The AFOSR Technical Report Summaries are published quarterly 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 for that quarter.
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.

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a. Subject Field
b. Title of Report
c. AD Number (Accession Number)

2) PERSONAL AUTHOR INDEX

a. Primary Author
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 unsolicited proposals 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.


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., 7304 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 appears in, and the volume number, date, and the page numbers of the journal.

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

Descriptors - Key words describing the research.

Identifiers - Commonly used designators, such as names of equipment, names of projects or acronyms, the AFOSR project and task number, and the Air Force Research Program Element number.
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AD-B090 732  8/3  6/16  20/3  8/1
VETERANS ADMINISTRATION HOSPITAL LOMA LINDA CA
ENGINEERING DESIGN LAB
(U) Nonlinear Electrodynamics in Biological Systems.

DESCRIPTIVE NOTE: Final rept. 1 May 83-30 Apr 84,
84  612P

PERSONAL AUTHORS: Adey, W. R.; Lawrence, A. F.;

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Distribution limited to U.S. Gov't. agencies and their contractors. Availability: Plenum Press, 233 Spring St.,
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SUPPLEMENTARY NOTE: Proceedings of an International Conference on Nonlinear Electrodynamics in Biological
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ABSTRACT:  (U) The proceedings of an internation's conference titled Nonlinear Electrodynamics in Biological
Systems was published by Plenum Press in December 1984.
The conference consisted of thirty-eight papers presented on topics ranging from nonlinear dynamics on whole
organisms to organic molecules. A session on the prospects for a bioelectronic technology was also included. This publication includes the following main topics: Nonlinear Effects of Electromagnetic Fields on Whole Organisms, Living Tissues and Tissue Preparations; Nonlinear Dynamics of Organic Molecules, Including Biomolecules; Prospects for a Bioelectronic Technology; Nonlinear Electrodynamics in Cellular Electrochemistry; Models of Nonlinear Processes; Applications of Nonlinear Physics in Biophysics, Biochemistry and Cell Biology. Originator supplied keywords include: Nonlinear theories; Electrodynamics; Bioelectronics.

DESCRIPTORS:  (U) *ELECTRODYNAMICS, *TISSUES(BIOLOGY).

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BIOCHEMISTRY, BIONICS, BIOMOLECULES, CELLS(BIOLOGY),
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ELECTROMAGNETIC FIELDS, MODELS, ORGANIC COMPOUNDS,
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IDENTIFIERS:  (U) PE61102F, WUAFOSR2312A1
4. Second and Higher Ideal MHD Stability Regions for Low and High Beta Plasmas.

DESCRIPTIVE NOTE: Rept. for Sep 79-Jan 80.

PERSONAL AUTHORS: Cap.F.;

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Distribution: Further dissemination only as directed by Air Force Office of Scientific Research/NP, Bolling AFB, Bldg. 410, Washington, DC 20222, at 8 Mar 85 or higher DoD authority.

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IDENTIFIERS: (U) WUAFOSR975103, PE81102F

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CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

(U) Ion Heating by the Current-Driven Collisionless Drift Instability.

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PERSONAL AUTHOR: Hatakeyama R. ;Oertl.M. ;Maerk,E. ;

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DESCRIPTORS: (U) *HEATING, *IONS, ELECTRIC CURRENT, ELECTRONS, MAGNETIC FIELDS, TEMPERATURE, RATES, LOW FREQUENCY, FREQUENCY, SATURATION, SPECTRA, ENERGY, WAVES

IDENTIFIERS: (U) WUAFOSR975103, PE81102F

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DTIC REPORT BIBLIOGRAPHY

AD-8091 019L  20/7
CAP (FERDINAND F) INNSBRUCK (AUSTRIA)
(U) Exact Analytical Force-Free Three-Dimensional Stellarator Equilibrium.
DESCRIPTIVE NOTE: Rept. for Jun 79-Jan 80.
MAR 80  17P
PERSONAL AUTHORS: Cap.F. F.
REPORT NO.  SCIENTIFIC-178
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MONITOR:  AFOSR
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DESCRIPTORS: (U)  *STELLATORS, THREE DIMENSIONAL,
FORCE(MECHANICS), TOROIDS, EQUILIBRIUM(GENERAL),
MAGNETOHYDRODYNAMICS

AD-8090 998L  18/12
CAP (FERDINAND F) INNSBRUCK (AUSTRIA)
(U) Economic, Political and Environmental Aspects of
Nuclear Power and Alternative Sources.
DESCRIPTIVE NOTE: Rept. for Jun-Jul 80.
AUG 80  24P
PERSONAL AUTHORS: Cap.F. F.
REPORT NO.  SCIENTIFIC-188
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DESCRIPTORS: (U)  *NUCLEAR ENERGY, ENVIRONMENTAL IMPACT,
ENERGY, SOURCES
IDENTIFIERS: (U)  *Fusion power, PE61102F
CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

(U) Force-Free Analytical Three-dimensional Toroidal MHD-Equilibria of Arbitrary Cross Section.

DESCRIPTIVE NOTE: Rept. for Jun 79-Jul 80.

AUG 80 21P

PERSONAL AUTHORS: Cap,F. F.

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DESCRIPTORS: (U) *MAGNETOHYDRODYNAMIC GENERATORS, FREE FIELD, FOURIER SERIES, THREE DIMENSIONAL

IDENTIFIERS: (U) PE81102F, WUA509R975103

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DESCRIPTORS: (U) *PLASMA WAVES, DISPERSION RELATIONS, ACOUSTIC WAVES, IONS, MAGNETIC FIELDS

IDENTIFIERS: (U) Drift instability, Ion heating, PE81102F, WUA509R975103
Beam Stabilization of the Current Driven Ion Acoustic Instability.

DESCRIPTIVE NOTE: Rept. for May 78-Sep 79.

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DESCRIPTORS: (U) *ION BEAMS, STABILIZATION, ACOUSTICS

IDENTIFIERS: (U) 0 machines, WUAFOSR975103, PE81102F

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CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

(U) Investigations on Plasma Instabilities.

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PERSONAL AUTHORS: Cap.F.;

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DESCRIPTORS: (U) *PLASMA OSCILLATIONS, PLASMA CONTROL,
HEATING, HANDBOOKS

IDENTIFIERS: (U) *Plasma instabilities. WUAFOSR975103,
PE81102F
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CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

(U) Stability Domains of Ballooning Modes in Toroidal Plasmas.

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PERSONAL AUTHORS: Cap,F. F. ;
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DESCRIPTORS: (U) +PLASMA WAVES, PRESSURE GRADIENTS, FIELD INTENSITY, MAGNETIC FIELDS, DOMAIN WALLS, STABILITY, TOROIDS

IDENTIFIERS: (U) Ballooning instabilities, PEB81102F, WIAFOSR875103

AD-8091 054L 20/9

UNCLASSIFIED REPORT

Distribution: Further dissemination only as directed by Air Force Office of Scientific Research, Bolling AFB, Bldg. 410, Washington, DC 20222, 8 Mar 85 or higher DOD authority.

DESCRIPTORS: (U) +PLASMA DEVICES, INTERACTIONS, +PARTICLES, +PLASMA WAVES, EXCITATION, AMPLITUDE, COHERENCE, GRIDS, NONLINEAR SYSTEMS, WAVES

IDENTIFIERS: (U) Q machines, ion waves, WIAFOSR875103, PEB81102F

AD-8091 044L 20/9
TEMPERATURE ANISOTROPY INSTABILITIES.

DESCRIPTIVE NOTE: Rept. for Mar-Oct 79.

NOV 79 19P

PERSONAL AUTHORS: Leubner, M.

REPORT NO. SCIENTIFIC-170

CONTRACT NO. F49620-80-C-0016

PROJECT NO. 8751

TASK NO. 03

MONITOR: AFOSR
TR-85-0313

UNCLASSIFIED REPORT

Distribution: Further dissemination only as directed by Air Force Office of Scientific Research/NA, Bolling AFB, Bldg. 410, Washington, DC 20222, 8 Mar 85 or higher DoD Authority.

DESCRIPTORS: (U) SOLAR WIND, THERMAL INSTABILITY, DISTRIBUTION FUNCTIONS, ANISOTROPY, IONS, CYCLOTRONS, VELOCITY, LINEARITY, DISPERSION RELATIONS, PROTONS, DISTRIBUTION, GROWTH (GENERAL), INTERPLANETARY SPACE, OUTER SPACE
UNCLASSIFIED REPORT

Distribution: Further dissemination only as directed by the Air Force Office of Scientific Research, Attn: NP. Bolling AFB, Bldg. 410, Washington, DC 20222, 8 Mar 85, or higher DoD authority.

DESCRIPTORS: (U) *PLASMA WAVES, *TOROIDAL, PRESSURE GRADIENTS, CARTESIAN COORDINATES, MAGNETIC FIELDS, THREE DIMENSIONAL, MAGNETOHYDRODYNAMICS, COMPRESSIBLE FLOW, ISOTHERMS

IDENTIFIERS: (U) PB81102F, WUAFORSR875103

UNCLASSIFIED REPORT

Distribution: Further dissemination only as directed by the Air Force Office of Scientific Research, Attn: NP. Bolling AFB, Bldg. 410, Washington, DC 20222, 8 Mar 85, or higher DoD authority.

DESCRIPTORS: (U) *PLASMA DEVICES, *MATHEMATICAL MODELS, COMPUTATIONS, LINEAR SYSTEMS, BIAS, EQUATIONS, NEUTRALIZATION, PARAMETERS, STEADY STATE

IDENTIFIERS: (U) *Q machines, Buneman instability, PB81102F, WUAFORSR875103
UNCLASSIFIED

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(U) Estimating Seismic Yield, PP Parameters and Tectonic Release Characteristics at the Novaya Zemlya Test Site.

DESCRIPTIVE NOTE: Final technical rept. 15 Nov 83 - 14 Nov 84.

JAN 85 148P

PERSONAL AUTHORS: Burger, R. W.; Lay, T.; Arvesen, C. G.; Burdick, L. U.

REPORT NO. WCCP-R-85-03

PARTIALzahl NO. F49620-83-C-0028, ARPA Order-4892

MONITOR: AFOSR TR-85-0485

UNCLASSIFIED REPORT

Distribution limited to U. S. Gov't. agencies only: Test and Evaluation; 2 May 85. Other requests must be referred to DARPA/TID, Arlington, VA 22209.

ABSTRACT: (U) A new method for estimating the yield of nuclear tests from short-period body waves has been applied to data from the Novaya Zemlya test sites. The method, which is called intercorrelation, takes advantage of all the information in the signal rather than a simple amplitude to period ratio as m sub b does. The intercorrelation technique explicitly accounts for path and receiver effects by analytically comparing signals from a test site with other signals from the test site at the same station. Since the paths are identieal, the differences in signals must be primarily due to changes in the character of the explosion source. The method automatically gives estimates of variations in the source time functions and in the PP arrival. The method provides a means to define a distinct test site in a quantitative way. This is a site in which all tests can be legitimately compared to each other in terms of yield and seismic signal. The physics of seismic wave generation and propagation to the monitoring network is different in some substantial way between the Northern and Southern Novaya Zemlya test sites.

DESCRIPTORS: (U) *YIELD(NUCLEAR EXPLOSIONS); *SIGNAL

AD-8091 093L

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HUGHES RESEARCH LABS MALIBU CA

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

DESCRIPTIVE NOTE: Final technical rept. 15 Jun 81-15 Jun
84.

AUG 84 199P

PERSONAL AUTHORS: Soffer, B. H.

CONTRACT NO. F49620-81-C-0088

PROJECT NO. 2305

TASK NO. A7

MONITOR: AFOSR
TR-85-0243

UNCLASSIFIED REPORT

Distribution limited to U.S. Gov't. agencies only; Test
and Evaluation: 21 Feb 85. Other requests must be
referred to Air Force Office of Scientific Research, Attn:
XOTD, Building 410, Bolling AFB, DC 20332.

ABSTRACT: (U) Optical data processing has not yet
achieved its potential of increased capacity and speed
compared with conventional electronic techniques,
primarily for lack of a practical real-time image
modulator, and because optical techniques have been
almost exclusively limited to linear operations. The
continuing research outlined in this report attacks these
issues by studying the implementation of real-time
nonlinear parallel-processing techniques. The various
implementations studied in this program all employ real-
time liquid-crystal light valves. Additional key words
include: Variable grating mode; Dynamic response;
Parallel processing; Optical signal processing; and
Optical data processing.

DESCRIPTORS: (U) DATA PROCESSING, REAL TIME, OPTICAL
PROCESSING, OPTICAL DATA, DYNAMIC RESPONSE, NONLINEAR
SYSTEMS, SIGNAL PROCESSING, PARALLEL PROCESSING, LIQUID
CRYSTALS

IDENTIFIERS: (U) PE81102F, WUAFOSR2305A7

AD-8090 439L

UNCLASSIFIED

PAGE 10 EVLOSA
CHARLES STARK DRAPER LAB INC CAMBRIDGE MA

(U) Optical Gyro Error and Performance Modeling.

DESCRIPTIVE NOTE: Final rept. 1 Dec 82-1 Dec 83.

NOV 83 89P

PERSONAL AUTHORS: Coccoli, J. D.; Feldman, J.;

REPORT NO. CSD-5748

CONTRACT NO. F49620-82-C-0006

PROJECT NO. 2305

TASK NO. B2

MONITOR: AFOSR TR-85-0003

UNCLASSIFIED REPORT

Distribution limited to U.S. Gov't. agencies only; Test and Evaluation, 27 Feb 85. Other requests must be referred to Air Force Office of Scientific Research, Dept. of the Air Force, Bolling AFB, DC 20332.

ABSTRACT: (U) This is the final annual report on passive optical gyro error and performance modeling. A description is given of several closed-loop baseline mechanisms of interferometer and resonator types of optical gyros. These mechanisms are intended to represent the state of the art. They are used as a basis to discuss error and performance issues. Additional keywords: Air Force research, Fiber optics, Interferometers, State of the Art. (Author)

DESCRIPTORS: (U) *GYROSCOPES, RESONATORS, PERFORMANCE (ENGINEERING), OPTICAL EQUIPMENT, ERRORS, PASSIVE SYSTEMS: INTERFEROMETERS

IDENTIFIERS: (U) Optical gyroscopes. WUAFOSR230582, PE81103F

UNCLASSIFIED REPORT

Distribution limited to DoD only; Critical Technology, 10 Jan 85. Other requests must be referred to Air Force Office of Scientific Research/XTD, Building 410, Bolling AFB, DC 20332.

ABSTRACT: (U) The principal objective of our research is to evaluate fluoride glasses for high optical transparency applications. Compatibility with a unique fabrication process of chemical vapor deposition will be a selection criteria. Fluoride glasses have a number of potentially useful characteristics such as extended spectral windows and ultra low theoretical attenuations. In order to exploit these characteristics, and fully define intrinsic optical and physical properties, it is necessary to fabricate very pure and homogeneous material. The most direct method of attaining the purification necessary to achieve ultra low loss optical waveguides is by chemical vapor deposition (CVD) of the core glass. This technology is well developed in silicate systems, but only in its early infancy in the class of infrared transmitting materials known as heavy metal fluoride glasses (HMFG). A new glass system was found which meets the minimum CVD requirements. This system is based upon Cds2-LiF-AIF3-PbF2 and is given the acronym CLAP glasses.

DESCRIPTORS: (U) *OPTICAL WAVEGUIDES, *GLASS, *FLUORIDES, LOW LOSS, INFRARED OPTICAL MATERIALS, BULK MATERIALS.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY          SEARCH CONTROL NO. EVLOSA
AD-B089 727L CONTINUED
AD-A153 980 20/9

VAPOR DEPOSITION

POLYTECHNIC INST OF NEW YORK FARMINGDALE DEPT OF
ELECTRICAL ENGINEERING

IDENTIFIERS:  (U) *Fluoride glasses, MUFOSR2303A3,
              PEB1102F

(U) Millimeter Wave Generation by Relativistic Electron
    Beams.

DESCRIPTION NOTE:  Annual rept. 1 Oct 83-30 Sep 84,
                DEC 84  131P

PERSONAL AUTHORS:  Kuo, S. P.; Cheo, B. R.;

REPORT NO.  POLY-84-007

CONTRACT NO.  AFOSR-83-0001

PROJECT NO.  2301

TASK NO.  A8

MONITOR:  AFOSR
          TR-85-0342

UNCLASSIFIED REPORT

ABSTRACT:  (U) We are studying various wave-plasma
           interaction processes towards the understanding of the
           collective physics of plasmas. The processes include the
           mechanisms leading to the generation of millimeter waves
           by relativistic electron beams (electron cyclotron maser
           instability) and the mechanisms providing channels for
           anomalous absorption of electromagnetic waves (electron
           cyclotron resonance heating and parametric instabilities).
           A single nonlinear equation which describes the tempor-
           al evolution of the field amplitude of the electron
           cyclotron maser instability has been derived self-
           consistently. Three adiabatic invariants of the electron
           motion under the electron cyclotron resonance heating by
           three differently polarized heater: (1) ordinary mode; (2)
           extraordinary mode; and (3) electrostatic mode are
           derived. Wave plasma interaction leading to various
           parametric instabilities in the ionsphere has also been
           studied. Keywords include: Millimeter wave generation,
           Relativistic electron beams, Wave-plasma interaction,
           Electron cyclotron maser instability, ECRH, and
           Parametric instabilities.

DESCRIPTIONS:  (U) *ELECTRON BEAMS, *PLASMA WAVES,
                ABSORPTION, AMPLITUDE, ANOMALIES, CYCLOTRON RESONANCE.

AD-B089 727L
CYCLOTRENS, ELECTROMAGNETIC RADIATION, ELECTROSTATICS, EQUATIONS, HEATING, INTERACTIONS, MASERS, MILLIMETER WAVES, NONLINEAR SYSTEMS, PARAMETRIC INSTABILITIES, PLASMAS(Physics), POLARIZATION, RELATIVITY THEORY, STABILITY, WAVE PROPAGATION

IDENTIFIERS: (U) PEG1102F, WUAFOSR2301A8

ABSTRACT: (U) Photoelectron kinetic energy spectra are presented for the 2 + 1 multiphoton ionization of NH₃ via the vibronic levels of the B and C' Rydberg states of the neutral. The contribution from delta v = 0 state-selected ionization is greater than 80% through the C' state and over 70% through the B state. This allows for the production of large densities of NH₃(+) ions with a high degree of vibrational selectivity.

DESCRIPTORS: (U) *AMMONIA, *IONS, *VIBRATIONAL SPECTRA, DENSITY, KINETIC ENERGY, PHOTOELECTRON SPECTRA, PRODUCTION, SELECTION, VIBRATION, ENERGY LEVELS, IONIZATION, ELECTRONIC STATES

IDENTIFIERS: (U) PEG1102F, WUAFOSR2303B1
UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Artificial Intelligence, v25 p75-94 1985

ABSTRACT: (U) Commonsense reasoning is 'nonmonotonic' in the sense that we often draw, on the basis of partial information, conclusions that we later retract when we are given more complete information. Some of the most interesting products of recent attempts to formalize nonmonotonic reasoning are the nonmonotonic logics of McDermott and Doyle. These logics, however, all have peculiarities that suggest they do not quite succeed in capturing the intuitions that prompted their development.

In this paper we reconstruct nonmonotonic logic as a model of an ideally rational agent's reasoning about his own beliefs. For the resulting system, called autoepistemic logic, we define an intuitively based semantics for which we can show autoepistemic logic to be both sound and complete. We then compare autoepistemic logic with the approach of McDermott and Doyle, showing how it avoids the peculiarities of their nonmonotonic logic.

Additional keywords: Reprints. (Author)

DESCRIPTORS: (U) *SEMANTICS, LOGIC, REASONING, REPRINTS

IDENTIFIERS: (U) Nonmonotonic logic, PE81102F, WUAFOSR2304A7

AD-A153 983 5/7

SRI INTERNATIONAL  MENLO PARK CA ARTIFICIAL INTELLIGENCE CENTER

(U) Semantical Considerations on Nonmonotonic Logic, 85 21P

PERSONAL AUTHORS: Moore, R. C.;

CONTRACT NO. F49620-82-K-0031

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR TR-85-0407

UNCLASSIFIED REPORT


ABSTRACT: (U) A pulsed demountable glow discharge has been used as an atom cell for laser excited atomic fluorescence. Lead atoms are sputtered from the surface of copper and graphite cathodes and are excited by a pulsed frequency-doubled dye laser after the discharge is switched off. The combination of a 'dark' atom cell with non-resonance atomic fluorescence leads to a very low background signal. The detection limit for lead is 0.1 micro g/g and for lead in aqueous solutions (5 micro l) deposited on graphite electrodes is 20 pg. Keywords include: Atomic fluorescence, Glow discharge, Laser, and Lead.

DESCRIPTORS: (U) *LASER INDUCED FLUORESCENCE, *GLOW DISCHARGES, ATOMS, CATHODES, CELLS, COPPER, DARKNESS, DEPOSITION, DETECTION, DYE LASERS, ELECTRODES, FREQUENCY MULTIPLIERS, GRAPHITE, LASERS, LIMITATIONS, PULSES, SOLUTIONS (MIXTURES), SURFACES, WATER, REPRINTS

AD-A153 982
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A153 951 20/5
TORONTO UNIV DOWNSVIEW (ONTARIO) INST FOR AEROSPACE STUDIES


DESCRITIVE NOTE: Final technical rept. 1 Oct 79-31 Oct 84.
OCT 84 84P

PERSONAL AUTHORS: Measures, R. M.;

CONTRACT NO. AFOSR-80-0057
PROJECT NO. 2301

AD-A153 951 CONTINUED

UNCLASSIFIED REPORT

ABSTRACT: (U) Laser saturation of an atomic resonance transition represents an important new mode of coupling laser energy into a gas or plasma. The basic mechanism in either case is supereelastic collisional heating of free electrons. For a gas various seed ionization processes precede this interaction. During the past year we have developed a computational code for mapping the three dimensional nature of this interaction. This is required because this strong interaction invariably distorts and attenuates the laser pulse as it propagates through the medium being excited. We have also developed a new experimental facility for studying this interaction and have recently completed our first spectroscopic measurements of the electron temperature produced in a sodium plasma created through laser resonance saturation. This temperature appears to be somewhat lower than predicted by our computer simulation and we are currently attempting to reconcile this difference. Also within the past year we have discovered that attenuation of the laser pulse is a maximum when the laser is detuned by about 0.5 nm from either of the resonance lines. Keywords include: XUV-ray lasers, Sodium plasma, Laser resonance saturation, Laser ionization, Electron temperature measurement, Stark broadening, Electron density measurements, Three photon saturation, Atom density measurements, Laser diagnostics, Alkali oven, and Supereelastic plasma heating.

