,

OCT 87 15P

PERSONAL AUTHORS: Sontag, Eduardo D.

CONTRACT NO. AFOSR-85-0247

PROJECT NO. 2304

MONITOR: AFOSR TR-88-0014

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Automatic Control, vAC-32 n10 p877-888 Oct 87.

ABSTRACT: (U) A nonlinear controllable plant, under mild technical conditions, admits a precompensator with the following property: along control trajectories joining pairs of states, the composite system (precompensator plus plant) is, up to first order, isomorphic to a parallel connection of integrators.

DESCRIPTORS: (U) *CONTROL THEORY, *REGULATORS, CONTROL, INTEGRATORS, REPRINTS, NONLINEAR SYSTEMS, MATRICES(MATHEMATICS).

IDENTIFIERS: (U) Precompensators, PE61102F, WUAFOSR2304.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 727 8/10

WISCONSIN UNIV-MADISON

(U) Micromechanics Models for Unsaturated, Saturated, and Dry Sands.

DESCRIPTIVE NOTE: Final rept. 1 Apr 84-30 Sep 87,

JAN 88

PERSONAL AUTHORS: Jeyapalan, Jey K.; Thiyagaram, M.; Saleira, W. E.

CONTRACT NO. AFOSR-84-0090

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR TR-88-0154

UNCLASSIFIED REPORT

ABSTRACT: (U) In this report, models for saturated and unsaturated soils are reviewed. In addition, the applicability of micromechanics modelling for unsaturated, saturated, and dry sands are explored. The expressions for effective moduli and poisson's ratio are developed for all levels of saturation fo sands. The potential of these models for providing a better understanding of partly saturated soil behavior is also discussed in this report.

DESCRIPTORS: (U) *SATURATION, *SOIL MECHANICS, MODELS, POISSON RATIO, SAND, SOILS, STRESS STRAIN RELATIONS, BULK MODULUS, SOIL MODELS, DRY MATERIALS, DEFORMATION, LOADS(FORCES), VOIDS.

IDENTIFIERS: (U) Saturated soils, Dry sand, Micromechanics, Constitutive models, Partly saturated soils, PE61102F, WUAFOSR2302C1.

AD-A189 727

AD-A189 728 12/9 20/12 12/6

ARIZONA STATE UNIV TEMPE SEMICONDUCTOR MATERIALS RESEARCH LAB

(U) Autonomous Control System for Czochralski Growth of LEC GaAs.

DESCRIPTIVE NOTE: Scientific rept. 1 Jul-30 Sep 87,

DEC 87 23P

PERSONAL AUTHORS: Schwuttke, G. H.; Riedling, Karl; White, Robert C.

CONTRACT NO. F49620-86-C-0012, $$ARPA Order-9099

PROJECT NO. 9099

TASK NO. 03

MONITOR: AFOSR TR-88-0193

UNCLASSIFIED REPORT

ABSTRACT: (U) This program reports research done under DARPA contract number F49620-86-C-0012. The goals of this program include the establishment of autonomous LEC crystal growth and its commercialization. This report provides a short description of the autonomous control system, a detailed description of the digital hardware developed for the control system and the multibus computer system and the computer-puller hardware of the growth system. Technical drawings for the signal processing box and the motor controller board are also given. During the first period (1 year) this system has grown 30 single GaAs crystals with a yield of better than 70% of single crystals. Keywords: Autonomous crystal growth, Expert control system, Gallium arsenides.

DESCRIPTORS: (U) *CONTROL SYSTEMS, *CRYSTAL GROWTH, *CZOCHRALSKI CRYSTALS, *GALLIUM ARSENIDES, *ARTIFICIAL INTELLIGENCE, *DIGITAL COMPUTERS, BOXES, ENGINEERING DRAWINGS, MOTORS, SIGNAL PROCESSING, LIQUIDS, ENCAPSULATION, MICROCOMPUTERS, SINGLE CRYSTALS.

IDENTIFIERS: (U) Expert systems, PE61102F, WUAFOSR909903.

AD-A189 728

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 725 11/6.1

MARYLAND UNIV COLLEGE PARK DEPT OF CHEMICAL AND NUCLEAR ENGINEERING

(U) Fundamental Studies on High Temperature Deformation Recrystallization, and Grain Growth of Two-Phase Materials.

DESCRIPTIVE NOTE: Interim technical rept. 1 Dec 86-30 Nov 87,

JAN 88 132P

PERSONAL AUTHORS: Ankem, S.; Grewal, G.; Vijayshankar, M. N.

CONTRACT NO. AFOSR-85-0367

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR TR-88-0055

UNCLASSIFIED REPORT

ABSTRACT: (U) Two-phase materials are technologically important because optimum properties can be obtained by a proper combination of the two phases. Among these materials, two phase Titanium alloys are of particular interest for high temperature aerospace applications. However, there is a lack of understanding in the areas of high temperature deformation, recrystallization and grain-growth behavior of two-phase alloys in terms of the properties of the component phases. Such an understanding is essential to develop new titanium alloys with greater high temperature strength and stability for high temperature applications. The lack of understanding is due to the complex deformation behavior of these two-phase materials. Whenever a material comprising two or more phases is subjected to stress, the component phases deform differently and this results in inhomogeneous strain and stress distributions. In addition, interaction stresses develop as a result of interactions between the deforming phases. For these reasons, the deformation behavior of two-phase materials cannot be explained by the simple law of mixture rule.

AD-A189 725 CONTINUED

DESCRIPTORS: (U) *DEFORMATION, *GRAIN GROWTH, *TITANIUM ALLOYS, AEROSPACE SYSTEMS, ALLOYS, BEHAVIOR, DISTRIBUTION, HIGH STRENGTH, HIGH TEMPERATURE, INTERACTIONS, MATERIALS, OPTIMIZATION, PHASE, PHASE STUDIES, RECRYSTALLIZATION, STRESSES, TWO PHASE FLOW.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A1.

AD-A189 725

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 724 9/1 14/2

NORTH CAROLINA STATE UNIV AT RALEIGH DEPT OF ELECTRICAL AND COMPUTER ENGINEERI NG

(U) Instrumentation for the Characterization and Development of Millimeter Wave Components Compatible with Monolithic Integration.

DESCRIPTIVE NOTE: Final rept. Aug 86-Nov 87,

JAN 88 33P

PERSONAL AUTHORS: Trew, R. J.

CONTRACT NO. AFOSR-86-0262

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR TR-88-0033

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes the design and development of a W-band (75-110 GHz) vector automatic network analyzer. The system was funded under the DoD sponsored University Research Instrumentation Program. The W-band system will be located in the Microwave Laboratory located in the Electrical and Computer Engineering Department of North Carolina State University. The equipment funded under this program will interface with an existing Hewlett-Packard 8510A automatic network analyzer and will extend the operating frequency range of this instrument to the millimeter-wave bands. Currently, the system is limited to an upper frequency of 26.5 GHz. The enhanced system will permit research to be performed in the area of millimeter-wave characterization of solid-state devices. In particular, we are interested in performing S-parameter measurements on experimental mm-wave devices in order to determine ultimate frequency and performance limitations. It is anticipated that information of this type will contribute to research directed towards developing optimized solid-state devices for mm-wave applications.

DESCRIPTORS: (U) *ANALYZERS, *INSTRUMENTATION, *SOLID STATE ELECTRONICS, AUTOMATIC, BANDS(STRIPS), COMPUTERS,

AD-A189 724

AD-A189 724 CONTINUED

ELECTRICAL ENGINEERING, ENGINEERING, FREQUENCY, LABORATORIES, MICROWAVES, MILLIMETER WAVES, NETWORKS, NORTH CAROLINA, OPTIMIZATION, UNIVERSITIES, VECTOR ANALYSIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A189 721 12/3

ALBERTA UNIV EDMONTON DEPT OF STATISTICS AND APPLIED PROBABILITY

(U) Martingale Representation and the Malliavin Calculus.