DESCRIPTORS: (U) *ULTRAVIOLET LASERS, *PULSED LASERS, ALKALI METAL COMPOUNDS, ATOMS, COLLISIONS, COMPUTERIZED SIMULATION, COUPLING(INTERACTION), DENSITY, DIAGNOSIS(GENERAL), ELASTIC PROPERTIES, ELECTRON DENSITY, ELECTRON TRANSITIONS, ELECTRONS, ENERGY, FREE ELECTRONS, HEATING, IONIZATION, LASERS, MEASUREMENT, NUCLEAR RESONANCE, OVENS, PHOTONS, PLASMAS(PHYSICS), RESONANCE SATURATION, SODIUM, SPECTROSCOPY, TEMPERATURE

IDENTIFIERS: (U) PE811027, WUAFOSR2301A8
UNCLASSIFIED REPORT

ABSTRACT: (U) We evaluate the electric microfield distribution in a multicomponent plasma (MCP). The method employed is an adaptation of the very simple adjustable-parameter exponential approximation previously developed for one-component plasmas (OCP). We also discuss a still simpler approximation in which the MCP is replaced by an effective OCP. The results are generally close to each other and the former is in very good agreement with computer simulations. Keywords include: Microfield distributions; Multicomponent plasma; Exponential approximation; and Computer simulations.

DESCRIPTORS: (U) DISTRIBUTION FUNCTIONS, ELECTRIC FIELDS, PLASMAS(PHYSICS), COMPUTERIZED SIMULATION, APPROXIMATION(MATHEMATICS), EXPONENTIAL FUNCTIONS, REPRINTS

IDENTIFIERS: (U) Electric microfield, WUAFOSR2301A3, PEB1102F

UNCLASSIFIED REPORT


ABSTRACT: (U) We present Monte Carlo simulations of the equation of state and radial distribution function for a mode fluid composed of hard spheroids. Keywords include: Hard spheroids; Monte Carlo Simulations; Equation of state; and Radial distribution function.

DESCRIPTORS: (U) MONTE CARLO METHOD, DISTRIBUTION FUNCTIONS, EQUATIONS OF STATE, FLUIDS, HARDENING, RADIUS(MEASURE), SIMULATION, SPHERES, REPRINTS

IDENTIFIERS: (U) Hard spheroids, WUAFOSR2301A3, PEB1102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A153 923 2/3
RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF
MATHEMATICS

(U) On Potential and Field Fluctuations in Classical
Charged Systems.
84 27P
PERSONAL AUTHORS: Lebowitz, J. L.; Martin, P. A.

PROJECT NO. 2301
TASK NO. A3
MONITOR: AFOSR
TR-85-0355

UNCLASSIFIED REPORT
SUPPLEMENTARY NOTE: In Jnl. of Statistical Physics,
V34 Nos1/2 P287-311 1984.

ABSTRACT: (U) Using electrostatic identifies the
potential and microfield in a plasma, important for
determining line shapes, are expressed as limits of local
quantities. These are shown to be well defined for
typical configurations of macroscopic, i.e., infinite
systems (under some mild clustering assumptions). Their
covariance contains a slowly decaying part. (for the
potential) whose coefficient is universal whenever the
Stillinger-Lovett second moment condition holds. We show
further that the contributions from distance regions
(which are equal to suitable averages over local regions)
have a Gaussian distribution. Keywords include: Coulomb
systems; potential fluctuations; microfield distribution;
particle correlations; sum rules; clustering.

DESCRIPTORS: (U) *POTENTIAL THEORY, *FIELD THEORY,
CLUSTERING, CORRELATION, PARTICLES, QUANTITY,
RANGE(DISTANCE), REGIONS, SHAPE, REPRINTS

IDENTIFIERS: (U) Sun rules, PEB1102F, WUAFOSR2301A3

AD-A1'3 923

UNCLASSIFIED
SEARCH CONTROL NO. EVLOSA

AD-A153 919 12/1 17/2
CONNECTICUT UNIV STORRS DEPT OF ELECTRICAL ENGINEERING
AND COMPUTER SCIENCE

(U) High Performance Asynchronous Limited Sensing
Algorithms for CSMA and CSMA-CD Channels.

DESCRIPTIVE NOTE: Technical rept.
MAR 85 44P
PERSONAL AUTHORS: Georgiopoulos, M.; Merakos, L.; Papantoni-
Kazakos, P.;

REPORT NO. UCT/DECS/TR-85-2
PROJECT NO. 2304

MONITOR: AFOSR
TR-85-0398

UNCLASSIFIED REPORT
ABSTRACT: (U) We consider the random multiple access of
a collision-type, packet-switched channel, for the
Poisson user model in a local area network environment,
where 'carrier sensing' techniques are possible due to
small propagation delays. We propose and analyze
asynchronous (unslotted) random access algorithms that
belong to a recently emerged class of random-access
algorithms, called 'limited channel sensing' algorithms.
Utilizing the regenerative character of the stochastic
processes that are associated with the random access
system, we derive lower bounds on the maximum stable
throughput, and tight upper and lower bounds on the
induced mean packet delay. The proposed algorithms are
inherently stable, they combine good performance with
modest channel sensing requirements, and they outperform
their synchronous counterparts in some Ethernet and
mobile radio environments.

DESCRIPTORS: (U) *ALGORITHMS, *COMMUNICATIONS NETWORKS,
CHANNELS, DETECTION, ENVIRONMENTS, LIMITATIONS, MODELS,
MULTIPLE ACCESS, NETWORKS, REQUIREMENTS, STABILITY,
STOCHASTIC PROCESSES, THROUGHPUT, USER NEEDS

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DTIC REPORT BIBLIOGRAPHY
SEARCH CONTROL NO. EVLOSA

AD-A153 919 CONTINUED

IDENTIFIERS: (U) Package switching. Local area networks.
PE81102F. WUAFOSR2304AS

AD-A153 913 20/11 11/8 1/3

SOUTHWEST RESEARCH INST SAN ANTONIO TX


DESCRIPTIVE NOTE: Annual Scientific rept.

FEB 85 48P


REPORT NO. SwRI-7438

CONTRACT NO. F49620-83-C-0054

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-85-0372

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the results of a study involving: (1) experimental characterization and analytical modeling of fatigue crack tip micromechanics in aerospace structural (aluminum and titanium) alloys; and (2) identifying and modeling key factors controlling subcritical crack growth and unstable fracture in single crystal nickel-base superalloys. The first section summarizes studies in which measured crack tip parameters and microstructural characterization are incorporated into a recently developed crack tip geometric model which interrelates microstructure with fatigue crack growth. The model is used with 7075-T651 Al, 7091 P/M Al, and Ti-6Al-4V to predict crack growth increments (strain spacings), which are then compared with experimental measurements for the Al alloys. Additional crack tip characterization was performed on an experimental high temperature aluminum alloy (HTAL). By using a recently developed SEM high temperature cycling stage, crack tip yielding and extension was characterized at 315 C, which showed that the interfaces of certain microstructural elements unique to the HTAL alloy were detrimental to its resistance to elevated temperature fatigue crack growth. The second section describes results of ambient temperature crack growth tests of single crystal Mar-M200.

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Tests were carried out as functions of stress intensity range, normal stress to shear stress ratio, and crystallographic orientation, and their effect on mode of cracking and crack growth characteristics was established. Additional keywords: Crack tip plasticity; Crack growth modeling; Crystallographic orientation.

DESCRIPTIONS: (U) *CRACK PROPAGATION, *FRACTURE(MECHANICS), *FATIGUE(MECHANICS), ALUMINUM, ALUMINUM ALLOYS, CRACKS, CRYSTALS, FRONT ENDS AND SURFACES, GEOMETRIC FORMS, HIGH TEMPERATURE, MATHEMATICAL MODELS, MECHANICS, METALLURGY, MODELS, NICKEL ALLOYS, ORIENTATION(DIRECTION), PARAMETERS, PLASTIC PROPERTIES, RANGE(EXTREMES), RATIOS, SHEAR STRESSES, SINGLE CRYSTALS, STRESS CONCENTRATION, SUBCRITICAL ASSEMBLIES, SUPERALLOYS, TITANIUM, STRUCTURAL MEMBERS, MICROSTRUCTURE, MATHEMATICAL MODELS, STRATIONS

IDENTIFIERS: (U) Aluminum alloy 7075-T651, Aluminum alloy -7091, Titanium alloy-6AL-4V, Crack tip plasticity, Crystallographic orientation, WUAFOSR2306A1, P681102F

SUPPLEMENTARY NOTE: Pub. in Journal of Chemical Physics, v81 n12 pt1 p5658-5665, 15 Dec 84.

ABSTRACT: (U) This dissociation dynamics of the RgI2(Rg=Ar,Kr,Xe) van der Waals complexes have been studied using three-dimensional quasiclassical trajectories. Specifically, the unimolecular dissociation of RgI2(B superscript 3 pi) with initial I2 vibrational excitation above the RgI+I dissociation limit of the B superscript 3 pi state was studied. In addition to complete dissociation to atoms, iodine recombination was observed to be a major reaction channel. This results is interpreted as a cage-like effect due to the inert gas atom, which also carries away a large fraction of the energy when the complex dissociates to from I2. The reaction mechanism leading to the formation of molecular products has been found to involve both direct and long-lived, complex trajectories. Dissociation of the complex RgI2 is favored by near collinear orientations. The decomposition kinetics of the complex are found to be complex and non-RRKM in character. A four-step reaction mechanism involving an explicit intramolecular energy transfer step is proposed to explain the calculated time dependence of the product concentrations. The calculated product vibrational distributions are in qualitative agreement with the experimental results.
AD-A153 912  CONTINUED

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLS0A

AD-A153 889  20/8  20/13

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF
MATHEMATICS

(U) Spherical Reference Systems for Nonspherical Hard
Interactions.

84  8P

PERSONAL AUTHORS: Williams, G. O.; Lebowitz, J. L.; Percus,
J. K.

CONTRACT NO. AFOSR-82-0016

PROJECT NO. 2301

TASK NO. A3

MONITOR: AFOSR

TR-85-0353

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. In Jnl. of Physical Chemistry,

ABSTRACT: (U) We investigate the applicability of the
median and Barker-Henderson prescriptions for obtaining
spherical reference systems for three models: hard linear
triatomic, hard heteronuclear dumbbells, and two-
component mixtures of hard dumbbells. We propose an
empirical method for determining the median potential for
systems lacking a high degree of symmetry. For mixtures
of hard molecules, we find that both the median and
Barker-Henderson prescriptions give rise to approximately
additive hard-sphere reference potentials. Keywords
include: Nonspherical molecules; hard triatomics,
dumbbells, mixtures; nonsymmetric median potential,
equation of state.

DESCRIPTORS: (U) *EQUATIONS OF STATE, *MOLECULE MOLECULE
INTERACTIONS, MIXTURES, SYMMETRY, HARDNESS, POLYATOMIC
MOLECULES, POTENTIAL ENERGY, REPRINTS

IDENTIFIERS: (U) Nonspherical molecules, Triatomic
molecules. Dumbbells. WUAFOSR2301A3. PE81102F

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OTIC REPORT BIBLIOGRAPHY

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF
MATHMATICS

(U) New Systematic Expansion of the Electric Field
Distribution in Plasmas.

NOV 84 13P

PERSONAL AUTHORS: Alastuey, A. ;Iglesias, C. A. ;Lebowitz, J.
L. ;Levesque, D. ;

CONTRACT NO. AFOSR-82-0018

PROJECT NO 2301

TASK NO. A3 *

MONITOR: AFOSR

TR-85-0381

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review A, v30 n5
p2537-2547 Nov 84.

ABSTRACT: (U) We derive a new systematic expansion of
the electric field distribution at a test charge immersed
in an infinite two- or three-dimensional one-component
plasma. The lowest-order truncation of this expansion
leads to a mean-field theory very similar to the
adjustable-parameter exponential approximation (APEX).
The next-order corrections to this mean-field theory are
explicitly computed in terms of the distribution
functions of the plasma particles. All the approximations
are compared to the Monte Carlo results for a two-
dimensional system at P=2 and various test charges. The
systematic approximations appear to be useful. Even the
zeroth-order approximation is quite accurate for large
test charges or strongly coupled systems and the next
order improves on it. Still, APEX is found to be most
reliable (as it is also in three dimensions) and remains
accurate in the practically interesting limit where the
test charge vanishes, i.e., at a neutral atom. Keywords
include: Plasmas; electric field distribution; systematic
expansion; exponential approximation; corrections; Monte
Carlo simulation.

DESCRIPTORS: (U) *ELECTRIC FIELDS, *PLASMASPHERE,
APPROXIMATION(MATHEMATICS), ATOMS, COUPLING(INTERACTION),

AD-A153 888

UNCLASSIFIED
UNCLASSIFIED

OTIC REPORT BIBLIOGRAPHY

AD-A153 887 12/1

WISCONSIN UNIV-MADISON DEPT OF COMPUTER SCIENCES

(U) On NGR (Upsilon) Multigrid Methods.

DESCRIPTIVE NOTE: Technical rept..

JAN 85 ' 38P

PERSONAL AUTHORS: Kamowitz, D.; Parter, S. V.

REPORT NO. CSTR-575

CONTRACT NO. AFOSR-82-0275

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR

TR-85-0351

UNCLASSIFIED REPORT

ABSTRACT: (U) Multigrid methods are proving themselves as very successful tools for the solution of the algebraic equations associated with discretization of elliptic boundary-value problems. Nevertheless, it seems we are just beginning to understand this powerful idea. Hence, there is a need for continued probing, experimentation and new proofs. For the sake of proof and more for the sake of insight, this report considers the extension to a general diffusion equation. In particular, for the two-grid scheme we reobtain the basic results indicate that other coefficients results carry over as well. Additional keywords: Algorithms; Linear algebraic equations; Problem solving; Estimates; Experimental data.

DESCRIPTORS: (U) *GRIDS, METHODOLOGY, ESTIMATES, EXPERIMENTAL DATA, ALGEBRA, ALGORITHMS, BOUNDARY VALUE PROBLEMS, DIFFUSION, ELLIPSES, EQUATIONS, LINEAR ALGEBRAIC EQUATIONS, PROBLEM SOLVING

IDENTIFIERS: (U) *Multigrid methods

UNCLASSIFIED REPORT

AD-A153 889 12/1

CONNECTICUT UNIV STORRS DEPT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE

(U) A 0 487 Throughput Limited Sensing Algorithm.

DESCRIPTIVE NOTE: Technical rept..

MAR 85 ' 38P

PERSONAL AUTHORS: Georgiadis, L.; Papantoni-Kazakos, P.

REPORT NO. UCT/DECS/TR-85-3

CONTRACT NO. AFOSR-83-0229

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR

TR-85-0397

ABSTRACT: (U) The authors consider Poisson packet traffic accessing a single slotted channel. They assume the existence of ternary feedback per channel slot. They also adopt the limited feedback sensing model, where each packet senses the feedback only while it is blocked. For the above model, they develop a collision resolution protocol, with last-come first serve characteristics, and we name the protocol, LSTFA. The LSTFA is a refinement of the algorithm developed in another document and it attains the same throughput as Gallager's algorithm does, without the full feedback sensing requirement in the latter. The algorithm is also easy to implement, it requires reasonable memory storage, it induces uniformly good transmission delays, and it is robust in the presence of feedback errors. In the presence of binary (collision versus noncollision) feedback, the algorithm may attain throughput 0.4493; the highest known to this point, among both full and limited sensing algorithms.

(Author)

DESCRIPTORS: (U) *ALGORITHMS, CHANNELS, COLLISIONS, DELAY, DETECTION, ERRORS, FEEDBACK, LIMITATIONS, MODELS, REFINING, REQUIREMENTS, RESOLUTION, SLOTS, TERNARY COMPATENTS, TRANSMISSION LINES
Preparation of Well-Defined Surfaces at Atmospheric Pressure: Studies by Electrochemistry and LEED of Pt(100) Pretreated with Iodine.

PERSONAL AUTHORS: Wieckowski, A.; Rosasco, S. O.; Schadt, B. C.; Stickney, J. L.; Hubbard, A. T.

ABSTRACT: Reported here are studies by LEED, Auger spectroscopy, and electrochemistry which show that Pt(100) monocrystal surfaces purposely disordered by electrochemical oxidation and reduction (as in the procedure commonly employed to clean or activate Pt electrodes) are restored to an ordered state by programmed heating under an Ar atmosphere containing iodine vapor. A nearly hexagonal, centered-rectangular adlattice of I atoms was formed, containing three I and five Pt atoms in the surface unit cell. Programmed heating of this adlattice led to stepwise desorption of halogen and produced a series of related adlattices. One of these is particularly amenable to identification, without LEED by means of its characteristic cyclic voltammogram for silver electrodeposition. The behavior of each iodine adlattice toward silver electrodeposition and programmed temperature desorption is reported. These atmospheric iodine pretreatment and voltammetric procedures for preparing and verifying a well-defined electrode surface do not require vacuum equipment, although demonstration of the ordered structures in this work employed LEED and related techniques under ultrahigh vacuum. This basic approach should be applicable to a wide range of metals and adsorbates.
**UNCLASSIFIED**

**DTIC REPORT BIBLIOGRAPHY**

**AD-A153 864  20/2**

ROCHESTER UNIV NY DEPT OF CHEMISTRY

(U) The Role of Phonons In the Excitation and Relaxation of Adspecies.

DEC 83 10P

PERSONAL AUTHORS: Berl, A. C.; Lee, K. T.; George, T. F.;

REPORT NO. 57

CONTRACT NO. AFOSR-82-0048

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR

TR-85-0393

**UNCLASSIFIED REPORT**


ABSTRACT: (U) The IR laser excitation of an ad bond is studied by both a quantum mechanical generalized master equation approach and a classical generalized Langevin approach. The role of phonons in the energy flow between the ad bond and the surface is considered. The latter approach looks further at local heating via direct excitation of surface atoms. It is seen that the Markovian approximation is in general inadequate, and the local heating is an important mechanism for desorption.

Keywords include: Laser-excited ad bond, Relaxation, Role of phonons. Quantum generalized master equation, Classical generalized langevin equation, Breakdown of markovian approximation, Desorption, and Local heating of surface atoms.

DESCRIPTORS: (U) *PHONONS, APPROACH, ATOMS, BREAKDOWN(ELECTRONIC THRESHOLD), DESORPTION, ENERGY TRANSFER, EQUATIONS, EXCITATION, HEATING, LASERS, MARKOV PROCESSES, QUANTUM THEORY, RELAXATION, APPROXIMATION(MATHEMATICS), REPRINTS

IDENTIFIERS: (U) PEB1102F, MUNR831303, WUA99R2303A2

AD-A153 864

**SEARCH CONTROL NO. EVLOSA**

**AD-A153 846  20/5**

FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY

(U) Laser-Induced Intermodulated Flame Fluorescence: A New Approach to Scattering Correction in Analytical Atomic Fluorescence.

84 18P

PERSONAL AUTHORS: Omenetto, N.; Hart, L. P.; Winefordner, J. D.;

CONTRACT NO. F49620-80-C-0005

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR

TR-85-0410

**UNCLASSIFIED REPORT**


ABSTRACT: (U) It is shown that the technique of intermodulated fluorescence can effectively correct for scattering problems in analytical flame fluorescence spectroscopy. When two laser beams, amplitude-modulated at different frequencies $f_{sub 1}$ and $f_{sub 2}$ and counterpropagated colinearly throughout an atomizer, are tuned to the absorption transition of the element of interest, non-linear mixing of the fluorescence signal results, due to saturation effects. By extraction of the signal at the sum or difference frequency, $f_{sub 2} + f_{sub 1}$ or $f_{sub 2} - f_{sub 1}$, the linear scattering component of the spectrum can be essentially eliminated. This has been demonstrated for a sodium solution nebulized in a premixed, laminar, argon-oxygen-hydrogen flame. Because the modulation signal can be observed only at the intersection volume between the two beams, this technique constitutes a powerful tool for spatially resolved combustion diagnostics. Keywords include: Flame, fluorescence, Intermodulation, Laser excitation, Atomic fluorescence, and Scatter.

DESCRIPTORS: (U) *LASER INDUCED FLUORESCENCE, ABSORPTION, COMBUSTION, CORRECTIONS, DIAGNOSIS(GENERAL), DIFFERENCE FREQUENCY, EXCITATION, EXTRACTION, FLAMES, FLUORESCENCE.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A153 846 CONTINUED

LASER BEAMS, LASERS, LINEARITY, MIXING, MODULATION,
NONLINEAR SYSTEMS, SATURATION, SCATTERING, SIGNALS,
SODIUM, SOLUTIONS (GENERAL), SPECTROSCOPY, TRANSITIONS,
REPRINTS

IDENTIFIERS: (U) Flame fluorescence, PE81102F,
WUAFOSR2303A1

AD-A153 842 7/4 21/2

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Resonant CARS Detection of OH Radicals.

DESCRIPTIVE NOTE: Final rept. 1 Aug 81-31 Dec 84,
JAN 85 48P

PERSONAL AUTHORS: Verdieck, J. F.; Hall, R. J.; Eckbreth, A.
C.;

REPORT NO. UTRC/R85-955655

CONTRACT NO. F49620-81-C-0063

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR
TR-85-0385

UNCLASSIFIED REPORT

ABSTRACT: (U) Under this AFOSR contract, resonant CARS
(Coherent Anti-Stokes Raman Spectroscopy) of OH has been
observed for the first time. Resonant CARS was achieved
for several electronic transitions in the ultraviolet A--
X bands of OH in a methane/oxygen flame. Saturation of
the resonant CARS spectrum of OH was examined
experimentally and definite evidence found, both in the
intensity variation, and the number and shapes of the
lines. Concurrently with the experimental studies, a good
understanding of the theoretical aspects of the resonant
CARS process has been secured, to the extent that
predicted resonant CARS spectra can be computer
synthesized and graphed for any selected frequency. A
major departure from theoretical predictions was the
experimental observation of satellite lines about the
central line, not predicted from theory. At present, the
cause of these extra resonances has not been determined,
but their appearance may arise from saturation effects,
or be caused by an undetermined nonlinear optical effect
(such as dephasing--induced coherences). Another
contributing factor may be rotational energy level
transfer brought about by collision processes, occurring
within the duration of the 10 nanosecond laser pulse.