DESCRIPTIVE NOTE: Rept. for 30 Sep 86-30 Sep 87,

NOV 87 13P

PERSONAL AUTHORS: Elliott, Robert J.; Kohlmann, Michael

CONTRACT NO. AFOSR-86-0332

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-87-1845

UNCLASSIFIED REPORT

ABSTRACT: (U) Using the theory of stochastic flows the integrand in a stochastic integral is identified. After some rearrangement this integrand is itself written in terms of a martingale which can be expressed as a stochastic integral, and by recursively repeating the representation a homogeneous chaos expansion is obtained. Using the stochastic integral representation an integration by parts formula is then derived. If the inverse of the Malliavin matrix M belongs to all the spaces L superscript p (Omega) we show a random variable has a smooth density. The difficult questions concerning the relationship between Hoermander's conditions on the coefficient vector fields and the integrability of 1/M are not discussed, but, at least for Markov flows, the discussion below appears to be an elementary treatment of some ideas of the Malliavin calculus.

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, *MATHEMATICAL FILTERS, CALCULUS, COEFFICIENTS, FORMULATIONS, INTEGRALS, INTEGRATION, THEORY, VECTOR ANALYSIS, BROWNIAN MOTION.

IDENTIFIERS: (U) *Jump processes, Martingales, Malliavin calculus, Stochastic minimum principle, Smoothing, Kolmogorov equations, PE61102F, WUAFOSR2304A1.

AD-A189 721

AD-A189 720 12/3

ALBERTA UNIV EDMONTON DEPT OF STATISTICS AND APPLIED PROBABILITY

(U) The Adjoint Process in Stochastic Optimal Control.

DESCRIPTIVE NOTE: Rept. for 30 Sep 86-30 Sep 87,

NOV 87 17P

PERSONAL AUTHORS: Elliott, Robert J.; Kohlmann, Michael

CONTRACT NO. AFOSR-86-0332

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-87-1846

UNCLASSIFIED REPORT

ABSTRACT: (U) The focus of this research is the filtering jump processes. To investigate the filtering of manifold valued processes, their approximation by random walks and Markov chains was studied. The object was to approximate a signal process by a finite state jump process for which a finite dimensional filter is available. Four papers were published during the past year, including The existence of smooth densities for the prediction, filtering and smoothing problems and The partially observed stochastic minimum principle. Using stochastic flows a minimum principle is obtained when a diffusion is controlled using stochastic open loop controls. An equation for the adjoint process is then derived using an explicit formula for the integrand in a certain stochastic integral.

DESCRIPTORS: (U) *OPTIMIZATION, *STOCHASTIC CONTROL, DENSITY, FLOW, MARKOV PROCESSES, OPEN LOOP SYSTEMS, SIGNAL PROCESSING, SIZES(DIMENSIONS), STOCHASTIC PROCESSES, MATHEMATICAL FILTERS, DIFFERENTIAL EQUATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A189 720

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 713 11/2 7/6

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Siloxane Modified SiO2-TiO2 Glasses Via Sol-Gel.

88 6P

PERSONAL AUTHORS: Parkhurst, C. S.; Doyle, W. F.; Silverman, L. A.; Singh, S.; Andersen, M. P.

CONTRACT NO. AFOSR-85-0026

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-87-1873

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Materials Research Society Symposium Proceedings, v73 p76-763 1986.

ABSTRACT: (U) Polydimethylsiloxane (PDMS)-modified Silicon dioxide-Titanium dioxide glasses have been prepared via the sol-gel route. Polymer compositions varied between 17 and 67 wt% PDMS, using PDMS of molecular weights 1,700 and 36,000. Also varied was the Silicon/titanium ratio for a given polymer content and the nature of the Ti alkoxide. A general synthetic procedure was found which made optically clear samples. Dense monolithic structures were obtained at room temperature for all compositions. The room temperature densification is attributed to relaxation and flow in the sample due to the presence of the polymer. The effects on properties of the overall composition and molecular weight of the polymer are reported, and implications in terms of structural models are considered.