DESCRIPTORS: (U) *HYDROXYL RADICALS, *RAMAN SPECTROSCOPY,

AD-A153 842

UNCLASSIFIED

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DTIC REPORT BIBLIOGRAPHY

COHERENCE, COLLISIONS, ELECTRON TRANSITIONS, ENERGY LEVELS, ENERGY TRANSFER, FLAMES, METHANE, OPTICAL PROPERTIES, OXYGEN, PREDICTIONS, RAMAN SPECTROSCOPY, ROTATION, SATURATION, THEORY, SPECTRAL LINES, ULTRAVIOLET SPECTRA, CONCENTRATION (CHEMISTRY)

IDENTIFIERS: (U) WUAFSR2308A3, PE61102F, CARS (Coherent Anti-Stokes Raman Spectroscopy), WUAFSR2308A3, PE61102F

SEARCH CONTROL NO. EVLOSA

AD-A153 838 20/8

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF MATHEMATICS

(U) Equivalent Potentials for Equations of State for Fluids of Nonspherical Molecules.

AUG 84 7P

PERSONAL AUTHORS: Williams, G. O.; Lebowitz, J. L.; Percus, J. K.;

.contract No. AFOSR-82-0018

Project No. 2301

Task No. A3

Monitor: AFOSR

TR-85-0354

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v81 n4 p2070-2075, 15 Aug 84.

ABSTRACT: (U) This investigation analyzes the extent to which the equation of state and other thermodynamic properties of systems of hard nonspherical molecules can be obtained from a density independent hard sphere reference system. It is concluded that the median and Barker-Henderson prescriptions effectively reproduce all data now available. The motivation for these two formulations is discussed in detail. Originator-supplied keywords include: Molecular fluids; Nonspherical interactions; Hard sphere reference system; Median potential; and Barker-Henderson prescription.

DESCRIPTORS: (U) MOLECULAR ASSOCIATION, EQUATIONS OF STATE, FLUIDS, FORMULATIONS, HARDENING, HARDNESS, INTERACTIONS, MOLECULES, MOTIVATION, SPHERES, THERMODYNAMIC PROPERTIES, REPRINTS

IDENTIFIERS: (U) WUAFSR2301A3, PE61102F

AD-A153 838
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A153 833  20/9

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF
MATHEMATICS

(U) The Two-Dimensional One-Component Plasma in an
Inhomogeneous Background: Exact Results.

DEC 84  18P

PERSONAL AUTHORS: Alastuey.A ;Lebowitz, J. L.

CONTRACT NO. AFOSR-82-0018

PROJECT NO. 2301

TASK NO. A3

MONITOR: AFOSR
TR-85-0382

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physique, v45 p1859-
1874 Dec 84.

ABSTRACT: (U) We study the general inhomogeneous two-
dimensional jellium where the background density varies
in one space direction only. At P = 2, explicit
functional representations of the one- and two-body
densities of the particles are derived in terms of the
electrostatic potential created by the background. The
present model can be used for describing a large variety
of charged interfaces. Keywords include: One-component
plasma; exact results; nonuniform background; charged
interfaces; and Reprints.

DESCRIPTORS: (U) PLASMAS(PHYSICS), TWO DIMENSIONAL,
REPRINTS, BACKGROUND, DENSITY, ELECTROSTATICS, INTERFACES,
NONUNIFORM, REPRINTS

IDENTIFIERS: (U) PE81102F, WAFOSR2301A3

SEARCH CONTROL NO. EVLOSA

AD-A153 830  21/2  21/4  14/2  21/5

ILLINOIS UNIV AT URBANA DEPT OF MECHANICAL AND INDUSTRIAL
ENGINEERING

(U) Research Test Facility for Evaporation and Combustion
of Alternative Jet Fuels at High Air Temperatures.

DESCRIPTIVE NOTE: Annual technical rept. 1 Feb 83-30 Jan
84.

MAR 84  45P

PERSONAL AUTHORS: Peters, J. E.;Krier,H.;Kim,K. K.
Coverdill,R. E.;Kirwan, J. E.

REPORT NO. UIUC-ENG-84-4001

CONTRACT NO. F49620-83-K-0027

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-85-0383

UNCLASSIFIED REPORT

ABSTRACT: (U) Improved gas turbine combustion
performance will require the effective utilization of
alternative fuels and advanced combustor concepts.
Further understanding of spray combustion processes
including fuel evaporation and flame propagation
is required. Research is underway which features a high
pressure and temperature non-vitiilated air system to
provide air at simulated gas turbine inlet conditions.
A special fuel injection system was designed to produce
monodisperse sprays for the purpose of evaporation and
eventual combustion experiments in our newly developed
test facility. This report represents a summary of the
engineering activities during the first year (of a two
year contract) which was focused on the construction of a
combustion test facility in which the evaporation and
burning rates of jet fuels can be measured as a function
of inlet conditions and fuel properties. A large heat
exchanger facility which supports this research can
deliver continuously non-vitiilated air at flow rates up to
1 kg/sec and 800 kPa at temperatures from 300 to 900K.
Details of the evaporation/combustion test section are
described. Also included are the design of the fuel
injection system and test results of the injector showing monodisperse sprays with drop diameters of approx. 70 micrometers.

DESCRIPTIONS: (U) TEST FACILITIES, COMBUSTION, FUEL SPRAYS, BURNING RATE, COMBUSTION CHAMBERS, COMBUSTORS, EVAPORATION, FACILITIES, FLAME PROPAGATION, FLOW RATE, FUEL INJECTION, FUELS, FUNCTIONS, GAS TURBINES, HEAT EXCHANGERS, HIGH PRESSURE, INLETS, PERFORMANCE (ENGINEERING), RESEARCH FACILITIES, SPRAYS, TEST EQUIPMENT, TEST FACILITIES, TEST METHODS, AIR FLOW, MEASUREMENT, JET ENGINE INLETS

IDENTIFIERS: (U) Alternative jet fuels, Nonvitiated air, Monodisperse sprays, PE811027, WUAFOSR2308A2

UNCLASSIFIED REPORT

ABSTRACT: (U) Studies of the production of microwave and millimeter wave radiation from rotating electron beams have been pursued at the University of Maryland under AFOSR sponsorship since 1978. In the period 1978-1981, these studies centered the broadband radiation produced when a rotating electron beam interacts with the TE and/or TM modes of a smooth cylindrical conducting boundary system. These early studies led in 1981 to the first demonstration of a new type of coherent radiation source at microwave and millimeter wave wavelengths with demonstrable advantages over existing sources. This device, informally called a Cusp Injected Magnetron of Cuspton by members of our group, produces radiation by the resonant interaction of a rotating electron beam with the modes of a magnetron-type conducting boundary.

DESCRIPTORS: (U) MAGNETRONS, ELECTRON BEAMS, BOUNDARIES, DEMONSTRATIONS, ELECTRON BEAMS, INTERACTIONS, MAGNETRONS, MARYLAND, MICROWAVES, MILLIMETER WAVES, PRODUCTION, RADIATION, RESONANCE, THEORY, UNIVERSITIES
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A153 818  7/2    20/8
STANFORD UNIV CA DEPT OF CHEMISTRY
(U) Effect of Internal and Translational Energy on the
NH3(+) + D2 Ion-Molecule Reaction,
FEB 85   8P
PERSONAL AUTHORS: Morrison, R. J. S.; Conaway, W. E.; Zare, R. N.;
CONTRACT NO.  F49620-83-C-0033
PROJECT NO.  2303
TASK NO.  81
MONITOR: AFOSR
TR-85-0399

UNCLASSIFIED REPORT
SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters,
v113 n5 p435-440, 1 Feb 85.

ABSTRACT: (U) Using 2+ multiphoton ionization, NH3(+) is
prepared in selected levels of the v2 bending mode (v=0-7)
and the NH(+) + D2 reaction is studied as a function of
the center-of-mass collision energy (1-10 eV). The
exchange channel (NH2D+HD or H + D) is enhanced by ion
vibrational excitation whereas the addition channel
(NH3D+ +D) is almost unaffected.

DESCRIPTORS: (U) *IONIZATION, *AMMONIA, *DEUTERIUM,
cations, collisions, energy, excitation, vibration,
collisions, energy, vibration, molecular ions, reprints

IDENTIFIERS: (U) Multiphoton ionization, ion molecule
interactions, WUAFOSR230381, PEB1102F

SEARCH CONTROL NO. EVLOSA

AD-A153 814  12/1
NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC
PROCESSES
(U) Limit Behaviour for Stochastic Monotonicity and
Applications.
DESCRIPTIVE NOTE: Technical rept.,
FEB 85  49P
PERSONAL AUTHORS: Cohn, H.;
REPORT NO. TR-93
CONTRACT NO. F49620-82-C-0009
PROJECT NO.  2304
TASK NO.  AB
MONITOR: AFOSR
TR-85-0402

UNCLASSIFIED REPORT
ABSTRACT: (U) A transition probability function P is
said to be stochastically monotone if P(x, -ALPHA, y) is
non-increasing in x for every fixed y. A (non-homogeneous)
Markov chain or process is said to be stochastically
monotone if its transition probability functions are
stochastically monotone. Diffusions, random walks, birth-
and-death and branching processes are examples of such
models. It is shown that stochastically monotone
processes exhibit two basic types of asymptotic behaviour.
Chains with stationary transition probabilities display a
cyclic pattern, and a suitably normed and centered chain
turns out to converge almost surely if its is
geo metrically growing. Applications to diffusions and
branching processes are added.

DESCRIPTORS: (U) *CHI SQUARE TEST, ASYMPTOTIC SERIES,
INTERVALS, LEAST SQUARES METHOD, STATISTICAL
DISTRIBUTIONS, STOCHASTIC CONTROL

IDENTIFIERS: (U) *Pearson chi square test, Goodness of
fit, WUAFOSR230485, PEB1102F

AD-A153 816

AD-A153 814
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A153 790 12/1
NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS
(U) Moment Inequalities for Real and Vector p-Stable
Stochastic Integrals.
DESCRIPTIVE NOTE: Technical rept.,
DEC 84 20P
PERSONAL AUTHORS: Woyczynski, W. A.;
REPORT NO. TR-87
CONTRACT NO. F49620-82-C-0009
PROJECT NO. 2304
TASK NO. A5
MONITOR: AFOSR
TR-85-0403

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Presented at the International
Conference on Probability in Banach Space, 1984, Medford,
WA.

ABSTRACT: (U) This paper describes moment inequalities
for single and double stochastic integrals with respect
to p-stable motion. The proofs are based on the author's
work on the structure of single and multiple p-stable
integrals and inequalities for moments of exit times of a
p-stable motion in previous works. Its results do not
apply directly to the situation in which the author's
want to use them, in particular, because one dimensional
processes are explicitly excluded there. So they offer
the needed variation of their result. The author's
propose an extension of the theory of stochastic
integration with respect to a p-stable motion, to the
case when the latter takes values in a Banach space.

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, INEQUALITIES,
INTEGRALS, INTEGRATION, MOMENTS, ONE DIMENSIONAL, WORK,
BANACH SPACE

IDENTIFIERS: (U) WUAFO3R2304A5, PE81102F

AD-A153 790

UNCLASSIFIED

SEARCH CONTROL NO. EVLOSA

AD-A153 789 12/1
NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC
PROCESSES
(U) Extent to which Least-Squares Cross-Validation
Minimises Integrated Square Error in Nonparametric
Density Estimation.
DESCRIPTIVE NOTE: Technical rept.,
FEB 85 27P
PERSONAL AUTHORS: Hall, P.; Marron, J. S.;
REPORT NO. TR-94
CONTRACT NO. F49620-82-C-0009
PROJECT NO. 2304
TASK NO. A5
MONITOR: AFOSR
TR-85-0401

UNCLASSIFIED REPORT

ABSTRACT: (U) Keywords: Windows; Kernel density
estimates; Asymptotic properties; Distribution functions;
Nonparametric statistics; Random variables; Stochastic
processes.

DESCRIPTORS: (U) *NONPARAMETRIC STATISTICS, ASYMPTOTIC
SERIES, ERRORS, DENSITY, ESTIMATES, RANDOM VARIABLES,
DISTRIBUTION FUNCTIONS, KERNEL FUNCTIONS

IDENTIFIERS: (U) WUAFO3R2304A5, PE81102F

AD-A153 789

UNCLASSIFIED
This document shows that, by reparametrization, the problem of estimating a linear combination of variance components can be reduced to that of estimating a single variance component. Such a reduction is used to obtain some characteristics of nonnegatively estimable linear combinations of various components. Characterization of nonnegativity and estimability using MINQUE is also discussed. Additional keywords: quadratic subspace, QUE's (quadratic unbiased estimators).
Thermodynamics of Homonuclear Diatomic Fluids from the
Angular Median Potential.

ABSTRACT: (U) The use of the angular median potential as
a temperature-independent spherical reference system for
approximating molecular fluids is tested for its
prediction of thermodynamics. Calculations have been
carried out for a wide range of homonuclear diatomics
with continuous atom-atom potentials believed to be
representative of the full range of simulation data
available for such systems. The results of the pressure
are surprisingly good both in the denotation regime and
around the triple point. In the latter case, however, the
internal energies for highly elongated molecules with
attractive potential wells are considerably too positive.
Comparison with other perturbation theories indicates
that the median reference system gives better pressures
but poorer energies than RAM, and that in many cases,
especially for purely repulsive potentials, it gives
results of comparable accuracy to those obtained with
nonspherical reference systems. Keywords: Diatomic fluids;
median potential; spherical reference system; denotation
regime; triple point; Reprints.

REPORT NO. AFOSR TR-85-0358

UNCLASSIFIED REPORT

AD-A153 756 20/13 20/4 7/4

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF
MATHEMATICS

(U) Therodynamik of Homonuclear Diatomic Fluids from the
Angular Median Potential.

MAR 84 10P

PERSONAL AUTHORS: MacGowan, D.; Walsman, E. M.; Lebowitz, J.
L.; Percus, J. K.

CONTRACT NO. AFOSR-82-0016

PROJECT NO. 2301

TASK NO. A3

MONITOR: AFOSR TR-85-0358

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics v80
n6 p2718-2726. 15 Mar 84. Prepared in cooperation with S-
Cubed, La Jolla, CA. F49620-83-C-0023.
(U) Passivation on High Q Acoustic Strain Sensor for Accelerometer.

DESCRIPTION NOTE: Final technical rept. 14 Feb 82-13 Jul 84.

NOV 84 39P

PERSONAL AUTHORS: Motamed, M. W.

REPORT NO. MRDC-41108.3FR

CONTRACT NO. F49620-82-C-0012

PROJECT NO. 2305

TASK NO. 82

MONITOR: AFOSR TR-85-0281

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective is to study the passivation effects on the frequency stability of SAW resonators. Cantilever SAW accelerometers based on the SAW resonator to be sensing element of acceleration is considered for a wide spectrum of Air Force applications. To produce the desired accuracy, a quartz beam is designed with the required sensitivity and a size adequate for the resonator structure. A theory of interface waves is developed for the purpose of material and thickness selection of passivation layers. Preliminary results indicated that Y2O3 (yttrium oxide) and AlN (aluminum nitride) were the best materials for passivation of SAW resonators. Keywords include: Accelerometer, Frequency Stability, Interface and layered waves, Surface effects, Passivation films, SiO2, AlN, Y2O3.

DESCRIPTORS: (U) *RESONATORS, *SURFACE ACOUSTIC WAVE DEVICES, ACCELERATION, ACCELEROMETERS, ACCURACY, AIR FORCE OPERATIONS, ALUMINUM, CANTILEVER BEAMS, FILMS, FREQUENCY, INTERFACES, LAYERS, MATERIALS, NITRIDES, PASSIVATION, QUARTZ, SELECTION, SPECTRA, STABILITY, STRUCTURAL PROPERTIES, SURFACE PROPERTIES, THEORY, THICKNESS, WAVES, YTTRIUM OXIDES

UNCLASSIFIED
ABSTRACT: (U) A number of results were obtained pertaining to signal detection and data compression for image processing. These results led to improved performance over previous approaches, with special attention given to methods which required less statistical knowledge and which were easier to implement. In particular, robustness and nonparametric techniques were employed to allow the exploitation of whatever knowledge was available, while retaining insensitivity to the remaining inexactness in knowledge. In addition, because the presence of dependency in the underlying random processes often complicates detector design, investigations into when weak dependency could be ignored were undertaken. Moreover, results were obtained pertaining to the general subject of the extent of variation (induced by incomplete knowledge of the dependency) in the form of the detector data processor. Finally, some results were obtained which allowed relaxing stationarity assumptions which were placed on the signal in earlier work. (Author)

DESCRIPTORS: (U) +IMAGE PROCESSING +NONPARAMETRIC STATISTICS +DATA PROCESSING +DATA PROCESSING EQUIPMENT +DETECTION +DETECTORS +SIGNALS

IDENTIFIERS: (U) Robustness, WAFOSR2304A5, PEB1102F

UNCLASSIFIED REPORT

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A153 444 12/1 20/8
TEXAS A AND M UNIV COLLEGE STATION DEPT OF ELECTRICAL ENGINEERING

(U) Interim Report for Grant AFOSR-82-0033.

DESCRIPTIVE NOTE: Rept. for 1 Jan-31 Dec 84,

JAN 85 12P

PERSONAL AUTHORS: Halverson, D.

PROJECT NO. 2303

UNCLASSIFIED REPORT

AD-A153 405 7/4

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Preparation of Well-Defined Surfaces at Atmospheric Pressure: Studies of Structural Transformations of Ag-Adlattices on Pt(111) by LEED and Electrochemistry.

84 21P


UNCLASSIFIED REPORT

SEARCH CONTROL NO. EVLOSA

AD-A153 405 7/4


ABSTRACT: (U) Pt(111) surfaces disordered by ion-bombardment or electrochemical oxidation were converted to well-defined, ordered states by annealing in iodine vapor at atmospheric pressure. A structure not obtainable in vacuum was formed. Pt(111)(3 x 9 x 3) R 30 deg, containing 0.621 atoms per surface Pt atom in a slightly distorted hexagonal array. The I-I interatomic distances in this structure, 0.33 and 0.36 nm, were less than the Van der Waals distance, 0.43 nm. Gentle heating of this structure under pure Ar yielded 12 molecules. I atoms and a series of structures. The Pt (111) x the square root of 7 x the square root of seven R 19.1 deg. I adlattice proved to be identifiable from its distinctive electrochemical behavior in electrodeposition of Ag from aqueous solutions of AgClO4, which consists of three prominent structural transitions. Kinematic calculations of the directions and qualitative intensities of the LEED beams at selected kinetic energies has led to proposed structures consisting of Ag atoms close-packed in registry with the three-fold sites of Pt but with I atoms substituted for Ag atoms at the (square root of 3 x square root of three)R30 deg positions. Phase boundaries caused by reversals of the two packing sites of the
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

UNCLASSIFIED

AD-A152 924  9/2

MARYLAND UNIV COLLEGE PARK DEPT OF COMPUTER SCIENCE

DESCRIPTIVE NOTE: Technical rept.

FEB 85  34P

PERSONAL AUTHORS: Selby, R. W., Jr.; Basili, V. R.; Baker, F.

REPORT NO. TR-1415

CONTRACT NO. F49620-80-C-0001

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-85-0292

UNCLASSIFIED REPORT

UNCLASSIFIED

ABSTRACT: (U) The Cleanroom software development approach is intended to produce highly reliable software by integrating formal methods for specification and design, complete off-line development, and statistically based testing. In an empirical study, 15 three-person teams developed versions of the same software system; ten teams applied Cleanroom, while five applied a more traditional approach. This analysis characterize the effect of Cleanroom on the delivered product, the software development process, and the developers. The major results of this study are (1) most developers were able to apply the techniques of Cleanroom effectively; (2) the Cleanroom teams' products met system requirements more completely and had a higher percentage of successful test cases; (3) the source code developed using Cleanroom had more comments and less dense complexity; (4) the use of Cleanroom successfully modified aspects of development style; and (5) most Cleanroom developers indicated they would use the approach again. Originator-supplied keywords included: Software development methodology; Off-line software review; Software measurement; Methodology evaluation; Software management; and Empirical study.

DESCRIPTORS: (U) DISTRIBUTED DATA PROCESSING, SYSTEMS

AD-A152 924  CONTINUED

ENGINEERING, COMPUTER PROGRAMS, HIGH RELIABILITY,
PROGRAMMERS, INTEGRATED SYSTEMS, TEST METHODS,
METHODOLOGY, TEST AND EVALUATION, CODING, HIGH DENSITY,
OFF LINE SYSTEMS, TEAMS (PERSONNEL)

IDENTIFIERS: (U) Cleanroom software development, WUAFOSR2304A2, PEB11027
UNCLASSIFIED

UNCLASSIFIED REPORT

ABSTRACT: (U) Certain path properties of a symmetric a-stable process are studied in terms of the kernel h. The existence of an appropriate modification of the kernel h enables one to use results from stable measures on Banach spaces in studying of X. Bounds for the moments of the norm of sample paths of X are obtained. This yields definite bounds for the moments of a double alpha-stable integral. Also necessary and sufficient conditions for the absolute continuity of sample paths of X are given. Along with the above stochastic integral representation of stable processes, the representation of stable random vectors due to LePage, Woodroofe and Zinn is extensively used and the relationship between these two representations is discussed. (Author).

DESCRIPTORS: (U) *CRITICAL PATH METHODS, *STOCHASTIC PROCESSES, STABILITY, BANACH SPACE, INTEGRALS

IDENTIFIERS: (U) WUAFO5R2304A5, PE61102F

AD-A152 927 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(5) On Stochastic Integral Representation of Stable Processes with Sample Paths in Banach Spaces.

DESCRIPTIVE NOTE: Technical rept.,

JAN 85 40P

PERSONAL AUTHORS: Rosinski, J.

REPORT NO. TR-88

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0296

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE. Prepared in cooperation with Wisconsin Univ., Madison, Dept. of Electrical and Computer Engineering.