DESCRIPTORS: (U) *SILICON DIOXIDE, *TITANIUM DIOXIDE, *GLASS, COMPOSITION(PROPERTY), METHYL RADICALS, MODELS, MOLECULAR WEIGHT, MONOLITHIC STRUCTURES(ELECTRONICS), POLYMERS, RATIOS, ROOM TEMPERATURE, SILICON, SILOXANES, TITANIUM, SILICA GLASS, MICROSTRUCTURE.

IDENTIFIERS: (U) Polydimethylsiloxane, Siloxane/ polydimethyl, PE61102F, WUAFOSR2303A3.

AD-A189 713

AD-A189 704 7/6 7/2

CALIFORNIA UNIV LOS ANGELES DEPT OF CHEMISTRY AND BIOCHEMISTRY

(U) Absorption of Gaseous Iodine by Polythiophene Films and Powders.

88 6P

PERSONAL AUTHORS: Reiss, H.; Kim, Dai-uk

CONTRACT NO. F49620-86-C-0060, $NSF-CHE82-07432

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-87-1844

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v90 n9 p1973-1977 1986.

ABSTRACT: (U) Further determinations of the 'reversible' absorption of iodine (vapor) in both polythiophene films and powders are performed. The films exhibit isotherms of iodine uptake vs. iodine pressure which, at low pressures, are concave downward at low temperatures and concave upward at higher temperatures. This behavior is interpreted in terms of hole-electron equilibria. At a pressure of about 0.68 torr all film isotherms exhibit a discontinuous slope to saturation. The powder isotherms followed those for the film up to the discontinuity, do not exhibit the discontinuity and continue to absorb iodine as the pressure is increased. By mixing helium into the iodine vapor, we demonstrate that the discontinuity occurs when the total gas pressure is in the neighborhood of 0.68 torr. The phenomenon is explained in terms of a electromechanical instability caused by the formation of a Schottky diode at the film-substrate interface.

DESCRIPTORS: (U) *FILMS, *GASES, *IODINE, *POLYMERS, *THIOPHENES, ABSORPTION, DIODES, ELECTROMECHANICAL DEVICES, HELIUM, HIGH TEMPERATURE, INTERFACES, ISOTHERMS, LOW PRESSURE, LOW TEMPERATURE, MIXING, POWDERS, PRESSURE, REVERSIBLE, SATURATION, SCHOTTKY BARRIER DEVICES, SLOPE,

AD-A189 704

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 704 CONTINUED

STABILITY, SUBSTRATES, VAPORS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A189 703 12/1

NEW YORK ACADEMY OF SCIENCES NY

(U) International Conference (3rd) on Combinatorial Mathematics.

DESCRIPTIVE NOTE: Final rept. 1 Mar 85-28 Feb 86,

FEB 86 2P

PERSONAL AUTHORS: Bloom,

CONTRACT NO. AFOSR-85-0104

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-87-1730

UNCLASSIFIED REPORT

ABSTRACT: (U) The conference had four major areas discrete and combinatorial optimization, algorithms and complexity, 2) discrete and computational geometry and robotics, 3) graph theory and combinatorics, and 4) applications and modeling.

DESCRIPTORS: (U) *COMBINATORIAL ANALYSIS, ALGORITHMS, COMPUTATIONS, GEOMETRY, GRAPHS, ROBOTICS, SYMPOSIA, THEORY.

IDENTIFIERS: (U) Graph theory, PE61102F, WUAFOSR2304A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 701 12/3

ALBERTA UNIV EDMONTON DEPT OF STATISTICS AND APPLIED PROBABILITY

(U) Filtering of Jump Processes.

DESCRIPTIVE NOTE: Annual rept. 30 Sep 86-30 Sep 87,

OCT 87 7P

PERSONAL AUTHORS: Elliott, Robert J.