ABSTRACT: (U) The problem of estimating a weighted average of a random process from noisy observations at a finite number of sampling points is considered. The performance of sampling decisions with optimal or suboptimal, but easily computable, estimator coefficients is studied. Several examples and special cases are studied including additive independent noise, nonlinear distortion with noise, and quantization noise. (Author).

DESCRIPTORS: (U) *STATISTICAL SAMPLES, COEFFICIENTS, ESTIMATES, NOISE, QUANTIZATION, DISTORTION, NONLINEAR SYSTEMS

IDENTIFIERS: (U) WUAFO5R2304A5, PE61102F

AD-A152 926 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES


DESCRIPTIVE NOTE: Technical rept.,

DEC 84 53P

PERSONAL AUTHORS: Bucklew, J. A.; Cambanis, S.

REPORT NO. TR-88

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0297
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A152 982  7/4

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Electrochemical Processes at Well-Defined Surfaces, 84 25P


CONTRACT NO. AFOSR-81-0149

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR TR-85-0338

UNCLASSIFIED REPORT


ABSTRACT: (U) The structures of layers of atoms and ions formed on well-characterized single-crystal electrode surfaces in vapor and in electrolytic solutions at atmospheric pressure have been investigated by means of LEED, Auger spectroscopy, cyclic voltammetry and related techniques. Electrodeposited layers of metals were generally found to be highly ordered when deposited onto well-defined substrates. Layer structure proved to be a sensitive function of the structure of pre-absorbed adlayers. In related studies, organic compounds of various types were found to form a layer of oriented adsorbed molecules on atomically smooth substrates. Reactivity of these oriented absorbed intermediates was sharply dependent upon orientation. Findings of this latter type involved accurate packing density measurements using thin-layer electrodes. Recent work will be reviewed and additional findings presented.

DESCRIPTORS: (U) + ELECTROCHEMISTRY, + ELECTRODES, + SURFACE CHEMISTRY, ELECTRON DIFFRACTION, CRYSTAL LATTICES, REPRINTS, AUGER ELECTRON SPECTROSCOPY, LAYERS, VOLTAMMETRY, METALS, PACKING DENSITY

IDENTIFIERS: (U) PE81102F, WUAFS0R2303A1

AD-A152 982

UNCLASSIFIED

SEARCH CONTROL NO. EVLO5A

AD-A152 932  12/1

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Nonsmooth Analysis and Frechet Differentiability of M-Functionals.

DESCRIPTIVE NOTE: Technical rept., JUN 84 27P

PERSONAL AUTHORS: Clarke, B. R.;

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-85-0298

UNCLASSIFIED REPORT

ABSTRACT: (U) A necessary requirement for existence of the Frechet derivative is that the defining psi function is uniformly bounded, and this naturally excludes those nonrobust estimators such as the maximum likelihood estimator in normal parametric models. In this paper the methods of nonsmooth analysis, described in the book by F. M. Clarke (1983), are introduced to the theory of statistical expansions, and are used here in the proofs of weak continuity and Frechet differentiability of M-functionals. Subsequently the conditions for Frechet differentiability given in Clarke (1983) can be relaxed to include most popular M-functionals. Additional keywords: distribution functions; M-estimators; robustness; gross error sensitivity; weak continuity; asymptotic expansions; asymptotic normality; selection functional; local uniqueness. (Author).

DESCRIPTORS: (U) + DISTRIBUTION FUNCTIONS, ESTIMATES, ASYMPTOTIC NORMALITY

IDENTIFIERS: (U) + Nonsmooth analysis. Robustness, WUAFS0R2304A5, PE81102F

AD-A152 932

UNCLASSIFIED  PAGE  47  EVLO5A
Hydroquinone: Supporting electrolytes.

DESCRIPTORS: (U) CHEMISORPTION, ELECTROCHEMISTRY, OXIDATION, PHENOLS, ORIENTATION (DIRECTION), REPRINTS, ADSORPTION, ELECTRODES, ELECTROLYTES, PACKING DENSITY, SURFACE ACTIVE SUBSTANCES, PLATINUM

IDENTIFIERS: (U) Hydroquinone, PE81102F, WUAFOSR2303A1

NORTH CAROLINA STATE UNIV AT RALEIGH DEPT OF MATHEMATICS

DEC 84 7P

PERSONAL AUTHOR: Campbell, S. L.

CONTRACT NO. AFOSR-84-0240

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0288


ABSTRACT: (U) This paper reviews the current literature on nonlinear and time-varying generalized state-space systems of the form $F(t, y, y_t)$ to the 1st power) = 0.

DESCRIPTORS: (U) SPACE SYSTEMS, REPRINTS, NONLINEAR SYSTEMS, TIME, VARIATIONS

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5

PERSONAL AUTHORS: Find, J. P.; Rheinboldt, W. C.

ABSTRACT: (U) In the study of solution manifolds of parameter-dependent nonlinear equations, extended systems of equations play an important role, especially for the computation of singular points, such as turning points, bifurcation points, etc. Various extended systems have been proposed in the literature. Here it is shown that a central feature in the construction of extended systems is the tangent map of differential geometry. A theory of extended equations based on the tangent map is presented which also exhibits the close connection with the choice of local coordinate systems. The ideas and results are illustrated with an example of a continuously stirred chemical reactor.

DESIGNATORS: (U) *BIFURCATION (MATHEMATICS), *MAPPING, REPRINTS, CHEMICAL REACTORS, DIFFERENTIAL GEOMETRY, EQUATIONS, COORDINATES, TANGENTS

IDENTIFIERS: (U) FE81102F, WUAFOSR2304A3
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A152 991

ILLINOIS UNIV AT URBANA FUSION STUDIES LAB

(U) Restrike Particle Beam Experiments on a Dense Plasma Focus: Opening Switch Research on a Dense Plasma Focus.

DESCRIPTIVE NOTE: Final rept. 30 Sep 79-29 Sep 84.

JUN 85 85P

PERSONAL AUTHORS: Gerdin, G.

REPORT NO. FSL-181

CONTRACT NO. AFOSR-79-0121

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR TR-85-0279

UNCLASSIFIED REPORT

ABSTRACT: (U) Research on this grant has focused on plasma focus experiments in the areas of particle beam generation and as a potential repetitive opening switch. In pursuing the former unique diagnostic tools were developed to measure the scaling of particle beam current and energy for both the electron and ion beams generated by the device. Simultaneous measurements of the energy spectra for both the electrons and ion beams were measured for the first time as were scaling laws for the increase of electron energy and current with input energy. The potential of the plasma focus as an opening switch was then investigated. Measurements of the current and voltage waveforms indicated that the resistance of the pinch was roughly ten times the classical value which was estimated from electron temperature measurements and streak pictures. To increase the efficiency the impaler concept was devised which could have a transfer effi of well over 50% according to the results of a physical model. The frequency of the microwave emission was measured using the delay line technique. The observed frequencies were most consistent with the lower hybrid frequency. Keywords include: Dense Plasma Focus, Particle Beam Generation, Opening Switch, Load Experiments, Pulsed Power.
ABSTRACT: (U) The author extends three well-known facts of Fourier series on the disc to Fourier series on the torus, a theorem of Riesz, a theorem of Szego, and the fact that any function in H sub 1 can be factored as the product of two functions in H sub 2. Here the role of negative integers is played by the lattice points in the third quadrant. In earlier extensions of these theorems this role was played by half-planes. Additional keywords: Stochastic processes; stationary fields; measures on torus; Fourier coefficients; factorization theorem. (Author).

DESCRIPTORS: (U) *THEOREMS, *FOURIER SERIES, STOCHASTIC PROCESSES, COEFFICIENTS, STATIONARY

IDENTIFIERS: (U) *TORUS, PE61102F, WUAFOSR2304A5
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A153 078 7/4
CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY
(U) Formation of Vertically Oriented Aromatic Molecules
Chemisorbed on Platinum Electrodes: The Effect of
Surface Pretreatment with Flat Oriented Intermediates.
84 7P
PERSONAL AUTHORS: Hubbard, A. T.; Sorliaga, M. P.

AD-A153 081 7/3 9/1
CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY
(U) The Adsorption, Orientation and Electrochemical
Oxidation of Hydroquinone at Smooth Platinum
Electrodes. The Effect of Electrode Potential,
84 11P
PERSONAL AUTHORS: Chia, V. K. F.; Sorliaga, M. P.; Hubbard, A. T.

UNCLASSIFIED REPORT

ABSTRACT: (U) The adsorption of aromatic compounds on Pt
electrodes, pretreated with a layer of flat oriented
intermediates at fractional or full coverages, has been
studied as a function of concentration. Measurements of
packing densities were based on a thin layer
electrochemical methods. Four aromatic compounds,
previously shown to absorb on clean electrodes in flat
and edgewise (vertical) orientations depending upon the
adsorbate concentration, were studied: hydroquinone 1,4-
naphthohydroquinone, 2,3-dimethylhydroquinone, and 2,5-
dimethylhydroquinone. Additional keyword: reprint.

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. In Jnl. of Electroanalytical
ABSTRACT: (U) The absorption, orientation and
electrochemical oxidation of hydroquinone at smooth Pt
electrodes in 1M HClO4 have been studied as a function of
electrode potential. Absorption and oxidation
measurements were based on thin-layer coulometric methods.
The packing density, orientation and reactivity at a
given-concentration were independent of the potential of
absorption in the range of 0.00 V less than E less than 0.50 V. At -0.10 and 0.80 V, the packing densities
decreased by about 15%, although the shapes of the T vs.
Tg curves remained unchanged. At extremely negative or
positive potentials, the absorbed amounts were
significantly lowered; the presence of two distinct Beta
plateaus in the absorption isotherms persisted at these
potentials, but the transition to higher Beta started at
higher concentrations, were typical of edge orientations.
The oxidation data also indicated that species absorbed
at -0.200 and 0.80 V undergo partial hydrogenation and
oxidation, respectively, to an extent which was greater
for flat orientations than for edge orientations. The
data further suggested that species formed at a given
orientation in the presence of absorbed hydrogen or
oxygen retained their original orientation in the
presence of adsorbed hydrogen or oxygen retained their

UNCLASSIFIED

AD-A153 078

AD-A153 081

PAGE 42 EVLOSA
UNCLASSIFIED REPORT

ABSTRACT: (U) Utilizing a multiple-element scale/coherence decomposition of the Navier-Stokes equations, the essential characteristics of the large scale turbulent structure are computed in wall-bounded shear flows. The effect of small-scale turbulence structure is modeled and the large-scaled turbulence structure is computed assuming weakly non-linear large-scale dynamics. The effects of large-scale non-linearity and the presence of wave-like elements in the flow are accounted for utilizing perturbation theory. The resultant propagation, evolution in the convected reference frame and (statistical) occurrence of three-dimensional vertical instabilities are computed and compared to experimental data. Subsequently, coherent reflective turbulence models shall be constructed from this analysis. Keywords include: Fluid dynamics; turbulence; coherent structure.

DESCRIPTORS: (U) VTURBULENCE, MATH NICRICAL MODELS, WALLS, SHEAR PROPERTIES, REFLECTION, NONLINEAR SYSTEMS, STRUCTURAL PROPERTIES, NAVIER STOKES EQUATIONS, THREE DIMENSIONAL, FLUID DYNAMICS, COHERENCE, DECOMPOSITION, SCALE, PERTURBATION THEORY

IDENTIFIERS: (U) Shear flow, PE61102F, WUAFOSR2307A2
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A153 118  12/1

PITTSBURGH UNIV  PA CENTER FOR MULTIVARIATE ANALYSIS

(U) Robust Tests of Mean Vector in Symmetrical
Multivariate Distributions.

DESCRIPTIVE NOTE: Technical rept..

JAN 85  20P

PERSONAL AUTHORS:  GirJ.N., Sinha, B. K.

REPORT NO.  TR-85-01

CONTRACT NO.  F49620-85-C-0008

PROJECT NO.  2304

TASK NO.  A5

UNCLASSIFIED REPORT

ABSTRACT: (U) This document discusses probability
density functions, lora1y minimax tests, and
matrices (mathematics).

DESCRIPTORS: (U) *MULTIVARIATE ANALYSIS, MINIMAX
TECHNIQUE, STATISTICAL DISTRIBUTIONS,
MATRICES (MATHEMATICS), PROBABILITY DENSITY FUNCTIONS

IDENTIFIERS: (U) PE81102F, WUAFOSR 2304A5

AD-A153 116

UNCLASSIFIED REPORT

ABSTRACT: (U) The properties of the truncated
distributions for the various families of probability
densities have been well discussed in the literature.
Also, well known are the expressions for mean, variance
and higher order moments of truncated distributions,
corresponding to certain families. Johnson and Kotz
present an excellent account of these properties almost
in every chapter of their four-volume reference work on
statistical distributions. This report derives a
probability inequality, and then using this inequality,
obtain a property of the variance of the subpopulation,
obtained by truncating the superpopulation between two
points for a certain family of density function bearing
some mild conditions. The variance of the univariate
truncated distribution increases with the value of the
truncation point. Additional keywords: probability
density functions. (Author).

DESCRIPTORS: (U) *STATISTICAL DISTRIBUTIONS, NORMAL
DENSITY FUNCTIONS, PROBABILITY DENSITY FUNCTIONS, MOMENTS,
TRUNCATION

IDENTIFIERS: (U) PE81102F, WUAFOSR 2304A5

AD-A153 115

UNCLASSIFIED
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A153 137 7/4

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Adsorption of Aromatic Compounds at Platinum Electrodes. A Comparative Study Illustrating the Deficiencies of Adsorption Measurements Based on Hydrogen Codeposition or Anodic Oxidation.

84 18P

PERSONAL AUTHORS: Soriba, M. P.; Hubbard, A. T.

CONTRACT NO. AFOSR-81-0149

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR

TR-85-0341

UNCLASSIFIED REPORT


ABSTRACT: (U) The adsorption of aromatic compounds at smooth polycrystalline Pt electrodes in aqueous 1 M HClO4 or H2SO4 has been investigated using thin-layer coulometry, hydrogen codeposition and anodic oxidation for comparative purposes. Three compounds were studied; hydroquinone, 1,4-dihydroxybenzene, and 2,2',5,5'-tetrahydroxybiphenyl; these compounds were previously shown by thin-layer coulometry to adsorb in specific orientational states which depend upon their solution concentrations. The hydrogen codeposition method does not give absolute packing densities, yields wrong fractional coverage data, and provides no indication of orientational transitions. These discrepancies point to severe deficiencies of the latter two methods for measurement of adsorption, and arise from the fact that conversion of hydrogen codeposition or anodic oxidation data to absolute packing densities or adsorbed molecule cross-section requires assumptions which have been proved to be incorrect, at least for aromatic molecules.

DESCRIPTORS: (U) *ADSORPTION, *AROMATIC COMPOUNDS, *ELECTRODES, NAPHTHALENES, BIPHENYL, REPRINTS, MEASUREMENT, OXIDATION, DEPOSITION, HYDROGEN, PLATINUM, PHENOLS, DEFICIENCIES, COULOMETERS

AD-A153 137

UNCLASSIFIED

PAGE 39 EVL05A
ABSTRACT: (U) This paper develops methods for the exact computation of the distribution of the maximum flow and related quantities in a planar network with independent and exponentially distributed arc capacities. A continuous time Markov chain (CTMC) with upper triangular rate matrix and single absorbing state is equal to the value of maximum flow in the network. Recursive algorithms are developed for computing the distribution and moments of the maximum flow. Algorithms are also presented to compute the probability that a given cut is the minimum capacity cut in the network. The algorithms are efficient and computationally stable. Distribution of the maximum flow, given a minimum cut, is studied. Keywords include: Maximum flow; Stochastic networks; Multi-state reliability modeling; Markov chains.

IDENTIFIERS: (U) WUAFOSR2304A5, PE81102F
ABSTRACT: (U) The research under this effort was concerned with stable high-order methods for nonlinear stiff systems of ordinary differential equations, relaxation methods for large scale circuit analysis, and fast direct methods for elliptic partial differential equations on general regions. More specifically, the convergence of the discretized version of the wave-form relaxation algorithm was shown under suitable assumptions on the stability of the multistep methods employed and on the strength of the feedback. A new large-scale circuit decomposition was shown to be effective for a large class of digital circuits. In the area of fast direct methods for elliptic partial differential equations, a one parameter family of factored discretizations of the Laplace operator was derived. A variant of the marching method was proposed which is much more stable than the conventional approach and is thus applicable to grids with large numbers of discretization steps in each direction.

DESCRIPTORS: (U) *PARTIAL DIFFERENTIAL EQUATIONS, *NUMERICAL METHODS AND PROCEDURES, CONVERGENCE, OPERATORS(MATHEMATICS), GRIDS, CIRCUIT ANALYSIS, NONLINEAR SYSTEMS, STIFFNESS, LAPLACE TRANSFORMATION, DECOMPOSITION, ALGORITHMS, RELAXATION, WAVEFORMS

IDENTIFIERS: (U) PE81102F, WAFOSR2304A3

AD-A153 247

UNCLASSIFIED REPORT


ABSTRACT: (U) Layers of Ag electrodeposited from aqueous solution onto a Pt(SiB(111)x(111)(3x1)-1 adlattice formed by pretreatment of the Pt(SiB(111)x(111) surface with I2 vapor were studied by LEED, AES and thermal desorption. Stability of the I adlattice toward exposure to perchloric acid solution, and persistence of I on the surface during multiple cycles of electrodeposition and dissolution of Ag was demonstrated. The I adlattice served to protect the Pt and Ag electrodeposited surfaces from unwanted side reactions. Electrodeposition of Ag occurred in three well-resolved UPD regions. Subsequent UHV experiments, after each UPD peak and up to coverages of a few monolayers, revealed that stable and ordered Ag superlattices were formed, each UPD region leading to a change in LEED pattern and superlattice structure. These results are compared with previous results for smooth Pt(111), evoking clues as to the role of steps in electrodeposition.

DESCRIPTORS: (U) *PLATINUM, *ELECTRODEPOSITION, *SILVER, IODINE, STABILITY, REPRINTS, CRYSTAL LATTICES, SURFACES, PERCHLORIC ACID

IDENTIFIERS: (U) PE81102F, WAFOSR2303A1

AD-A153 197

UNCLASSIFIED
square root of 3 unit mesh at intervals 17 Pt unit
vectors divide the surface into hexagonal antiphase
domains.

Descriptors: (U) *ELECTROCHEMISTRY, *OXIDATION,
*ELECTRODEPOSITION, SILVER, PLATINUM, ARRAYS, ATOMS,
BAROMETRIC PRESSURE, BOUNDARIES, COMPUTATIONS, CONVERSION,
DISTORTION, IODINE, KINEMATICS, OXIDATION, PACKAGING,
Packing Density, SQUARE ROOTS, STRUCTURAL PROPERTIES,
Structures, Surfaces, Transformations, Transitions,
Vacuum, VAPORS, REPRINTS

Identifiers: (U) PE61102F, WJAFOSR2303A1

UNCLASSIFIED REPORT

Supplementary Note: Pub. in Jnl. of Physical Chemistry,

Abstract: (U) The effect of temperature on the
electrocatalytic oxidation of aromatic compounds (1,4-
dihydroxybenzene and 1,4-dihydroxynaphthalene) adsorbed
on smooth polycrystalline platinum in aqueous solutions
has been investigated. Adsorption occurred spontaneously
when the clean platinum surface was immersed into aqueous
solutions of the aromatic compounds. Analytical
measurements were made by using thin-layer
electrochemical methods. As the temperature was raised
from 5 to 85°C, the extent of oxidation of species bound
in the edgewise orientation was increased considerably,
in contrast to that of species attached in the flat
orientation, which was nearly constant. The oxidation
data suggest that CO2 is the principal product from flat-
adsorbed species at or above room temperature but that
the product distribution from edge-oriented intermediates
is a sensitive function of temperature.

Descriptors: (U) *THERMOCHEMISTRY, *OXIDATION, *AROMATIC
COMPOUNDS, *ELECTROCATALYSTS, NAPHTHALENES, BENZENE,
REPRINTS, ADSORPTION, PLATINUM, TEMPERATURE

Identifiers: (U) PE61102F, WJAFOSR2303A1
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A152 887 12/1
TEXAS A AND M UNIV COLLEGE STATION DEPT OF ELECTRICAL ENGINEERING

(U) Alphabet-Constrained Data Compression.

DESCRIPTIVE NOTE: Final rept. 1 Oct 83-30 Nov 84.
JAN 85 232P

PERSONAL AUTHORS: Gibson, J. D.; Fischer, T. R.;

PROJECT NO. AFOSR-84-0003

TASK NO. A6

MONITOR: AFOSR
TR-85-0289

UNCLASSIFIED REPORT

ABSTRACT: (U) The alphabet-constrained theory of data compression provides a specific methodology for obtaining explicit data compression system designs, which is in sharp contrast with rate distortion theory and the usual intuitive design methods. Various aspects of alphabet-constrained data compression were investigated, including preposterior analysis, adaptive code generators, vector quantization and the relationships among prediction, quantization and stationarity. Simulations of several coder designs for speech and image sources were performed.

DESCRIPTORS: (U) *CODING, *DATA COMPRESSION, ADAPTIVE SYSTEMS, INFORMATION SYSTEMS, IMAGES, SOURCES, METHODOLOGY, DISTORTION, THEORY, CONTRAST, SHARPNESS, SPEECH

IDENTIFIERS: (U) WUAOSR2304A6, PEB1102F

AD-A152 887

UNCLASSIFIED

SEARCH CONTROL NO. EVLOSA

AD-A152 879 20/8
GEORGIA UNIV ATHENS DEPT OF PHYSICS AND ASTRONOMY

(U) A Study of Excitations during Collisionally-Induced Electron Detachment of Negative Ions.

DESCRIPTIVE NOTE: Annual rept. 1 Aug 83-31 Jul 84.
JUL 84 23P

PERSONAL AUTHORS: Menendez, M. G.; Duncan, M. M.;

PROJECT NO. AFOSR-83-0264

TASK NO. A4

MONITOR: AFOSR
TR-85-0280

UNCLASSIFIED REPORT

ABSTRACT: (U) Measurements of the double differential cross sections for the electron detachment of the negative ion of hydrogen upon collision with atomic targets were made around 1 MeV. The double differential cross section at and near zero degrees in the laboratory frame for the single electron detachment was found to account for all of the structure seen in the total (non-specific) double differential cross section. Although quantitative data do not yet exist, it is clear that the double electron detachment process does not contribute significantly to the total double differential cross section at zero degrees. Hence, the non-specific cross sections were used to investigate details of the angular, incident energy, and target dependencies of the structure. The results strongly indicate that a portion of the structure is a manifestation of leaving the final state projectile, the hydrogen atom, in an excited state. A modified version of the electron energy analyzer which permits measurement of Lyman alpha photons coincident with ejected electrons was completed. This version of the analyzer will be used to measure directly the electron energy spectrum coincident with excitation of the hydrogen atom to the 2p state.

DESCRIPTORS: (U) *ELECTRON IMPACT SPECTRA, EXCITATION, DIFFERENTIAL CROSS SECTIONS, ELECTRON ENERGY, HYDROGEN, ANIIONS

AD-A152 879
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A152 858 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) A Bilaterally Deterministic rho-Mixing Stationary Random Sequence.

DESCRIPTIVE NOTE: Technical rept.

FEB 85 17P

PERSONAL AUTHORS: Bradley, R. C.

REPORT NO. TR-91

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0348

UNCLASSIFIED REPORT

ABSTRACT: (U) A non-degenerate strictly stationary sequence of random variables is constructed such that the P-mixing (maximal correlation mixing) condition is satisfied and each X sub k is measurable with respect to the double-tail sigma-field.

DESCRIPTORS: (U) *SEQUENCES (MATHEMATICS), *RANDOM VARIABLES, MEASUREMENT, CONSTRUCTION, CORRELATION, MIXING, STATIONARY

IDENTIFIERS: (U) WUAFOSR2304A5, PEB1102F

AD-A152 858

SEARCH CONTROL NO. EVLOSA

AD-A152 827 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC PROCESSES

(U) On the Exceedance Point Process for a Stationary Sequence.

DESCRIPTIVE NOTE: Technical rept.

JAN 85 23P

PERSONAL AUTHORS: Hsing, T., Leadbetter, W. R.

REPORT NO. TR-89

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0293

UNCLASSIFIED REPORT

ABSTRACT: (U) It is known that the exceedance points of a high level by a stationary sequence are asymptotically Poisson as the level increases, under appropriate long range and local dependence conditions. When the local dependence conditions are relaxed, clustering of exceedances may occur, based on Poisson positions for the clusters. In this paper a detailed analysis of the exceedance point process is given, and show that, under wide conditions, any limiting point process for exceedances is necessarily compound Poisson. Sufficient conditions are also given for the existence of such a limit. The limiting distributions of extreme order statistics are derived as corollaries. Keywords include: Extreme values; stochastic processes; exceedances; point processes.

DESCRIPTORS: (U) *SEQUENCES (MATHEMATICS), *CLUSTERING, STOCHASTIC PROCESSES, POISSON DENSITY FUNCTIONS, LIMITATIONS, STATIONARY

IDENTIFIERS: (U) Exceedance points. WUAFOSR2304A5, PEB1102F

AD-A152 827
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A152 812 12/1 14/4
CITY COLL. NEW YORK DEPT OF MATHEMATICS
(U) Inequalities for Distributions with Increasing Failure Rate.

DESCRIPTIVE NOTE: Technical rept.
DEC 84 18P
PERSONAL AUTHORS: Brown, M.

REPORT NO. CUNY-MB84-01
CONTRACT NO. AFOSR-84-0095
MONITOR: AFOSR TR-85-0291

UNCLASSIFIED REPORT

ABSTRACT: (U) Inequalities are obtained for IFR (increasing failure rate) distributions. These include bounds on the renewal function for a renewal with IFR interarrival time, and bounds on the quality of exponential approximation to IFR distributions. Keywords include: Inequalities; IFR; IFRA; DMRL; NBU and NBUE distributions; renewal theory; exponential approximations.

DESCRIPTORS: (U) +STATISTICAL DISTRIBUTIONS, +FAILURE, EXPONENTIAL FUNCTIONS, APPROXIMATION(MATHEMATICS), RATES, THEORY

IDENTIFIERS: (U) Inequalities, Renewal theory, IFR(Increasing Failure Rate), NBU distributions, WUAFOSR2304K3, PEB1102F

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UNCLASSIFIED REPORT

ABSTRACT: (U) The results of a one-year contract on electrode erosion phenomena are summarized. The arc voltage drop in a spark gap was measured for various electrode, gas, and pressure combinations. A previously developed model of self breakdown voltage distribution was extended. A jet model for electrode erosion was proposed and an experimental arrangement for testing the model was constructed. The effects of inhomogeneities and impurities in the electrodes were investigated. Some of the work described here is scheduled for completion in 1985 under a current grant (AFOSR 84-0032). The areas of investigation described here include: (1) Self breakdown voltage distributions; (2) Electrode erosion; (3) Spark gap voltage recovery. Originator supplied keywords include: Breakdown; Recovery; Electrode; Erosion; Arc voltage; Spark gaps; and JIE(Jet Impact Erosion).

DESCRIPTORS: (U) +ELECTRODES, SPARK GAPS, RECOVERY, VOLTAGE, EROSION, IMPURITIES, BREAKDOWN(ELECTRONIC THRESHOLD)

IDENTIFIERS: (U) +Electrode erosion, JIE(Jet Impact Erosion), PEB1102F, WUAFOSR2301A7

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AD-A152 802 9/1
TEXAS TECH UNIV LUBBOCK LASER LAB
(U) Spark Gap Electrode Erosion.

DESCRIPTIVE NOTE: Final rept. 1 Oct 83-30 Sep 84.
DEC 84 137P
PERSONAL AUTHORS: Krompholz, H.; Kristiansen, M.

CONTRACT NO. AFOSR-84-0015
PROJECT NO. 2301
TASK NO. A7
MONITOR: AFOSR TR-85-0282

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AD-A152 812

UNCLASSIFIED
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A152 800  20/8  7/2  20/5
AVCD EVERETT RESEARCH LAB INC EVERETT WA

(U) Experimental Study of Dissociative Attachment in
Optically-Pumped Lithium Molecules.

DESCRIPTIVE NOTE: Final rept. 1 Mar-31 Oct 84.

JAN 85 28P

PERSONAL AUTHORS: McGeoch, M. W.; Schlier, R. E.;

CONTRACT NO. F49620-84-C-0044

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-85-0284

UNCLASSIFIED REPORT

ABSTRACT: (U) The first experimental observations of
dissociative attachment in lithium dimmer molecules are
presented. Lithium molecules are optically pumped via the
Li2I(8) electronic state into selected levels of the
ground electronic state. Low energy electrons are created
by two-step laser photoionization of lithium atoms.
Product Li ions are detected by time-of-flight
spectrometry. Preliminary analysis of the data gives a
rate constant of 3 x 10 to the 8th power cc/sec for the
attachment of 0.1 eV electrons to lithium vibrational
states v = 8 to v = 12, without strong dependence on the
selected states. Originator-supplied keywords include:
Dissociative Attachment.

DESCRIPTORS: (U) *MOLECULAR ASSOCIATION, *LITHIUM,
*MOLECULES, *OPTICAL PUMPING, ATTACHMENT, DISSOCIATION,
ELECTRONIC STATES, GROUND STATE, IONS, ATOMS, ELECTRONS,
LOW ENERGY, SPECTROMETRY, PHOTOIONIZATION

IDENTIFIERS: (U) Dissociative attachment, PEG1102F,
WUAFOSR2301A7

AD-A152 800

UNCLASSIFIED

SEARCH CONTROL NO. EVLOSA

AD-A152 715  13/8  9/2  5/1  13/9
BRIGHAM YOUNG UNIV PROVO UT COMPUTER AIDED MFG LAB

(U) Manufacturing Information System.

DESCRIPTIVE NOTE: Final rept. 1 Jul 82-31 Oct 84.

DEC 84 258P

PERSONAL AUTHORS: Allen, D. K.; Smith, P. R.; Smart, M. J.;

CONTRACT NO. AFOSR-82-0253

PROJECT NO. 2305

TASK NO. K1

MONITOR: AFOSR
TR-85-0275

UNCLASSIFIED REPORT

ABSTRACT: (U) This is the final report of a project to
develop prototype miniature laboratory apparatus to be
used in conducting a series of experiments and
investigations relating to a Manufacturing Information
System. The size and cost of manufacturing equipment has
made it extremely difficult to perform a realistic
modeling and simulation of the manufacturing process in
university research laboratories. Likewise the size and
cost factors, coupled with many uncontrolled variables of
the production situation has even made it difficult to
perform adequate manufacturing research in the industrial
setting. The difficulty of developing Integrated
Manufacturing Systems is well documented by the large
amount of funding and effort being spent by industry and
government. It was the purpose for research funded under
this grant to continue the development of miniature
prototype equipment for use in an integrated CAD/CAM
Laboratory. The equipment developed under this grant and
from previous work is capable of actually performing
production operations (e.g. drilling, milling, turning,
punching, etc.) on metallic and non-metallic workpieces.
It is now expected that the prototype equipment developed
or otherwise acquired under this grant will now provide
the basis for extensive research on Manufacturing
Information Systems. Common Database Development, CIM
Application Program Development, Local Area Networking,
and Knowledge-based CAD/CAM Training utilizing
Interactive Videodisc Delivery Systems. Originator-
supplied keywords included: Manufacturing, Integrated, Information, Flexible, Distributed, System, Assembly Language, Computer Programs, Mechanical Drawing.

DESCRIPTORS: (U) *COMPUTER AIDED MANUFACTURING, *MANAGEMENT INFORMATION SYSTEMS, *INDUSTRIAL ENGINEERING, *DISTRIBUTED DATA PROCESSING, INDUSTRIAL PRODUCTION, ROBOTICS, DRILLING, MILLING MACHINES, MACHINE TOOLS, CONTROL SYSTEMS, MECHANICAL DRAWING, DATA BASES, COSTS, COMPUTER PROGRAMS, SETTING (ADJUSTING), DISK RECORDING SYSTEMS, SIMULATION, MINIATURIZATION, PROTOTYPES, ASSEMBLY LANGUAGES

IDENTIFIERS: (U) WUAFOSR2305K1, PEB1102F

ABSTRACT: (U) Two double laser resonance experiments of collisional hole filling and vibration to rotation transfer have been used to determine rotational relaxation rates for hydrogen fluoride. The rates for rotational levels J2 through J14 range from 55,000,000/ sec/torr to 2,000,000 sec/torr and these results are described by kinetic rate models. The rates increase with temperature by about 20 percent 300 K and 1000 K. The effect of several added gases on the rates has been measured. Vibration to rotation transfer proceeds by the accepted vibrational relaxation rate. A significant fraction of V=1 population is transferred with about 35 percent passing through the levels J10 - J14 of V=0.

Originator-supplied keywords include: Relaxation rates, V-R transfer, Hydrogen fluoride, Rotational population transfer, and Chemical lasers.

DESCRIPTORS: (U) *RELAXATION TIME, *HYDROGEN FLUORIDE, MOLECULAR ROTATION, MOLECULAR VIBRATION, COLLISIONS, ENERGY LEVELS, RESONANCE, HOLES (ELECTRON DEFICIENCIES), FILLING, CHEMICAL LASERS, REACTION KINETICS, TRANSFER

IDENTIFIERS: (U) WUAFOSR2303B1, PEB1102F
A sky-mapping filter photometer has been used to determine the 630.0 nm airglow enhancement produced by explosive release of $3 \times 10^9$ to the 26th power carbon dioxide molecules into the F-region at 320 km altitude on 8 September 1982 as part of project BIME. The enhancement is produced when carbon dioxide molecules engage in atom transfer with the F-region oxygen ions to form molecular oxygen(+) ions, which subsequently dissociatively recombine with the ambient electrons to produce O(1D) atoms to yield the 630.0 nm radiation. The morphology of the enhanced airglow region has been traced in a series of 630.0 nm intensity contour maps as a function of time, the enhancement reaching a central brightness of approximately 400 R about 2 min after release and a diameter of about 250 km some 3 min after release. The measurements of central intensity and enhanced region radius as a function of time are compared with model calculations by Mendillo and Hernier of diffusive expansion of carbon dioxide molecules from either a point release or from an initial, extended volume. While peak intensities are reasonably reproduced, the measured decay of the 630.0 nm intensity and the growth in size of the enhanced region are rather different from the model predictions. The measured 200 m/s drift southeastward of the enhanced region is consistent with the motion of the neutral thermosphere.
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<th>DTIC REPORT BIBLIOGRAPHY</th>
<th>SEARCH CONTROL NO. EVLOSA</th>
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<td><strong>AD-A152 882 7/3</strong></td>
<td><strong>AD-A152 281 5/10 8/18</strong></td>
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<td>MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY</td>
<td>MEDICAL RESEARCH INST OF SAN FRANCISCO CA</td>
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<td>85</td>
<td>84</td>
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<td>PERSONAL AUTHORS: Seyferth, D.; Shannon, M. L.; Vick, S. C.; Lim, T. F. O.</td>
<td>DESCRIPTIVE NOTE: Annual scientific rept. 1 Sep 83-31 Aug 84,</td>
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<td>CONTRACT NO. AFOSR-83-0003</td>
<td>NOV 84 6P</td>
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<td>PROJECT NO. 2303</td>
<td>PERSONAL AUTHORS: Nakayama, K.; Mackeben, M.</td>
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<td>TASK NO. 82</td>
<td>CONTRACT NO. AFOSR-83-0320</td>
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<td>MONITOR: AFOSR TR-85-0301</td>
<td>PROJECT NO. 2313</td>
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<td><strong>UNCLASSIFIED REPORT</strong></td>
<td>TASK NO. A5</td>
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<tr>
<td><strong>ABSTRACT:</strong> <em>(U) Bis(triphenylphosphine)palladium dichloride was found to catalyze two types of process with 1,1-dimethyl-2,3-bis(trimethylsilyl)silirene: 1) formal dimethyldisilene extrusion follow by trapping of this species by unsaturated organic species that are present; 2) insertion of unsaturated substrates into the silirene ring. Such catalyzed reactions with terminal acetylenes, allenes, and some terminal 1,3 dienes are described. Originator-supplied keywords include: Silacycloprenes, Organosilicon synthesis, Insertion reactions, and Transition Metal catalysis.</em></td>
<td><strong>UNCLASSIFIED REPORT</strong></td>
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<td><strong>ABSTRACT:</strong> <em>(U) This study is designed to find the origins of electrical signals generated by the brain in association with selective visual attention. A series of behavioral and electro-physiological tests on humans as well as on trained, alert monkeys is proposed and progress in pursuit of the stated goal is reported. Originator supplied keywords include: Monkey, P300(brain wave), and Current source density analysis.</em></td>
<td>SUPPLEMENTARY NOTE: Original contains color plates: All DTIC/NTIS reproductions will be in black and white.</td>
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<td><strong>IDENTIFIERS:</strong> *(U) Insertion reactions, Sillirennes, Silylenes, PE81102F, WUAFOSR230382</td>
<td><strong>IDENTIFIERS:</strong> *(U) *Evoked potential, PE81102F, WUAFOSR2313A5</td>
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The focus of the research effort is the understanding of three-dimensional shock wave-turbulent boundary layer interactions. The approach uses the full mean compressible Navier-Stokes equations with turbulence incorporated through the algebraic turbulent eddy viscosity model of Baldwin and Lomax. This year's principle accomplishments are: (1) the Baldwin-Lomax model was evaluated for a series of non-separated two-dimensional turbulent boundary layers. (2) the 3-D Navier-Stokes codes was rewritten into CYBER 200 FORTRAN. (3) the computed results for the 3-D sharp fin alpha sub g = 10 deg were compared with the results of a separate calculation by C. Horstmann using the k-epsilon turbulence model and the experimental data of McClure and Dilling, etc. (4) the 3-D sharp fin at alpha sub g = 20 deg was computed, and the results compared with the available experimental data. The examination of the flowfield structure of the 3-D sharp fin at alpha sub g = 20 deg was initiated. Original supplied keywords include: High speed flows; Viscous-inviscid interactions; Shock-boundary layer interactions; Computational fluid dynamics; Navier-Stokes equations; and Turbulence.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A152 197 20/1

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Research and Development of Subsurface Acoustic Wave Devices for Sensor Applications.

DESCRIPTIVE NOTE: Final rept. 30 Nov 83-31 Jan 85.

JAN 85 59P

PERSONAL AUTHORS: Cullen, D. E.; Grudkowski, T. W.

REPORT NO. UTRC/R85-926871

CONTRACT NO. F49620-84-C-0006

PROJECT NO. 2305

TASK NO. 05

MONITOR: AFOSR
TR-85-0260

UNCLASSIFIED REPORT

ABSTRACT: (U) Surface skimming bulk waves (SSBW) in quartz were examined for sensor applications. Sensitivities to substrate strains, temperature, and fluid immersion were determined for AT and BT-cut quartz. The application of a strain sensitive SSBW device configuration as a fluid damped, cantilever beam accelerometer was investigated. This program has resulted in the discovery of an SSBW mode with properties that are extremely well suited to the development of acoustic wave sensors. Originator-supplied keywords include: Surface Skimming Bulk Waves (SSBW), SSBW sensors, and SSBW strain sensitivity.

DESCRIPTORS: (U) *ACOUSTIC DETECTORS, *ACOUSTIC EQUIPMENT, ACOUSTIC WAVES, CANTILEVER BEAMS, QUARTZ, DETECTORS, WAVE PROPAGATION, IMMERSION, SUBSURFACE

IDENTIFIERS: (U) P.61102F, WUAFOSR2305B2

AD-A152 187 7/4

CALIFORNIA UNIV DAVIS DEPT OF WATER SCIENCE AND ENGINEERING

(U) Vibrational Relaxation of N2(A Cubed Sigma(+)) sub u, v = 1,2,3).

NOV 83 6P

PERSONAL AUTHORS: Thomas, J. M.; Jeffries, J. B.; Kaufman, F.

CONTRACT NO. AFOSR-80-0207

PROJECT NO. 2303

TASK NO. 81

MONITOR: AFOSR
TR-85-0156

UNCLASSIFIED REPORT


ABSTRACT: (U) N2 (A, v=0-3) produced by the Ar(3Po2) + N2 reaction and detected by laser-induced fluorescence undergoes rapid, stepwise vibrational relaxation but slow electronic quenching with added CH4 or CF4. Rate constants, K superscript V subscript Q of 1.5, 3.1, and 5.0 X 10 to the -12th power cc/s are measured for Q=CH4, v=1-3, and 0.47, 1.8, and 5.5 X 10 to the -12th power cc/s for Q=CF4, v=1-3, with approx + or - 20% accuracy sigma. Information is also obtained for the unrelaxed, relative v populations. Originator supplied keywords include: Laser-Induced Fluorescence, Vibrational Relaxation, Electronic Quenching.

DESCRIPTORS: (U) *QUenching, *RELAXATION, *VIBRATION, POPULATION, CONSTANTS

IDENTIFIERS: (U) WUAFOSR2305B1, PEG110F

AD-A152 197

UNCLASSIFIED

AD-A152 187
ABSTRACT: (U) Rayleigh-wave group-velocity have been obtained by the moving window analysis of high-explosive ground motion records at McCormick Ranch, Kirtland AFB. Fundamental mode velocities (225 to 264 m/s) were determined for the period range 50-180 ms at a recording distance of 229 m. Also, higher mode dispersion was observed for periods 25-60 ms with group velocities of 80 305 m/s. Possible spall phase dispersion was observed at distances of 11-38 m. Seismic refraction surveys provided initial model parameter for the test site. An iterative inversion method was used to estimate the shear velocity distribution. Constant layer thickness and attenuation values equal 50-100 were additional initial constraints. Inversion results yielded a shear-wave velocity model of 245-610 m/s to a depth of 24 m at McCormick Ranch. Originator-supplied keywords include: Rayleigh wave, group velocity, and high explosive tests.

DESCRIPTORS: (U) HIGH EXPLOSIVES, TEST METHODS, RAYLEIGH WAVES, GROUND MOTION, INVERSION, ITERATIONS, MOTION, WINDOWS, VELOCITY, REFRACTION, SHEAR PROPERTIES

IDENTIFIERS: (U) WAFAOSR2309D9, PEB11027

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SEARCH CONTROL NO. EVLOSA

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AD-A152 172 19/1

CALIFORNIA STATE UNIV NORTHRIDGE DEPT OF GEOLOGICAL SCIENCES

(U) Inversion of Rayleigh Wave Group Velocities from High-Explosive Tests.

DESCRIPTIVE NOTE: Final rept. Apr 82-31 Mar 83.

JAN 85 32P

PERSONAL AUTHORS: Simila, G. W.

CONTACT NO. AFOSR-82-0138

PROJECT NO. 2309

TASK NO. D9

MONITOR: AFOSR TR-85-0278

UNCLASSIFIED REPORT

ABSTRACT: (U) The problem of estimating the variance parameter robustly in a heteroscedastic linear model is considered. The situation where the variance is a function of the explanatory variables is treated. To estimate the variance robustly in this case, it is necessary to guard against the influence of outliers in the design as well as outliers in the response. By analogy with the homoscedastic regression case, two estimators are proposed which do this. Their performance is evaluated on a number of data sets. The authors had considerable success with estimators that bound the self-influence, that is, the influence on observation has on its own fitted value. The authors conjecture that in other situations, for example, homoscedastic regression, bounding the self-influence will lead the estimators with good robustness properties. Additional keywords: Air Force research; and Mathematical models. (Author)

DESCRIPTORS: (U) MATHEMATICAL MODELS, ESTIMATES, NUMERICAL METHODS AND PROCEDURES, REGRESSION ANALYSIS, AIR FORCE RESEARCH, WEIGHTING FUNCTIONS, PARAMETERS, VARIATIONS, VARIABLES

IDENTIFIERS: (U) Robustness, Outliers, WAFAOSR2304A5

AD-A152 104 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Some New Estimation Methods for Weighted Regression When There are Possible Outliers.

DESCRIPTIVE NOTE: Technical rept.

JAN 85 31P

PERSONAL AUTHORS: Gillin, D. M.; Carroll, R. J.; Ruppert, D.