CONTRACT NO. AFOSR-86-0332

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-87-1930

UNCLASSIFIED REPORT

ABSTRACT: (U) The focus of this research is the filtering jump processes. To investigate the filtering of manifold-valued processes, their approximation by random walks and Markov chains was studied. The object was to approximate a signal process by a finite-state jump process for which a finite-dimensional filter is available. Keywords: Filtering, Stochastic control, Minimum principle, Martingale representation, Probability densities, Malliavin calculus.

DESCRIPTORS: (U) *MARKOV PROCESSES, *MATHEMATICAL FILTERS, CALCULUS, FILTERS, SIGNAL PROCESSING, SIZES(DIMENSIONS), STOCHASTIC CONTROL, PROBABILITY DENSITY FUNCTIONS, BROWNIAN MOTION.

IDENTIFIERS: (U) Manifolds(Mathematics), Jump processes, Martingales, Markov chains, Malliavin calculus, WUAFOSR2304AI, PE61102F.

AD-A189 697 12/6 25/5

MARYLAND UNIV COLLEGE PARK SYSTEMS RESEARCH CENTER

(U) Architecture of MRMS Simulation: Distributing Processes,

JAN 87 10P

PERSONAL AUTHORS: Sinha, Velu

CONTRACT NO. AFOSR-87-0073

MONITOR: AFOSR
TR-87-1436

UNCLASSIFIED REPORT

ABSTRACT: (U) The Mobile Remote Manipulator System Simulator is based on an interconnected network of heterogenous computers. The simulation is divided into modules which run concurrently on multiple computers. Modules are designed so that they perform a specific task which can be used in a variety of simulations. As each of these modules is built, it is necessary to provide a method for intermachine/ intermodule communication. This paper describes various methods which can be used for this type of communication, and also describes various standard data formats which are used to get data from module to module in the MRMS Simulator.

DESCRIPTORS: (U) *CIRCUIT INTERCONNECTIONS, *COMMUNICATION AND RADIO SYSTEMS, *COMPUTERS, *DATA DISPLAYS, HETEROGENEITY, NETWORKS, SIMULATION.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 691 11/2

KANSAS UNIV LAWRENCE DEPT OF CIVIL ENGINEERING

(U) Submicroscopic Deformation in Cement Paste and Mortar at High Load Rates.

DESCRIPTIVE NOTE: Final rept. 1 Aug 86-31 Jul 87,

OCT 87 15P

PERSONAL AUTHORS: Darwin, David

CONTRACT NO. AFOSR-86-0207

PROJECT NO. 2917

TASK NO. A1

MONITOR: AFOSR TR-87-1733

UNCLASSIFIED REPORT

ABSTRACT: (U) Research into the submicroscopic behavior of the cement paste and mortar constituents of concrete is enhanced through the acquisition of an integrated scanning electron microscope, energy dispersive spectrometer, image analysis system. The combined system is used to obtain crack surveys of cement paste and mortar loaded in uniaxial compression at strain rates ranging from 0.3 to 300,000 microstrain per second. Research background, equipment selection procedures, equipment capabilities, installation, and on-site evaluation are described. Crack dimensions, orientations, and locations are determined using the combined instrumentation. The surface crack distributions are converted to three-dimensional crack distributions, which are in turn used in estimate the portion of the total deformation due to cracking. The new instrumentation provides a major improvement in both the quality and the quantity of crack data available for analysis. Keywords: Cement, Concrete, Electron microscopes, Image analysis, Microcracks, Microscopic, Mortar, Strain rate, Submicrocracks, X ray analysis.

DESCRIPTORS: (U) *CEMENTS, *CONCRETE, ACQUISITION, BEHAVIOR, COMPRESSION, DEFORMATION, ELECTRON MICROSCOPES, ELECTRONIC SCANNERS, IMAGE PROCESSING, MICROCRACKING, MORTARS, SPATIAL DISTRIBUTION, SPECTROMETERS, STRAIN RATE,

AD-A189 691 CONTINUED

TEST AND EVALUATION, THREE DIMENSIONAL, X RAYS, MATHEMATICAL PREDICTION, PHASE TRANSFORMATIONS, FAILURE(MECHANICS).