REPORT NO. MIMEO-SER-1571

CONTACT NO. F49620-82-C-0009, NSF-MCS81-00748

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-85-0264

UNCLASSIFIED REPORT

ABSTRACT: (U) Rayleigh-wave group-velocity have been obtained by the moving window analysis of high-explosive ground motion records at McCormick Ranch, Kirtland AFB. Fundamental mode velocities (225 to 264 m/s) were determined for the period range 50-180 ms at a recording distance of 229 m. Also, higher mode dispersion was observed for periods 25-60 ms with group velocities of 80 305 m/s. Possible spall phase dispersion was observed at distances of 11-38 m. Seismic refraction surveys provided initial model parameter for the test site. An iterative inversion method was used to estimate the shear velocity distribution. Constant layer thickness and attenuation values equal 50-100 were additional initial constraints. Inversion results yielded a shear-wave velocity model of 245-610 m/s to a depth of 24 m at McCormick Ranch. Originator-supplied keywords include: Rayleigh wave, group velocity, and high explosive tests.

DESCRIPTORS: (U) HIGH EXPLOSIVES, TEST METHODS, RAYLEIGH WAVES, GROUND MOTION, INVERSION, ITERATIONS, MOTION, WINDOWS, VELOCITY, REFRACTION, SHEAR PROPERTIES

IDENTIFIERS: (U) WAFAOSR2309D9, PEB11027

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(U) Problems related to fracture of bonded structures and composites were studied with emphasis on the time dependence of the failure process. Three subject areas in this thesis are identified: (a) Residual stresses due to changes in temperature through the glass transition range. It is found that determination of the creep compliance or of the relaxation modulus is the most important material property for accurate stress determination. General experimental and analytical agreement prevails. (b) In temperature ‘accelerated’ crack propagation tests along interfaces it is found that crack propagation stops upon raising the temperature. The reason for this ‘unexpected’ behavior is that with raising the temperature the elimination of residual stresses overcomes the reduction of viscosity so that crack arrest becomes possible. (c) Fatigue crack propagation is studied for a viscoelastic material. In contrast to metals the rate of crack growth per cycle is strongly affected by the frequency, declining with increasing frequency. However, the average velocity (cm/sec) per cycle increases with frequency. Thus it is more important to consider the time under stress than merely...
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AD-A152 084 CONTINUED

the number of cycles.

DESCRIPTORS: (U) *ADHESIVE BONDING, *BONDED JOINTS.
*COMPOSITE MATERIALS, *TIME DEPENDENCE, CREEP, CRACK
PROPAGATION, FRACTURE MECHANICS, RESIDUAL STRESS, THESES.
VISCOELASTICITY, PREDICTIONS, STRESSES

IDENTIFIERS: (U) PE61102F, WUAFOSR230782

AD-A152 038

RESEARCH INST OF COLORADO FORT COLLINS

(U) High Efficiency Transverse D. C. Electron Beams.

DESCRIPTIVE NOTE: Final scientific rept. 1 Aug 83-31 Jul 84.
OCT 84 57P

PERSONAL AUTHORS: Collins, G.

REPORT NO. RIC-247

CONTRACT NO. AFOSR-83-0287

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-85-0242

UNCLASSIFIED REPORT

ABSTRACT: (U) The proposed new sintered metal oxide-
metal (e.g. A12O3-Mo) cathodes were tested. As
originally predicted these cathode materials produce high
current beams (1A) at multikilowatt power in atmospheres
containing a pure novel gas or a mixture of a novel gas
and a metal vapor at generation efficiencies up to 75%.
In contrast with other cathode materials previously used,
the sintered materials allow multikilowatt electron beam
operation in an oxygen free atmosphere. This is an
important development in the construction of an cw
electron beam excited UV laser, where no oxygen can be
tolerated. These new electron guns developed for laser
excitation find also important applications in other
areas of research, such as the processing of
microelectronic materials. Keywords include: High
efficiency transverse D.C. electron beams.

DESCRIPTORS: (U) *ELECTRON BEAMS, *LASERS, CATHODES.
MATERIALS, OPERATION, ELECTRON GUNS, ATMOSPHERES, OXYGEN,
SINTERING, METAL VAPORS, MICROELECTRONICS, PROCESSING

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY  SEARCH CONTROL NO. EVL05A

AD-A152 027 3/2

TUFTS UNIV  WEDFORD MA DEPT OF PHYSICS

(U) Very Large Array Observations of Coronal Loops and Related Observations of Solar Type Stars.

DESCRIPITIVE NOTE:  Annual scientific rept. 1 Jan-31 Dec 84, Jan 84 118P

PERSONAL AUTHORS: Lang K. R. :

PROJECT NO. AFOSR-83-0019

TASK NO. 2311

MONITOR: AFOSR TR-85-0256

UNCLASSIFIED REPORT

ABSTRACT: (U) Observations of solar active regions with the Very Large Array (V.L.A.) led to a new understanding of the origin and prediction of the solar bursts which disrupt communication systems and interfere with high-flying aircraft. The V.L.A. was used to delineate the temperature and magnetic structure at different heights in coronal loops, and the magnetic field strength was also determined. Much of the visible solar disk was resolved at 20 cm wavelength with 2.8 in. angular resolution. Snapshot maps at intervals of 3 seconds were used to specify changes in the temperature and the magnetic field before and during solar bursts. These snapshot maps were used to investigate the flow of plasma within coronal loops during solar bursts. Postflare loop systems were similarly investigated. Our V.L.A. observations provided new information on coronal heating and emerging magnetic loops that may trigger the emission of solar bursts. Keywords include: Coronal loops - Radio radiation, Polarization, Evolution, Temperature, Density, Magnetic field, Thermal cyclotron lines, Very large array, Solar bursts - Origin, Prediction, Preburst heating, Changing magnetic fields, Coherent maser-like emission, Flare build-up, Nearby stars - Coronae, Bursts, Slowly varying emission, International ultraviolet explorer satellite.

DESCRIP'TORS: (U) SOLAR ACTIVITY, SOLAR CORONA, SOLAR

AD-A152 027 CONTINUED

OBSEVATORIES, MAGNETIC FIELDS, LOOPS, COMMUNICATION AND RADIO SYSTEMS, SOLAR DISTURBANCES, TEMPERATURE, DENSITY, PREDICTIONS, SOLAR SATELLITES, INFRARED PHOTOGRAPHY, POLARIZATION, ARRAYS

IDENTIFIERS: (U) Solar bursts, WUA0SR2311A1, PE81102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLOSA

AD-A151 888 6/16 5/10 12/1

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF PSYCHOLOGY

(U) Vision Algorithms and Psychophysics.

DESCRIPTIVE NOTE: Annual scientific rept 15 Jul 83-14 Jul 84.

SEP 84 24P

PERSONAL AUTHORS: Richards, W. A.

CONTRACT NO. F49620-83-C-0135

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR

TR-85-0248

UNCLASSIFIED REPORT

ABSTRACT: (U) Vision by man or machine is the useful symbolic descriptions form images of the world. Studies of human visual system provide valuable insights into the kinds of descriptions that will be the most useful, but little insight into the computational problems involved in deriving and manipulating these descriptions. This research examines several computational problems associated with aspects of two- and three-dimensional vision. The solution to these problems includes the design and implementation of particular algorithms. Their efficiency and flexibility is compared with that of the human visual processor. Keywords include: Image understanding, Visual pattern recognition, Visual algorithms, Human vision, Biological information processing.

DESCRIPTORS: (U) +ALGORITHMS, +VISION, +PSYCHOLOGY.

TWO DIMENSIONAL, COMPUTATIONS, HUMANS, IMAGES, PATTERN RECOGNITION, VISUAL PERCEPTION, INFORMATION PROCESSING.

THREE DIMENSIONAL

IDENTIFIERS: (U) PEB1102F, WUAFOSR2313A5

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AD-A151 902 20/8 7/5 7/4
SRI INTERNATIONAL MENLO PARK CA
(U) Kinetics and Structure of Excited States.
DESCRIPTIVE NOTE: Final rept., JAN 85 10P
PERSONAL AUTHORS: Gallagher, T. F.;
REPORT NO. SRI-MP-85-005
CONTRACT NO. F49620-79-C-0212
PROJECT NO. 2301
TASK NO. A4
MONITOR: AFOSR TR-85-0257

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this research program was to reach an understanding of excited atom processes by a systematic experimental study of their spectroscopy, interactions with strong fields, and collisions. The method used is laser excitation of excited atoms in conjunction with a variety of state selective detection techniques developed in our laboratory. Although it is unusual to study spectroscopy and collisions in the same research program, it has proved to be a very enlightening approach. The following section of this report summarizes the accomplishments. For reference, a list of the scientific papers published under this contract is included. These papers embody the main conclusions of our study.

DESCRIPTORS: (U) *REACTION KINETICS, *ELECTRONIC STATES, *ATOMS, *LASERS, INTERACTIONS, COLLISIONS, excitation

IDENTIFIERS: (U) LPN-SRI-PYU-8702, WUAFOSR2301A4, PE81102F

UNCLASSIFIED REPORT

ABSTRACT: (U) Electroencephalographic (EEG) and performance measures were obtained from eight adult male subjects during a sequence of 18 trials over a six-hour period consisting of alternating performance and non-performance epochs in a flight simulation task. EEG data were subjected to a limited bandpass frequency analysis. Task engagement (performance) was associated with greater density in central cortical rhythmic patterns, while a reciprocal decrease was observed in parietal-occipital activity. The opposite relationship was observed during non-performance segments, with density greater in parietal-occipital data. This reciprocity was most consistent in the central 8-11 Hz and parietal-occipital 4-7 Hz bands. EEG activity from these two areas was also found to be modulated over time, with linear trends related to performance epochs. Central rhythmic activity tended to increase progressively over trials in performance epochs while parietal-occipital patterns showed the opposite trend. Parietal-occipital activity was greatest during non-performance epochs and both areas showed an in-phase periodic pattern, with a cycle duration approximating 90 minutes. Originator-supplied keywords: Visual motor performance. EEG correlates of performance. Quantitative analysis, Ultradian rhythms, Somatosensory EEG. Performance prediction. Response accuracy and speed. Periodicity.

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AD-A151 902

AD-A151 901 6/16 5/10
CALIFORNIA UNIV LOS ANGELES DEPT OF ANATOMY
DESCRIPTIVE NOTE: Annual rept. 30 Sep 83-29 Sep 84.
OCT 84 18P
PERSONAL AUTHORS: Sterman, M. B.;
CONTRACT NO. AFOSR-82-0335
PROJECT NO. 2313
TASK NO. A4
MONITOR: AFOSR TR-85-0247

UNCLASSIFIED REPORT

AD-A151 901 6/16 5/10
CALIFORNIA UNIV LOS ANGELES DEPT OF ANATOMY
DESCRIPTIVE NOTE: Annual rept. 30 Sep 83-29 Sep 84.
OCT 84 18P
PERSONAL AUTHORS: Sterman, M. B.;
CONTRACT NO. AFOSR-82-0335
PROJECT NO. 2313
TASK NO. A4
MONITOR: AFOSR TR-85-0247

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AD-A151 912 21/2

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) High Temperature Catalytically Assisted Combustion.

DESCRIPTION NOTE: Final rept. 1 Aug 81-31 Jul 83.

JUL 83 69P

PERSONAL AUTHORS: Bracco, F. V.; Royce, B. S. H.; Santavicca, D. A.; Stein, Y.

CONTRACT NO.: AFOSR-81-0248

PROJECT NO.: 2308

TASK NO.: A2

MONITOR: AFOSR
TR-85-0259

UNCLASSIFIED REPORT

ABSTRACT: (U) Results of research on a two dimensional, transient catalytic combustion model and on a high temperature perovskite catalyst are presented. A recently developed two dimensional, transient model has been used to study the ignition of carbon monoxide/air mixtures in a platinum coated catalytic honeycomb. Comparisons between calculated and measured steady state substrate temperature profiles and exhaust gas compositions show good agreement. A platinum doped perovskite catalyst has been proposed which will exhibit low temperature light off and high temperature stability. Preliminary tests using a perovskite powder with one percent by weight platinum are encouraging, showing very little change in surface activity when used with propane fuel. Variations in catalytic activity from sample to sample have also been found and after extensive testing the cause of these variations have not been identified. However, preliminary tests using Fourier transform infrared photoacoustic spectroscopy do indicate differences in the various catalyst samples that may be related to the difference in catalytic activity. The use of bench top oven and differential scanning calorimetry techniques for screening catalysts in terms of relative activity and aging characteristics has also been demonstrated.

Originator-supplied keywords include: Catalytic combustion, and Perovskite catalysts.

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AD-A151 920

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCES

(U) Evaluation Radar Detection Probabilities by Steepest Decent Integration.

SEP 84 12P

PERSONAL AUTHORS: Helstrom, C. W.; Ritcey, J. A.

CONTRACT NO. AFOSR-82-0343

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-85-0285

UNCLASSIFIED REPORT


ABSTRACT: (U) The probability of detection for radars employing noncoherent integration and a fixed threshold or cell-averaging constant false alarm rate (CA-CFAR) processor is computed by nonfluctuating and chi-squared fluctuating targets. A bound on the truncation error alloys for a simple stopping rule for the numerical integration. The method has applicability to many problems in radar detection theory.

DESCRIPTORS: (U) *RADAR, *DETECTION, THRESHOLD EFFECTS, NUMERICAL INTEGRATION, PROBABILITY, ALLOYS, ERRORS, TRUNCATION, INCOHERENCE, INTEGRATION, PROBABILITY, THEORY

IDENTIFIERS: (U) PEB1102F, WUAFOSR2304A5

FLORIDA STATE UNIV TALLAHASSEE

(U) Stochastic Versions of Rearrangement Inequalities.

84 10P

PERSONAL AUTHORS: D'Abadie, C.; Proschan, F.

CONTRACT NO. F49620-82-K-0007

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-85-0267

UNCLASSIFIED REPORT


ABSTRACT: (U) This paper develops a unified way of obtaining stochastic versions of deterministic rearrangement inequalities. Rearrangement inequalities compare the value of a function of vector arguments with the value of the same function after the components of the vectors were rearranged. The classical example of a rearrangement inequality is the well-known inequality of Hardy, Littlewood, and Polya for sums of products. The function sigma is an example from a class of functions called arrangement increasing functions for which such rearrangement inequalities hold. We present a number of examples of densities which satisfy the condition.

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, *INEQUALITIES, REPRINTS, FUNCTIONS(MATHEMATICS)

IDENTIFIERS: (U) *Rearrangement inequalities, WUAFOSR2304A5, PEB1102F
UNCLASSIFIED

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AD-A151 958

YALE UNIV NEW HAVEN CONN

(U) Population Inversion in Laser-Initiated Vacuum Arcs.

DESCRIPTIVE NOTE: Annual rept. 1 Feb 84-31 Jan 85.

JAN 85 54P

PERSONAL AUTHORS: Krishnan, M.

CONTRACT NO. AFOSR-81-0077

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR

TR-85-0258

UNCLASSIFIED REPORT

ABSTRACT: (U) A detailed study of resonant photo-excitation of CII ions in a vacuum arc discharge by line radiation from laser produced, AlIII ions was completed. Although enhanced fluorescence by up to a factor of eight in CII at 2138 A was observed, the collisional-radiative kinetics are such as to prevent a population inversion from building up under the conditions of the experiments. This unfavorable conclusion prompted the identification of a new class of Be-like, photo-excited lasers with potential laser wave-lengths from 2177 A in CIII down to 230 A in MgIX. Design considerations for such lasers are presented. Initial experiments in CIII pumped by MnVI line radiation have shown fluorescence enhancements in CIII at 2177 A up to a factor of 150. Optimization of the pump plasma geometry has increased this enhancement to a factor of 500. Gain estimates are given which suggest that a laser can be constructed at 2177 A. Originator supplied keywords include: Short wavelength lasers, X-ray lasers, Vacuum arcs, Laser plasmas.

DESCRIPTORS: (U) LASER INDUCED FLUORESCENCE, CARBON DIOXIDE LASERS, EXCITATION, LASER BEAMS, LASER PUMPING, WAVE PROPAGATION, X RAYS

IDENTIFIERS: (U) X-ray lasers, PE61102F, WUAFOSR2301A8

AD-A151 922

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS


DESCRIPTIVE NOTE: Annual rept. 1 Feb 83-31 Jan 84.

JUN 83 122P

PERSONAL AUTHORS: Abousit, B. L.; Sandhu, R. S.; Hong, S. J.; Hieath, M. S.;

REPORT NO. OSURF-715107-84-5

CONTRACT NO. AFOSR-83-0055

PROJECT NO. 2307

TASK NO. C1

MONITOR: AFOSR

TR-85-0266

UNCLASSIFIED REPORT

ABSTRACT: (U) A computer program was developed for evaluation of finite element models for soil consolidation and study of dynamic response of fluid-saturated soils. One- and two-dimensional consolidation problems were analyzed using different finite elements. Transient response of saturated porous elastic media for dynamic as well as quasi-static problems was studied. Results were compared with the numerical and analytical solutions available. Keywords include: Computer simulation, Consolidation, Dynamic response, Finite element method flow through porous media seepage seismic response.

DESCRIPTORS: (U) SOIL MECHANICS, SOILS, FLUID, COMPUTER PROGRAMS, DYNAMIC RESPONSE, FINITE ELEMENT ANALYSIS, NUMERICAL ANALYSIS, ELASTIC PROPERTIES, POROUS MATERIALS, SATURATION, COMPUTERIZED SIMULATION, FINITE ELEMENT ANALYSIS, MATHEMATICAL MODELS, TRANSIENTS

IDENTIFIERS: (U) Soil consolidation, PE61102F, WUAFOSR2307C1

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DTIC REPORT BIBLIOGRAPHY

AD-A151 968 CONTINUED

IDENTIFIERS: (U) Motion detection, Weber's law, Power law, PE81102F, WUAOSR2313A5

SEARCH CONTROL NO. EVLOSA

AD-A151 959 20/5

SCHAFFER (W J) ASSOCIATES INC ARLINGTON VA

(U) Short Wavelength Chemical Laser (SWCL) Workshop.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-31 Aug 85.

DEC 84 42P

PERSONAL AUTHORS: Watt, W.

REPORT NO. WJSA-R85T-03

CONTRACT NO. F49620-84-C-0104

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR

TR-85-0277

UNCLASSIFIED REPORT

ABSTRACT: (U) The workshop was held for the purpose of identifying the government's interest in SWCL technology, reviewing past and present efforts in this area and presenting the government's plans for a new thrust in SWCL source development. In addition, the workshop was to provide a forum for interaction between members of the Strategic Defense Initiative Organization (SDIO) and the 8.1 agencies with the technical community in order to create an enthusiastic response to the SWCL thrust and to generate new concepts as well as to involve new participants in this technically challenging area. This document contains abstracts of papers presented at the workshops. Some of the topics discussed in the sessions include: HF Lasers - What have we learned?; Chemical Oxygen - Iodine Laser Review; Why So FEW Chemical Lasers?; Approach to Efficient Short-Wavelength Chemical Lasers; Metal/Oxidizer Systems; Pyrotechnic Systems; Metastable State Production; Metastable Transfer Systems; Energy Exchange Mechanisms.

DESCRIPTORS: (U) CHEMICAL LASERS, SHORT WAVELENGTHS, IODINE, ENERGY TRANSFER, HYDROGEN FLUORIDE LASERS, METASTABLE STATE, THRUST, OXYGEN, PLANNING, METALS, OXIDIZERS, PYROTECHNICS, WORKSHOPS

IDENTIFIERS: (U) PE81102F

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AD-A151 989 7/4 20/4

S-CUBED LA JOLLA CA

(U) Equation of State and Two-Body Correlations for Fluids of Non-Spherical Molecules.

DESCRIPTIVE NOTE: Final rept. 1 Nov 82-31 Dec 84,
JAN 85 40P

PERSONAL AUTHORS: Waisman, E. M.;

REPORT NO. SSS-R-85-7095

CONTRACT NO. F49620-83-C-0022, AFOSR-82-0018

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR
TR-85-0252

UNCLASSIFIED REPORT


ABSTRACT: (U) This report is concerned with the progress made in obtaining the equation of state for fluid mixtures of non-spherical molecules beyond which is already in the previous annual report, SSS-R-84-8458, December 1983. Mixing rules and the mediation procedure were used for a CO2-C2H68 and other mixtures and found to give a very concise simple theory which is in good agreement with molecular dynamics. New mixing rules for spherical non-conformal potentials were obtained in the case of the exp-6. Originator supplied keywords include: Equation of State, Non-spherical Molecules, Non-conformal Potentials, Molecular Mixtures, Mixing Rules, Homonuclear Diatomics.

DESCRIPTORS: (U) *CORRELATION TECHNIQUES, *FLUID DYNAMICS, *EQUATIONS OF STATE, *MOLECULES, CARBON DIOXIDE, ETHANES, MOLECULAR PROPERTIES, MIXTURES, DIATOMIC MOLECULES, NUCLEAR PROPERTIES, THEORY

IDENTIFIERS: (U) PE81102F, WUAFOSR2301A8

AD-A151 989

NEW HAMPSHIRE UNIV DURHAM VISION RESEARCH LAB

(U) Spatial and Temporal Visual Masking and Visibility.

DESCRIPTIVE NOTE: Final rept. 1 Oct 79-29 Sep 84.

OCT 84 39P

PERSONAL AUTHORS: Smith, R. A.;

CONTRACT NO. AFOSR-80-0045

PROJECT NO. 2313

TASK NO. A8

MONITOR: AFOSR
TR-85-0245

UNCLASSIFIED REPORT

ABSTRACT: (U) Two major studies have been completed this year, and several others are in progress. In visual masking, we have studied the effect of different detection criteria and find that criterion has a more profound effect than is usually believed. Not only does criterion change alter overall sensitivity, but the qualitative nature may yield either Weber's Law behavior or power-law behavior, depending on criterion. We conclude that much of the literature on spatial frequency masking is essentially unreplicable, since criterion was uncontrolled, and we offer possibility of using motion to enhance the visibility of displayed images. We have been studying hypothetical detectors for moving objects. We began this study with the simplest possible stimulus, a pair of briefly-flashed lines, separated in space and time (a variant of the apparent motion paradigm). Although lateral interactions between line segments have generally been reported to be inhibitory, with this paradigm, we find a range of excitatory interactions which suggest a motion detector with a tuned velocity of about 3 deg/sec. Additional keywords: Vision, Visibility, Charts.

DESCRIPTORS: (U) *VISUAL TARGETS, *VISUAL PERCEPTION, SENSITIVITY, REQUIREMENTS, LINEARITY, VELOCITY, TIME DEPENDENCE, MOTION, MOVING TARGETS, MASKING, SPATIAL DISTRIBUTION, VISION, DISPLAY SYSTEMS, VISIBILITY, DETECTION, BEHAVIOR

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DTIC REPORT BIBLIOGRAPHY

AD-A151 980 20/9 20/12

BOSTON COLLEGE CHESTNUT HILL MA DEPT OF PHYSICS

(U) Effects of Magnetic Shear on Lower Hybrid Waves in the
Suprauroral Region.

DESCRIPTIVE NOTE: Final rept. 1 Apr 83-31 Mar 84,
JAN 85 19P

PERSONAL AUTHORS: Bakshi, P.;

CONTRACT NO. AFOSR-83-0112

PROJECT NO. 2311

TASK NO. D9

MONITOR: AFOSR
TR-85-0251

UNCLASSIFIED REPORT

ABSTRACT: (U) Effects of magnetic shear on lower hybrid
modes are investigated. It is shown that due to non-local
effects, even a small shear can significantly affect the
instability, leading to stabilization for some parameter
ranges. These results are of importance in the context of
the recently proposed mechanism of lower hybrid
acceleration and ion evolution in the suprauroral region.
Originator supplied keywords: Lower hybrid waves,
Magnetic shear, Ion acceleration, Suprauroral plasma
waves, Conics, Plasma instabilities.

DESCRIPTORS: (U) *MAGNETIC FIELDS. *SHEAR PROPERTIES,
*PLASMAS(PHYSICS). *ION ACCELERATORS. ACCELERATION, IONS,
HYBRID SYSTEMS. PLASMA WAVES. STABILIZATION

IDENTIFIERS: (U) *Magnetic shear, *Lower hybrid waves,
Suprauroral plasma waves. Instabilities, /EB1102F,
WUAFOSR2311D9

UNCLASSIFIED REPORT

ABSTRACT: (U) Principal Component Analysis is a
 technique that is widely used to extract component wave
forms from event related potential (ERP) records.
Analysis of simulated ERP records indicate that Principal
Component Analysis may produce biased solutions in some
cases. Two alternative methods of analysis are considered;
confirmatory factor analysis and time series analysis.
Confirmatory factor analysis provides superior results if
the experimenter has reason to reject some component wave
forms on a priori grounds. Time series analysis is
preferable in situations in which the analysis can be
conducted on only a few records. The ERP is a record of
the electrical activity detected in the brain following the
presentation of a stimulus.

DESCRIPTORS: (U) *BRAIN. *ELECTRICAL MEASUREMENT,
MATHEMATICAL MODELS. WAVEFORMS. BIAS. SOLUTIONS(GENERAL).
FACTOR ANALYSIS. TIME SERIES ANALYSIS. EXTRACTION

IDENTIFIERS: (U) *ERP(Event Related Potential). /EB1102F,
WUAFOSR2313A4

AD-A151 977

UNCLASSIFIED

PAGE 70 EVLOSA
UNCLASSIFIED REPORT

ABSTRACT: (U) The dc dynamics of models of incommensurate charge density wave (CDW) conductivity was reduced to a purely static problem. The dc characteristics of the incommensurate chain have been determined. A microscopic understanding of differences in nonlinear electrical properties of different CDW materials has been obtained. The experimentally observed scaling of field- and frequency-dependent conductivities was shown to occur in classical systems and can therefore no longer be regarded as evidence of quantum tunneling. The dynamic threshold of incommensurate charge density wave conductivity was seen to be described by a new characteristic function, in which singularities emerge as the velocity approaches zero. The dynamics of the incommensurate chain with long range interactions has been solved exactly, using both analytic and graphical techniques. This complete solution provides direct insight into nonlinear sliding conductivity. (Author).

DESCRIPTORS: (U) *CHARGE DENSITY, *WAVES, ELECTRICAL CONDUCTIVITY, DIRECT CURRENT, ELECTRICAL PROPERTIES

IDENTIFIERS: (U) *Sliding charge density waves, WUAOSR2304A3, PE81102F

UNCLASSIFIED REPORT

ABSTRACT: (U) This document reports that the original software development program has been extended in several directions: adaptive mesh generation, multigrid methods, singular perturbation problems. A crude code generator for very general two point boundary value problems has been activated. Extensions in all these directions are under way. (Author)


IDENTIFIERS: (U) PE81102F, WUAOSR2304A3
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A151 990    11/8    7/4
MCDONNELL DOUGLAS RESEARCH LABS ST LOUIS MO

(U) Metallurgical Characterization of Aluminum Powder Consolidation.

DESCRIPTIVE NOTE: Annual technical rept. 1 Sep 83-1 Sep 84.

SEP 84    45P

PERSONAL AUTHORS: Sastry, S. M. L.; Peng, T. C.; Bowden, D. M.; O'Neal, J. E.;

CONTRACT NO. F49620-83-C-0152

PROJECT NO. 2308

TASK NO. A1

Monitor: AFOSR

TR-85-0254

UNCLASSIFIED REPORT

ABSTRACT: (U) The influence of metallurgical and process variables on the consolidation, densification, and properties of rapidly solidified aluminum alloy powders is being investigated. Cold compaction, hot pressing, powder extrusion, and explosive consolidation are being used to consolidate rapidly solidified 9.0% aluminum powder (reference material), Al-3Li-1Cu-1Mg-0.2Zr (a representative low-density, high-modulus alloy), and Al-8Fe-7Ce alloys (representative of high-temperature alloys). The alloys included in the study provide wide variations in hardness, flow stress, work hardening rate, plasticity, and oxide-film thickness. The consolidation techniques selected for the study provide variations in pressure, compaction rate, and extent of oxide-film breakdown. Three 35-kg lots of rapidly solidified alloy powders were prepared by vacuum atomization; and the powders were characterized with respect to particle size distribution, cooling rates, constituent phases, and volatile contaminants. The pressure dependence of densification during cold compaction was correlated with the yield stress and work hardening of the three alloys. Originator-supplied keywords include: Aluminum alloys, Hot pressing, Densification, Microstructure, Zirconium, Powder metallurgy, Extrusion, Interparticle bonding, Porosity, Degassing, Rapid solidification, Explosive consolidation, Recovery, Lithium, Recrystallization, Consolidation, Iron, Cerium, X Ray diffraction, and Electron Microscopy.

DESCRIPTORS: (U) *ALUMINUM ALLOYS, *POWDER METALLURGY, *SOLIDIFICATION, DENSITY, HARDNESS, DEGASIFICATION, CERIUM, COOLING, IRON, COMPACTING, ELECTRON MICROSCOPY, HOT PRESSING, LITHIUM, MICROSTRUCTURE, EXTRUSION, RECRYSTALLIZATION, ATOMIZATION, X RAY DIFFRACTION, ZIRCONIUM, PARTICLE SIZE, POROSITY

IDENTIFIERS: (U) Densification, Consolidation, WUAF0S2308A1, PEB1102F
(U) Analysis of Combustion Oscillations in Heterogeneous Systems.

DESCRIBITIVE NOTE: Final rept. 15 Mar 82-15 Mar 84.

PERSONAL AUTHORS: Ben-Reuven, M.

REPORT NO. PCRL-FR-84-002

CONTRACT NO. F49620-82-C-0062

PROJECT NO. 2308

UNCLASSIFIED REPORT

Availability: Document partially illegible.

ABSTRACT: (U) This study is aimed at elucidation of the physical mechanisms capable of driving acoustic instability in solid propellant rocket motors, of the type termed velocity-coupled instability. The first and second tasks of this research, Critical Literature Review, and Order of Magnitude Analyses of velocity-coupling mechanisms, have been reported earlier. The third part of the study, Analytical Simulation of the Interior Flowfield Within a Solid Propellant Grain, is reported herein. The subject of the present analysis is simulation of the cold-flow experiments by Dr. Brown at UTC/CSD, in which nitrogen is injected through the porous sidewalls of a cylindrical pipe, creating an internal axisymmetric flow field. A comprehensive analytical model of the nonsteady flow processes entails a system of four partial differential equations for continuity, radial and axial momentum and thermal; enthalpy. The flowfield is considered compressible and viscous, with all of the dissipative terms included. A focal point of the analysis has been the thin viscous sublayer adjacent to the porous surface, where visco-acoustic interactions occur. Additional keywords: mathematical models; combustion stability; numerical analysis; computations; heat transfer; and perturbations.

DESCRIPTRORS: (U) COMBUSTION STABILITY, COMBUSTION, SOLID PROPELLANT ROCKET ENGINES, ROCKET PROPELLANT GRAINS, PERTURBATIONS, VELOCITY, COUPLING/INTERACTION, SOLID ROCKET PROPELLANTS, RADIAL FLOW, VISCOUS FLOW, ACOUSTICS, PARTIAL DIFFERENTIAL EQUATIONS, HETEROGENEITY, OSCILLATION, MATHEMATICAL MODELS, LITERATURE SURVEYS, DISSIPATION, HEAT TRANSFER, AXIALLY SYMMETRIC FLOW, FLOW FIELDS, INTERNAL, NITROGEN, PHYSICAL PROPERTIES, MOMENTUM, ENTHALPY, THERMAL PROPERTIES, MATHEMATICAL MODELS, NUMERICAL ANALYSIS, POROUS MATERIALS, SURFACES, THINNESS

IDENTIFIERS: (U) Acoustic instability; Velocity coupled instability; Visco-acoustic interactions; Nonsteady flow; PEG1102F, WUAFOSR2308A1
(U) Adaptive Control for Uncertain Dynamical Systems.

PERSONAL AUTHORS: Corless, M.; Leitmann, G.

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-85-0274

UNCLASSIFIED REPORT


ABSTRACT: (U) In this paper, a mathematical model is embodied in ordinary differential equations, the state equations of the system. We divide the systems under consideration into three subclasses depending on the type of potentially destabilizing uncertainties present in the system description (model uncertainty) and in the way the control enters into the description (input uncertainty).

For each of the systems considered there exists a state feedback control which assures that the zero state is globally uniformly asymptotically stable. However, these controls depend on constants in the system description which are not known; e.g., such constants are the values of unknown constant disturbances or unknown bounds on time-varying parameters or inputs. We propose controllers which may be regarded as adaptive versions of the feedback controls mentioned above; in place of the unknown constants, on employs quantities which change or adapt as the state of the system evolves. Under some circumstances, these adaptive quantities may be considered to be estimates of the unknown constants. The method of devising these adaptive controllers is based on the constructive use of Lyapunov theory as suggested, in a somewhat different context, in previous works.

DESCRIPTORS: (U) • ADAPTIVE CONTROL SYSTEMS, • FEEDBACK, • MATHEMATICAL MODELS, ESTIMATES, STABILITY, PERTURBATIONS, EVOLUTION; GENERAL, REPRINTS, CONTROL, CONSTANTS.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

ILLINOIS UNIV AT CHICAGO CIRCLE DEPT OF PHYSICS

(U) Studies of Collisional and Nonlinear Radiative Process for Development of Coherent UV and XUV Sources.

DESCRIPTIVE NOTE: Final rept. Nov 83-Nov 84.

NDV 84 116P

PERSONAL AUTHORS: Rhodes, C. K.; Pummer, H.; Egger, H.

CONTRACT NO. AFOSR-82-0280

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR

TR-85-0253

UNCLASSIFIED REPORT

ABSTRACT: (U) The availability of recently developed high brightness picosecond rare gas halogen sources permits the performance of a broad range of basic physical studies of high-lying electronic states of atomic and molecular materials. Moreover, the extension of the ultraviolet source technology to the femtosecond range will enable the generation of extreme physical environments, namely, coherent irradiation with an electric field amplitude, that are impossible to establish by any other known means. Experiments conducted over the past year indicate that it may be feasible to examine the detailed properties of states in a wide variety of systems in the region above 100 eV, and even possibly into the 1000 range of excitation, with these new experimental tools. The excited configurations of principal interest are those coupled to adjacent continua, prominent members of which are multiply excited and core excited states. The nature of intra-atomic interactions, including collective motions, figures naturally and importantly in this topic.

DESCRIPTORS: (U) *ELECTRONIC STATES, COHERENT RADIATION, ATOMS, INTERACTIONS, COLLISIONS, FAR ULTRAVIOLET RADIATION, EXCITATION, BRIGHTNESS, ULTRAVIOLET RADIATION, AMPLITUDE, ELECTRIC FIELDS, MATERIALS, MOLECULES, HALOGENS
UNCLASSIFIED

OTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLOSA

AD-A152 012  19/1  7/4  12/1

TEXAS UNIV AT ARLINGTON

(U) Detonations of Solid Explosives.

DESCRIPTIVE NOTE: Final rept. 1 Nov 82-31 Oct 84.

DEC 84  44P

PERSONAL AUTHORS: Bremer, N. E.;

PROJECT NO. AFOSR-83-0024

CONTRACT NO. 2301

TASK NO. A8

MONITOR: AFOSR

TR-85-0281

UNCLASSIFIED REPORT

ABSTRACT: (U) The main goal of this project is to calculate the activation energy of explosive molecules. Progress has come in the form of four different approaches to the problem: (1) Configuration interaction method; (2) Gaussian 82 Computer program; (3) MNDOOC procedure; (4) Green's function techniques. We will have the first Cray version of Dr. Henry F. Schaefer's CI programs, and access to several large Cray computers on which to run the programs. As a result, we expect to perform very large and highly accurate CI calculations on explosive molecules of interest. The Gaussian 82 Computer Program is generally considered to be state of the art program in the area of Moller-Plesset perturbation theory. We have recently obtained access to a new Cray version of Gaussian 82 which is not yet available to the general scientific community and we expect to perform activation energy calculations that are better and more accurate values than those that were previously possible using Gaussian 82. The MNDOOC method, which is a new correlated version of the MNDO method, has been used to compute accurate values for the activation energy of methyl nitrate. We have recently used Green's function theory to derive a new one-electron equation that goes beyond previous one-electron equations to include higher order correlation terms. As correlation plays a very important part in molecular reactions, this new equation is expected to lead to significant improvements in the calculation of molecular activation energies.

AD-A152 012

AD-A152 012  CONTINUED

IDENTIFIERS: (U) CRAY computers, MNDO methods, Moller Plesset perturbation theory, *Methyl nitrate. One electron equations, *Solid explosives, CI(Configuration Interaction), PEB1102F

AD-A152 012
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

PITTSBURGH UNIV. PA CENTER FOR MULTIVARIATE ANALYSIS

(U) On Asymptotic Joint Distribution of the Eigenvalues of
the Noncentral Manova Matrix for Nonnormal Populations.

DESCRIPTIVE NOTE: Technical rept.

DEC 84 18P

PERSONAL AUTHORS: Bai, Z. D.; Krishnaiah, P. R.; Liang, W. Q.

REPORT NO. TR-84-53

CONTRACT NO. F49820-85-C-0008

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR

TR-85-0263

UNCLASSIFIED REPORT

ABSTRACT: (U) The problem of testing the hypothesis of
the inequality of the mean vectors of several
multivariate populations with a common covariance matrix
received considerable attention in the literature. The
test procedures are based upon certain functions of the
eigenvalues of the multivariate analysis of variance
(MANOVA) matrix. In the univariate case, the MANOVA
matrix reduces to the ratio of the between group and
within group sums of squares. The joint distribution of the
eigenvalues of the MANOVA matrix in the noncentral
case is useful in studying the power of the tests for the
inequality of the mean vectors. This distribution is also
useful in the problems connected with selection of
important discriminant functions in the area of
classification. Fisher, Hsu, and Roy have independently
derived the joint distribution of the eigenvalues of the
MANOVA matrix in the central case. Hsu derived the above
distribution in the noncentral case when the sample size
tends to infinity and the underlying distribution is
multivariate normal. In proving the above result, Hsu
assumed that the ratios of the sample sizes of the groups
to the total sample size tend to constants in the
limiting case. This paper extends the result of Hsu to the
case when the underlying distribution is not
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A151 885  12/1

PITTSBURGH UNIV  PA CENTER FOR MULTIVARIATE ANALYSIS

(U) On Limiting Empirical Distribution Function of the
Eigenvalues of a Multivariate F Matrix. Revised.

DESCRIPTIVE NOTE: Technical rept..

DEC 84  22P

PERSONAL AUTHORS: Bai, Z. D.; Yin, Y. Q.; Krishnaiah, P. R.

REPORT NO.  TR-84-42-REV

CONTRACT NO.  F49620-82-K-0001, F49620-85-C-0008

PROJECT NO.  2304

TASK NO.  A5

MONITOR: AFOSR

TR-85-0262

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Revision of report dated Oct 84, AD-
A149 818.

ABSTRACT: (U) In this paper, the authors derived an
explicit expression for the limiting of the empirical
distribution function (e.d.f.) of a central multivariate
F matrix when the number of variables and degrees of
freedom both tend to infinity in certain fashion. The
authors also extended the above result to the case when
the underlying distribution is not necessarily
multivariate normal but the first four moments exist. The
limiting distribution is useful in deriving the limiting
distributions of certain test statistics which arise in
multivariate analysis of variance, canonical correlation
analysis and tests for the equality of two covariance
matrices. Additional keywords: Wishart matrices;
computations; correlation. (Author).

DESCRIPTORS: (U) *DISTRIBUTION FUNCTIONS, *MULTIVARIATE
ANALYSIS, *MATRICES(MATHEMATICS), CORRELATION, DEGREES OF
FREEDOM, ANALYSIS OF VARIANCE, STATISTICAL TESTS, WISHART
MATRICES, COMPUTATIONS, EIGENVALUES, LIMITATIONS,
VARIABLES, COVARIANCE

IDENTIFIERS: (U) F Matrix, PE61102F, WUAFOSR2304A5

AD-A151 885

UNCLASSIFIED

SEARCH CONTROL NO. EVL05A

AD-A151 886  13/13  19/4  18/3

NEW MEXICO UNIV  ALBUQUERQUE BUREAU OF ENGINEERING
RESEARCH

(U) Elastic-Workhardening SDF (Single-Degree-of-Freedom)
System Subjected to Random Blast Excitations.

DESCRIPTIVE NOTE: Interim rept..

NOV 84  52P

PERSONAL AUTHORS: Ju, F. D.; Paez, T. L.; Chang, F.

REPORT NO.  ME-130(84)AFOSR-993-1

CONTRACT NO.  AFOSR-81-0088

PROJECT NO.  2307

TASK NO.  C2

MONITOR: AFOSR

TR-85-0269

UNCLASSIFIED REPORT

ABSTRACT: (U) An above ground explosion generates a
shock wave in air, as airblast, and is accompanied by
some duration of strong wind. Especially, the airblast
from a nuclear detonation can cause extremely high air
pressures and has a relatively long period of duration.
When structures under design may be subjected to this
sort of loading condition, it is necessary to analyze the
behaviors of the structures when subjected to this kind
of input to determine whether the structures can survive
or not. The present phase of investigation developed a
model to characterize the permanent set of SDF, bilinear
hysteretic system subject to blast type loading. From
that model, the elastic structural response was
characterized. A computer program VAR.F was developed
compute the moments of critical measures of inelastic
response. The means and variances the maximum
displacement response of the permanent set and of the
energy of dissipation are all useful in probabilistic
analyses in structural design or in damage assessment of
structures subjected to blast-type loads. Generator-
supplied keywords include: Bilinear work-hardening,
Permanent set, Maximum displacement response, Energy of
dissipation, Computer program, Fortran.

AD-A151 886

UNCLASSIFIED
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A151 866 CONTINUED

DESCRIPTORS: (U) *BLAST LOADS, *STRUCTURAL RESPONSE, OVERPRESSURE, LONG RANGE(TINE), AIRBURST, EXCITATION, SURVIVABILITY, PROBABILITY, HARDENED STRUCTURES, DEGREES OF FREEDOM, AIRBORNE, HYSTERESIS, COMPUTER PROGRAMS, DISPLACEMENT, RESPONSE, DISSIPATION, ENERGY, FORTRAN, DAMAGE ASSESSMENT, ELASTIC PROPERTIES, HIGH PRESSURE, RIGIDITY, MOMENTS, NUCLEAR EXPLOSIONS, SHOCK WAVES

IDENTIFIERS: (U) Airblast, Work hardening, Bilinear work hardening, Maximum displacement response, PE81102F, WJAFOSR2307C2

SEARCH CONTROL NO. EVLO5A

AD-A151 799 20/11

PURDUE UNIV LAFAYETTE IN SCHOOL OF AERONAUTICS AND ASTRONAUTICS

(U) Initiation, Growth, and Coalescence of Small Fatigue Cracks.

DESCRIPTIVE NOTE: Annual rept. 15 Jan 83-14 Jan 84.

MAY 84 83P

PERSONAL AUTHORS: Grandt, A. F., Jr.

CONTRACT NO. AFOSR-82-0041

PROJECT NO. 2307

TASK NO. 82

MONITOR: AFOSR TR-85-0064

UNCLASSIFIED REPORT

ABSTRACT: (U) This interim report summarizes the second year's progress on a research effort directed at studying the initiation, growth, and coalescence of small fatigue cracks at notches. A fracture mechanics based model is described to predict the growth and coalescence of multiple cracks located at notches. The predictive model is compared with experimental results obtained with multiple cracked specimens made from a transparent polymer and for metal specimens. Current efforts and future goals are also briefly described. (Author)

DESCRIPTORS: (U) *CRACKS, *FATIGUE(MECHANICS), COALESCEENCE, CRACK PROPAGATION, CRACKING(FRACTURING), NOTCH SENSITIVITY, MATHEMATICAL MODELS

IDENTIFIERS: (U) PE81102F, WJAFOSR230782
UNCLASSIFIED

AD-A151 744 7/4 20/8

UNIVERSITY PARK DEPT OF CHEMISTRY

(U) Secondary Ion Mass Spectrometry Studies of Solids and Surfaces.

DESCRIPTIVE NOTE: Final rept. 1 Nov 83-31 Oct 84.

JAN 85 15P

PERSONAL AUTHOR(S): Winograd, N.