IDENTIFIERS: (U) *Cement paste, Integrated scanning electron microscope, PE61102F, WUAFOSR2917A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A189 690 21/2 20/4

STANFORD UNIV CA HIGH TEMPERATURE GASDYNAMICS LAB

(U) Turbulent Reacting Flows and Supersonic Combustion.

DESCRIPTIVE NOTE: Annual report 15 Sep 86-30 Sep 87,

SEP 87 28P

PERSONAL AUTHORS: Bowman, C. T.; Hanson, R. K.; Mungal, M. G.; Reynolds, W. C.

CONTRACT NO. F49620-86-K-0022

PROJECT NO. 3484

TASK NO. A1

MONITOR: AFOSR TR-87-1899

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates: All DTIC and NTIS reproductions will be in black and white.

ABSTRACT: (U) An experimental and computational investigation of supersonic combustion flows is in progress. The principal objective of the research is to gain a more fundamental understanding of mixing and chemical reaction in supersonic flows. The research effort comprises three inter-related elements: 1) an experimental study of mixing and combustion in a supersonic plane mixing layer; 2) development of laser-induced fluorescence techniques for time-resolved two-dimensional imaging of species concentration, temperature, velocity and pressure; and, 3) numerical simulations of compressible reacting flows. The design of the supersonic plane mixing layer was completed and the high-pressure gas storage system was installed. The pulsed lasers and camera systems, to be used for two-dimension flow field imaging, were installed and initial performance evaluations are in progress. This work has focussed on development of appropriate numerical methods for performing full-turbulence simulations of high-speed compressible flows and on the application of these methods to temporally and spatially developing compressible mixing layers. The effort to date has identified several promising numerical methods for

AD-A189 690

AD-A189 690 CONTINUED

compressible flow problems. In addition, a code was developed for compressible mixing layers, and initial simulation using this code shows interesting features, such as imbedded shock waves, in high-speed mixing layers. Keywords: Turbulent reacting flow, Laser diagnostics, Computational fluid dynamics.

DESCRIPTORS: (U) *COMPRESSIBLE FLOW, *TURBULENT FLOW, *SUPERSONIC COMBUSTION, *SUPERSONIC FLOW, CAMERAS, CHEMICAL REACTIONS, COMPUTATIONS, DIAGNOSIS(GENERAL), FLOW FIELDS, FLUID DYNAMICS, GASES, HIGH PRESSURE, HIGH VELOCITY, IMAGES, LASER INDUCED FLUORESCENCE, LASER APPLICATIONS, LAYERS, MIXING, NUMERICAL ANALYSIS, NUMERICAL METHODS AND PROCEDURES, PULSED LASERS, SHOCK WAVES, SIMULATION, STORAGE, SUPERSONIC CHARACTERISTICS, TEST AND EVALUATION, TIME, TWO DIMENSIONAL FLOW, CONCENTRATION(CHEMISTRY), TEMPERATURE, PRESSURE MEASUREMENT.

IDENTIFIERS: (U) Turbulent reacting flow, Computational fluid dynamics, WUAFOSR3484A1.

AD-A189 690

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI128

AD-A189 687 20/10

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Transition-Strength Fluctuations and the Onset of Chaotic Motion,

DEC 86 5P

PERSONAL AUTHORS: Alhassid, Y.; Levine, R. D.

CONTRACT NO. AFOSR-86-0011

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-87-1865

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review Letters, v57 n23 p2879-2882, 8 Dec 86.

ABSTRACT: (U) The maximum-entropy formalism is used to characterize the fluctuations in transition strengths for a bound quantum-mechanical system. In the chaotic limit only one, ever present, sum rule is required as a constraint. The resulting distribution is that of Porter and Thomas, which can also be derived from random-matrix theory. For nonchaotic systems the distribution of transition strengths has a lower entropy. A possible additional constraint, operative during the onset of chaos, is proposed. The distribution of maximal entropy subject to both constraints accords with computed intensities in a system of two degrees of freedom.

DESCRIPTORS: (U) *ENTROPY, *QUANTUM THEORY, DISTRIBUTION, INTENSITY, REPRINTS, TRANSITIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

AD-A189 687

AD-A189 686 9/1 9/5 20/12

OPTICAL SOCIETY OF AMERICA WASHINGTON D C

(U) Topical Meeting on Picosecond Electronics and Optoelectronics.

DESCRIPTIVE NOTE: Final rept. 12 Jan-10 Oct 87,

OCT 87 208P

PERSONAL AUTHORS: Quinn, J. W.

CONTRACT NO. AFOSR-87-0181

PROJECT NO. 2308

TASK NO. B1

MONITOR: AFOSR TR-88-0152

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Presented at Picosecond Electronics and Optoelectronics Topical Meeting, Incline Village, NV 14-16 Jan 87.

ABSTRACT: (U) The purpose of this conference is to bring together workers in the areas of electronics and optoelectronics who share a common interest in the physics and technology of pico-second solid state devices, their multi-gigahertz applications and ultrafast measurement techniques. Subjects covered included: optoelectronic devices; semiconductor device physics; electronic devices; cryo-electronics; device fabrication technology; device characterization; and circuits and signal processing.

DESCRIPTORS: (U) *ELECTRONIC EQUIPMENT, *ELECTRONICS, *ELECTROOPTICS, *SEMICONDUCTOR DEVICES, *SIGNAL PROCESSING, *SOLID STATE ELECTRONICS, FABRICATION, HIGH RATE, MEASUREMENT, METHODOLOGY, PHYSICS, SYMPOSIA.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308B1.

AD-A189 686

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 673 20/2 20/12 9/5 9/1

ILLINOIS UNIV CHAMPAIGN

(U) Gallium Arsenide and Related Compounds, 1986.

DESCRIPTIVE NOTE: Final rept. 1 Aug 86-30 Jul 87,

86 520P

PERSONAL AUTHORS: Lindley, W. T.

CONTRACT NO. AFOSR-86-0169

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR
TR-87-1800

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Proceedings of the International Symposium on Gallium Arsenide and Related Compounds (13th) , Held in Las Vegas, Nevada on 28 Sep-1 Oct 86.

ABSTRACT: (U) The 13th International Symposium on Gallium Arsenide and Related Compounds was held in Las Vegas, Nevada from September 28 through Oct 1, 1986. There were 360 participants from 15 countries. There were 180 regular papers and 16 late news papers submitted from which the Technical Program Committee selected 91 regular papers and 8 late news papers to be presented at the conference. The significant recent growth and development of the field is well illustrated by the scope of the papers printed included are: bulk growth, epitaxial growth, characterization, processing, quantum wells, optoelectronic devices and high-speed devices.

DESCRIPTORS: (U) *ELECTROOPTICS, *GALLIUM ARSENIDES, *CRYSTAL GROWTH, *ELECTRONIC EQUIPMENT, EPITAXIAL GROWTH, NEVADA, QUANTUM ELECTRONICS, DOPING, ION IMPLANTATION, VAPOR DEPOSITION, SEMICONDUCTORS, FIELD EFFECT TRANSISTORS, SYMPOSIA.

IDENTIFIERS: (U) WUAFOSR2306B1, PE61102F.

AD-A189 673

AD-A189 665 14/4 20/5 14/2

NORTHWESTERN UNIV EVANSTON IL DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) Image Localization: Imaging Conditions,

87 3P

PERSONAL AUTHORS: Luzzi, D. E.; Marks, L. D.

CONTRACT NO. AFOSR-86-0344

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-87-1943

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Annual Meeting of the Electron Microscopy Society of America (45th) p78-79 1987.

ABSTRACT: (U) The study of localized phenomena, defect structures, relaxations, surface impurities, etc., all require the ability to resolve small deviations from equilibrium (average) positions of the atoms. Thus, a useful HREM image must have the property of being a one-to-one mapping of the atomic columns in the image to those in the specimen. This localization of the image depends on the imaging parameters of the microscope and on the spatial frequency of the information (1). Therefore, each microscope should be calibrated for the imaging conditions under which the maximum localisation of the information of any given spatial frequency is obtained. We have done this for the Hitachi H-9000 HREM which is operated typically at 300 kV, with a Cs of 0.9 and a focal spread of approximately 80 A (fwhm).

DESCRIPTORS: (U) *ELECTRON MICROSCOPY, *HIGH RESOLUTION, *IMAGE PROCESSING, *ATOMIC STRUCTURE, ATOMS, FREQUENCY, IMAGES, IMPURITIES, RELAXATION, REPRINTS, SPATIAL DISTRIBUTION, SURFACES, DEFECTS(MATERIALS).

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A2.

AD-A189 665

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 652 11/4

TEXAS A AND M UNIV COLLEGE STATION MECHANICS AND MATERIALS CENTER

(U) Damage Models for Delamination and Transverse Fracture.

DESCRIPTIVE NOTE: Final technical rept. 15 Feb 84-14 Jun 87,

AUG 87 85P

PERSONAL AUTHORS: Schapery, Richard A.; Goetz, Douglas P.; Lamborn, Mark J.

REPORT NO. MM-5034-87-11

CONTRACT NO. AFOSR-84-0088

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFOSR TR-88-0129

UNCLASSIFIED REPORT

ABSTRACT: (U) Theoretical and experimental work on the deformation and fracture of fibrous composites with distributed damage is described. Emphasis is on establishing the existence of potentials analogous to strain energy and on using these so called work potentials in deformation and fracture studies. The difference between changing damage and constant damage processes is accounted for by using multivalued work potentials. Discussed first are investigations of flat rectangular bar specimens and thin walled tubes under axial and torsional loading. The limited amount of experimental data presently available on angle ply laminates confirms the existence of a potential even when there are large increases in microcracking. Next, path independence of the J integral is discussed. A study is then described in which the J integral is used to determine fracture energy for delamination in double-cantilevered beam specimens, some of which have a large percentage of off-axis fibers; the results are compared with fracture energies found by standard methods (which do not account for effects of distributed damage).
Keywords: Composites, Damage, Delamination, Fracture,

AD-A189 652

AD-A189 652 CONTINUED

Fiber reinforced plastic.

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *DEFORMATION, *FIBER REINFORCEMENT, *FRACTURE(MECHANICS), *REINFORCED PLASTICS, AXES, DAMAGE, DISTRIBUTION, ENERGY, EXPERIMENTAL DATA, FIBERS, J INTEGRALS, LOAD DISTRIBUTION, LOADS(FORCES), MICROCRACKING, MODELS, RECTANGULAR BODIES, STANDARDIZATION, THEORY, TORSION, TRANSVERSE.

IDENTIFIERS: (U) PE61102F, WUAFOSR230282.

AD-A189 652

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI12B

AD-A189 636 8/11

IOWA STATE UNIV AMES DEPT OF MATHEMATICS

(U) Recovery of the Elastic Parameters of a Layered Half-Space,

87 29P

PERSONAL AUTHORS: Sacks, P. E.; Symes, W. W.

CONTRACT NO. AFOSR-84-0252

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR
TR-87-1941

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Geophysical Journal of The Royal Astronomical Society, v88 p593-620 1987.

ABSTRACT: (U) This article studies the problem of recovering the elastic parameters of a layered half-space from single component measurements of reflected waves. We analyze the perturbational relationship between the elastic moduli (rho, lambda, and mu) and the vertical component of surface particle displacement due to a point impulsive traction. This linearized has a unique solution and derive some stability estimates.

DESCRIPTORS: (U) *SEISMIC REFLECTION, DISPLACEMENT, ELASTIC PROPERTIES, ESTIMATES, MEASUREMENT, MODULUS OF ELASTICITY, PARTICLES, PERTURBATIONS, PULSES, REPRINTS, STABILITY, SURFACES, TRACTION, VERTICAL ORIENTATION, SEISMIC WAVES.

IDENTIFIERS: (U) Inverse problems, Layered half space, PE61102F, WUAFOSR2304A4.