CONTRACT NO. AFOSR-82-0057

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR TR-85-0228

ABSTRACT: (U) We have recently completed construction of an energy- and angle-resolved detector for neutral particles desorbed from ion bombarded surfaces. It is based on a time-of-flight measurement for the neutral energies, multiphoton resonance ionization (MPRI) for the angular information. Using this detector, we have initiated a series of experiments aimed at determining the energy and angular distributions of the Rh atoms ejected from clean and adsorbate covered polycrystalline and single crystal surfaces. From the polycrystalline material, we find the velocity distribution of Rh atoms follows closely the form predicted by Thompson with a peak intensity occurring at approximately 5 eV and a high energy tail decreasing in intensity as E-2. Polar angle distributions exhibit nearly a cos^2 shape. From a Rh(001) crystal, the velocity distribution generally peaks at a higher value than that found from the polycrystalline surface, and depends strongly on the value of the polar collection angle. In addition to energy distribution measurements into a given angle, we are able to extract angular distribution measurements into a given azimuth from Rh(001) show three peaks of preferred ejection angles. Originator supplied keywords include: Surface Analysis, Secondary Ion Mass Spectrometry, Ion Bombardment, Multi-Photon, Clusters.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A151 740  12/1
NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Transformations in Regression: A Robust Analysis.
FEB 85  13P

PERSONAL AUTHORS:  Carroll, R. J.; Ruppert, D. ;

CONTRACT NO.  F49620-82-C-0009

PROJECT NO.  2304

TASK NO.  A5

MONITOR:  AFOSR
TR-85-0268

UNCLASSIFIED REPORT


ABSTRACT:  (U) The authors consider two approaches to robust estimation for the Box-Cox power-transformation model. One approach maximizes weighted, modified likelihoods. A second approach bounds a measure of gross-error sensitivity. Among the authors' primary concerns is the performance of these estimators on actual data. In examples that the authors study, there seem to be only minor differences between these two robust estimators, but they behave rather differently than the maximum likelihood estimator of estimators that bound only the influence of the residuals. These examples show that model selection, determination of the transformation parameter, and outlier identification are fundamentally interconnected. Keywords include: Power transformation; Box-Cox model; robust estimation; influence functions.

DESCRIPTORS:  (U) *TRANSFORMATIONS(MATHEMATICS), *ESTIMATES, REGRESSION ANALYSIS, MATHEMATICAL MODELS, FUNCTIONS(MATHEMATICS), MATHEMATICAL MODELS, REPRINTS, SELECTION, RESIDUALS, POWER

IDENTIFIERS:  (U) Robust estimation, Power transformation, Estimators, Influence functions, Box c ox power transformation model, PE81102F, WWAFOSR2304A5

AD-A151 612  9/1
Carnegie-Mellon Inst of Research Pittsburgh PA

(U) Structured Phase Transitions on a Finite Interval.
84  38P

PERSONAL AUTHORS:  Carr, J.; Gurtin, M. E.; Siemrod, M. ;

CONTRACT NO.  DAAG29-82-K-0002, AFOSR-81-0172

MONITOR:  ARO, AFOSR
18463.7-MA,TR-85-0273

UNCLASSIFIED REPORT


SUPPLEMENTARY NOTE:  Supported in part by DAAG29-80-C-0041

ABSTRACT:  (U) VAN DER WAALS. In his classic paper, gave arguments in support of a compressible fluid whose free energy at constant temperature depends not only on the density, but also on the density gradient. Cahn & Hilliard, apparently unaware of VAN DER WAALS' paper, rederived VAN DER WAALS' theory and, using this theory, obtained several important results concerning the interfacial energy between phases. Since then gradient theories have been used to analyze phase transitions, spinodal decomposition, and other physical phenomena.

DESCRIPTORS:  (U) *PHASE TRANSFORMATIONS, THEORY, REPRINTS, COMPRESSIVE PROPERTIES, DENSITY, PHYSICAL PROPERTIES, FREE ENERGY, INTERFACES, PHASE TRANSFORMATIONS, SPINODAL DECOMPOSITION

IDENTIFIERS:  (U) Finite Interval

AD-A151 612
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A151 556 12/1 6/16
TEXAS UNIV AT AUSTIN

(U) Mathematical Models Relating to Human Thermoregulation: Basic Assumptions, Validation, and Application. Parts A & B.

DESCRIPTIVE NOTE: Final rept. 2 Mar 82-28 Feb 83.
NOV 84 190P
PERSONAL AUTHORS: Wissler, E. H.;
CONTRACT NO. AFOSR-MIPR-82-0214
PROJECT NO. 2312
TASK NO. A1
MONITOR: AFOSR
TR-85-0181

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Presented at a workshop held at Texas Univ., Austin on 13-15 Dec 82.

ABSTRACT: (U) A workshop was held at The University of Texas at Austin in December 1982. The workshop evaluated available mathematical models which could be used to simulate human thermal behavior under various conditions. The program involved the following four activities: (1) obtain copies of the mathematical models, install them on computers located at the University of Texas, and verify that they were operating correctly, (2) collect sets of data suitable for testing mathematical models and enter them into a machine readable data base, (3) use the models to simulate the conditions represented by the experimental data, (4) discuss the simulated results with the authors of the models and a group of outstanding thermal physiologists who offer constructive criticism and suggestions for improving the models. (Author)

DESCRIPTORS: (U) *THERMAL PROPERTIES, *MATHEMATICAL MODELS, *HUMAN BODY, DATA BASES, BODY TEMPERATURE, HEAT BALANCE, HUMANS, PHYSIOLOGISTS, BEHAVIOR, WORKSHOPS, DATA PROCESSING, EXPERIMENTAL DATA, COMPUTER APPLICATIONS

IDENTIFIERS: (U) WUAFOSR2312A1, PE61102F

AD-A151 558

SEARCH CONTROL NO. EVLOSA

AD-A151 539 20/6
PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF ELECTRICAL ENGINEERING

(U) Nonlinear Edge Preserving Filtering Techniques for Image Enhancement.

DESCRIPTIVE NOTE: Technical rept.,
JUN 84 5P
PERSONAL AUTHORS: Lee, Y. H.; Kassam, S. A.;
CONTRACT NO. AFOSR-82-0022
PROJECT NO. 2304
TASK NO. A5
MONITOR: AFOSR
TR-85-0194

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Presented at the MidWest Symposium on Circuits and Systems (27th) Held in Jun 84.

ABSTRACT: (U) Recently introduced generalizations of the median filter (namely the alpha-trimmed mean and modified trimmed mean filters) are reviewed and related to a class of nonlinear filters called selective averaging filters, and two new filters are defined. These filters are examined for performance on noise-corrupted images and shown to have good smoothing characteristics without edge smearing.

DESCRIPTORS: (U) *OPTICAL IMAGES, *IMAGE PROCESSING, FILTER ANALYSIS, FILTERS, NONLINEAR SYSTEMS, OPTIMIZATION, EDGES

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5

AD-A151 539
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A151 520  7/4  7/3

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF CHEMISTRY


84  4P


PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-85-0217

UNCLASSIFIED REPORT


ABSTRACT: (U) Photolysis of dodecamethyldicyclohexasilane has been used as a convenient source of dimethylsilylene in solution and in the gas phase. The reaction has also been used to generate the silylene in hydrocarbon and argon matrices so that its infrared, UV-visible, and fluorescence spectra could be recorded. In fact, irradiation in the UV-visible band at 450 nm has been used to induce rearrangements of dimethylsilylene which have been monitored by infrared spectroscopy. We report results which show that this system is more complicated than the current literature suggests and which demonstrates that the UV-visible spectrum of dimethylsilylene has been incorrectly assigned or that there is a substantial shift in its absorption maximum in going from matrices to solution. Author's keywords include: dimethylsilylene; quenching; kinetics; UV spectroscopy.

DESCRIPTORS: (U) *SILICON COMPOUNDS, *METHYL RADICALS, *REACTION KINETICS, *ABSORPTION SPECTRA, SILANES, REPRINTS, FLUORESCENCE, INFRARED SPECTROSCOPY, PHOTOLYSIS, VISIBLE SPECTRA, QUENCHING, ULTRAVIOLET SPECTROSCOPY

IDENTIFIERS: (U) Dimethylsilylene, WUAFSR2303B2, PE81102F

AD-A151 520

SEARCH CONTROL NO. EVLOSA

AD-A151 519  7/5  7/3

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF CHEMISTRY

(U) Photolysis of Dodecamethyldicyclohexasilane: Formation of Both Methylsiline and Dimethylsilylene.

84  4P


PROJECT NO. AFOSR-80-0008

TASK NO. B2

MONITOR: AFOSR TR-85-0223

UNCLASSIFIED REPORT


ABSTRACT: (U) Experimental and spectroscopic investigations of the products of dodecamethyldicyclohexasilane photolysis on reaction with labeled organic reagents throw new light on the formation of methylsiline and dimethylsilylene and their interconversion reactions. Photolysis of dodecamethyldicyclohexasilane (I) with light of 254 nm has been reported to yield dodecamethyldicyclopentasilane and dimethylsilylene (II). This procedure is in fact the standard method to generate II in solution. We would like to report experimental and spectroscopic observations which demonstrate that this system is more complicated than the current literature suggest. Specifically, that photolysis of I in the presence of ethanol-O-d sub 1 leads to both II and methylsiline (III). Dimethylsilylene (II) reacts with ethanol-O-d sub 1 to yield dimethylethoxyxilane-Si-d sub 1 (IV-Si-d sub 1) while III reacts with ethanol-O-d sub 1 to yield dimethylethoxyxilane-C-d sub 1 (IV-C-d sub 1). Author keywords include: dimethylsilylene; methylsiline; reaction with ethanol O-d sub 1; photolysis dodecamethyldicyclohexasilane.

DESCRIPTORS: (U) *SILANES, *METHYL RADICALS, *PHOTOLYSIS, ETHANOLS, EXPERIMENTAL DATA, REPRINTS, SPECTROSCOPY

AD-A151 519
IDENTIFIERS: (U) Dimethylsilene, Dimethylsilylene, Silane/Dodecamethyl cyclohexa, WUAFOSR230382, PEB1102F

(U) The Role of Oxygen in the Redox Chemistry of Lutetium Diphthalocyanine.

OCT 84 4P


CONTRACT NO. F49620-83-C-0088

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR

TR-85-0213

UNCLASSIFIED REPORT


ABSTRACT: (U) Spectroscopic evidence on the role of oxygen in the redox chemistry of lutetium diphthalocyanine is reported. The observations indicate an irreversible reaction of oxygen with vacuum-sublimed films of the dye material and a reversible reaction with its solution in dimethylformamide. This behavior can account for several apparent anomalies found in previous investigations. Author keywords include: Phthalocyanines; oxygen; spectroscopy; electrochemistry.


IDENTIFIERS: (U) WUAFOSR230382, PEB1102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

NEW YORK UNIV NY COURANT INST OF MATHEMATICAL SCIENCE

(U) The Ballooning Spectrum of Rotating Plasmas

FEB 84 11P

PERSONAL AUTHORS: Hamelir, E.; Laurence, P.

CONTRACT NO. AFOSR-81-0020

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR TR-85-0184

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Mathematical Physics, v25 n2 p358-405 Feb 84.

ABSTRACT: (U) Ballooning modes are shown to be part of the spectrum by using a 'singular sequence' of localized modes. We show that the modes arise from Alfvén and slow magnetoacoustic waves propagating along rays confined inside the plasma. Different ballooning modes are seen, depending on the particular rotating frame of observation, indicating that there are accumulation points of eigenvalues. The effect of rigidly rotating flow is seen to be destabilizing due to an analog of the Rayleigh-Taylor instability associated with density gradients in the presence of a centrifugal force. Flow shear also modifies the stability criterion. A certain component of the flow shear will eliminate the ballooning modes.

(Author)

DESCRIPTORS: (U) *PLASMA OSCILLATIONS, EIGENVALUES, ROTATION, CENTRIFUGAL FORCE, FLOW, SHEAR PROPERTIES, STABILITY

IDENTIFIERS: (U) Rayleigh-Taylor instability.

WUAFOSR2304A4, PE81102F

AD-A151 485

UNCLASSIFIED REPORT

MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF ELECTRONICS

(U) Microwave Emission from Relativistic Electron Beams

DESCRIPTIVE NOTE: Interim scientific rept. 1 Nov 83-31 Oct 84.

NOV 84 40P

PERSONAL AUTHORS: Bekefi, G.

CONTRACT NO. AFOSR-84-0028

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR TR-85-0238

UNCLASSIFIED REPORT

ABSTRACT: (U) A free electron laser equipment is currently underway in which a 1kA, 2.1 MeV electron beam is excited by a helical wiggler field of 2 cm periodicity to produce submillimeter radiation at wavelengths between 400 and 600 micrometers. This experiment will operate in the high gain Raman regime with a maximum calculated output power at saturation of approximately 50MW. This free laser is unique in two respects. First, the electron beam will be transported through the wiggler with the aid of two short solenoidal focusing lenses. This system obviates the need for strong uniform guiding magnetic field in the interaction region thereby insuring that the cyclotron maser quality is not excited. Second, this FEL employs a very high quality electron beam. The beam is produced in a multielectrode electron gun which uses a cold field emission cathode. The gun consists of a planar cathode and anode grid followed by four accelerating stages. The accelerating electrodes are shaped to provide electrostatic focussing by balancing the self-electric and magnetic fields of the beam.

DESCRIPTORS: (U) *ELECTRON EMISSION, *MICROWAVE BEAMS, *MILLIMETER WAVES, *FREE ELECTRON LASERS, ELECTRON BEAMS, MAGNETRONS, MAGNETIC FIELDS, ELECTRIC FIELDS, ELECTROMAGNETIC RADIATION

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DTIC REPORT BIBLIOGRAPHY

AD-A151 472 CONTINUED
IDENTIFIERS: (U) *Microwave emission, *Millimeter wave emission, Ripped field magnetron, Emission guns, PE81102F, WUAFOSR2301A1

UNCLASSIFIED REPORT


ABSTRACT: (U) Various theoretical approaches to laser-induced molecular dynamics in the context of multishot processes are reviewed. The presentation is divided into two general categories: gas-phase processes and surface processes. Within the first category, unimolecular dynamics and molecular collisions are addressed. Within the second category, energy flow in adspecies-surface systems in examined, and laser applications to the surface chemistry are discussed. Origianlator-Supplied keywords include: Unimolecular Dynamics, Molecular Collisions, Transition-State Spectroscopy.

DESCRIPTORS: (U) *LASER APPLICATIONS, *PHOTOCHEMICAL REACTIONS, *MOLECULAR STATES, REACTION KINETICS, VAPOR PHASES, SURFACE CHEMISTRY, ENERGY TRANSFER, COLLISIONS, SPECTROSCOPY

IDENTIFIERS: (U) Molecular dynamics, PE81102F, WUAFOSR2303A2

ROCHESTER UNIV NY DEPT OF CHEMISTRY

(U) Laser-Induced Molecular Dynamics: Rate Processes in the Gas Phase and at Solid Surfaces.

JAN 85 152P

PERSONAL AUTHORS: Lin, J. T.; Hutchinson, M.; George, T. F.;

CONTRACT NO. AFOSR-82-0048

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-85-0225

UNCLASSIFIED REPORT

AD-A151 447 7/5 20/8

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for epitaxial growth of lithium ferrite and hexagonal ferrite was continued with further improvements in substrate size. Work on sputter deposition of hexagonal ferrites was initiated. Keywords include: Lithium ferrite, and Liquid phase epitaxy.

DESCRIPTORS: (U) *EPITAXIAL GROWTH, GARNETS, FERRITES, LAYERS, MAGNETIC PROPERTIES, DELAY LINES, FERROMAGNETIC RESONANCE, MICROWAVE EQUIPMENT, RIPPLES, SUPPRESSION, LIQUID PHASES, WAVE PROPAGATION, DEPOSITION, SPUTTERING, SUBSTRATES, LITHIUM COMPOUNDS, SPECTROSCOPY, MAGNETOSTATICS

SUPPLEMENTARY NOTE: Continuation of Contracts F44620-75-C-0045, F44620-79-C-0048, and F44620-80-C-0045.

ABSTRACT: (U) The objective of this research is to develop new and improved epitaxial ferrite materials for use in microwave and millimeter-wave signal processing devices. The major emphasis has been on multiple layer magnetic garnet structures for magnetostatic wave (MSW) delay lines. Previous research demonstrated that improved linearly dispersive MSW characteristics (that is, linear variation of delay time with frequency) could be obtained using structures which consisted of two epitaxial magnetic garnet layers separated by an epitaxial nonmagnetic layer. More detailed analysis of the magnetostatic modes in such multiple layer materials was carried out using ferromagnetic resonance (FMR) spectroscopy. This work is aimed at understanding details such as the occurrence of notch in the passband of multiple layer MSW delay lines. A significant problem, common to all MSW delay lines---single layer as well as multiple layer, is the presence of fluctuations in the delay vs. frequency characteristics. These fluctuations, usually called ripple, are attributed reflections of the propagating magnetostatic waves. A new method for suppressing ripple has been devised and demonstrated. In the course of studying epitaxial growth of strontium hexaferrites, a new ferrite material was developed. Crystal growth of gallate spinels for use as substrates
A statistical analysis of vertical air motion has been performed for data taken in the 3-20 km altitude range by the Poker Flat MST (Mesosphere - Stratosphere - Troposphere) radar during the period September 1979-January 1982. The variability of vertical velocities is analyzed as a function of season, time of day and synoptic weather conditions. The overall frequency distribution of vertical velocities can be approximated by the sum of two normal distributions: one with variance about 10 times larger than the other. The variability of vertical velocity at all levels is found to correlate most closely with horizontal wind speed at 700 mb on a day-to-day basis. The total variance is larger in summer than in winter at all hours of the day and especially during the afternoon hours. A statistically significant diurnal variation of vertical motions is found during summer with amplitude in the midtroposphere near 2 cm/s. Interpreting the vertical wind variability as a manifestation of vertically propagating waves, we compare the results here with earlier studies of turbulence variations. These comparisons show a plausible link between the intensity of turbulence at jet stream altitudes and the production of waves near the surface. Keywords include: Wind, and MST radar.
Comparison of Two Life Distributions on the Basis of Their Percentile Residual Life Functions.

ABSTRACT: (U) The 100 alpha-percentile ($0 < \alpha < 1$) residual life function at time $t$ is defined to be the 100 alpha-percentile of the remaining life given survival up to time $t$. In particular, when $\alpha = 0.5$, the median residual life function is obtained. The related mean residual life function is used in biometry, actuarial studies, and reliability. In situations similar to those where the median and other percentiles are preferred to the mean, the percentile residual life function will be of a quantity of interest. Properties of percentile residual life functions are studied in Joe and Proschan (1984) and Halim and Singpurwalla (1974). In this paper, we consider inference problems for the comparison of two life distributions on the basis of their percentile residual life functions. Keywords include: Failure rate function, percentile residual life function, stochastic ordering, distribution-free two-sample test.

ABSTRACT: (U) In Part I, the results of short and intermediate period data analyses for the determination of a frequency dependent Q model of the mantle under the shield areas of Eurasia are presented. The spectra of short period P waves from nuclear explosions in the 1-8 Hz frequency range give $t^*$ sub p = approx. 0.15-0.2 seconds. Part II presents analyses of long period data. Long period multiple S and ScS phases observed in northern Europe were analyzed to determine mantle attenuation in the 0.02 to 0.2 Hz range under the Eurasian shield. Two groups of events are used: deep Far-Eastern earthquakes and large earthquakes near the edges of the shield areas of Eurasia. Part III provides the Q model. A large set of broad band data was analyzed to determine the frequency and depth dependence of Q for P and S waves under the northern shield areas of Eurasia. A range of techniques utilizing spectra, amplitude ratios and waveform modeling were used to derive apparent and absolute $t^*$ for P and S waves covering the seismic band between 0.01 to 10 Hz. A supplement discusses methodologies for estimating $t^*(f)$ from Short Period Body Waves and Regional Variations of $t^*(f)$ in the United States. Keywords include: Attenuation.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY  SEARCH CONTROL NO. EVLOSA

AD-A151 365  13/8

AD-A151 387 CONTINUED

ARIZONA UNIV  TUCSON OPTICAL SCIENCES CENTER

U  In Situ Thin Film Measurement.

DESCRIPTORS:  (U)  +SEISMIC WAVES, +ATTENUATION, EARTH
MODELS, PRIMARY WAVES(SEISMIC WAVES), SEISMIC DATA,
SPECTRAL ANALYSIS, NUCLEAR EXPLOSION DETECTION, AMPLITUDE,
RATIOS, BROADBAND, EURASIA, EARTH MANTLE, SHIELDING,
DEPTH, FREQUENCY, EARTHQUAKES, EUROPE, NORTH(DIRECTION),
NUCLEAR EXPLOSIONS, WAVEFORMS, SECONDARY WAVES, UNITED
STATES

IDENTIFIERS:  (U)  Frequency dependence, Q
models(Seismology), Continental shields, Northern Europe,
Body waves(Seismology), PE61101E, WUAFOSR449300

UNCLASSIFIED REPORT

ABSTRACT:  (U)  A scanning monochromator system for the
monitoring of thin film deposition in a box coater is
described.  The system employs data from both a quartz
 crystal oscillator and a wide band transmission
 spectrometer.  The spectrometer uses a holographic grating
as its dispersive element and a CCD array to collect the
data.  All data is sent to a microcomputer where the
information is displayed, stored, and analyzed.  Several
applications, including measurement of optical constants
of optical constants of inhomogeneous films and
characterization of moisture adsorption, are discussed.

DESCRIPTORS:  (U)  +THIN FILMS, COATINGS, MONOCHROMATORS,
DEPOSITION, MEASUREMENT
UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the research work that has been done in the past year, investigating the use of laser-sustained plasmas for propulsion applications. One focus of the research is the initiation of plasmas in inert gases using metal vapor seedants. Another is to define the operating characteristics of the dual-flow design by measuring temperatures, number densities, and global absorption. A pressure chamber has been built to permit observations of the plasma under wide ranges of pressure, flow conditions, and beam geometry. Laser energy absorption will be measured using a high-flux calorimeter, and temperature profiles will be found using a combination of spectroscopic relative line intensity measurements, thermocouples, infrared thermography, and possible laser induced fluorescence. The report summarizes the design and construction of the pressure chamber, optics, and related equipment, and discusses the techniques which will be used to analyze temperatures throughout the flowfield. Keywords include: Beam energy propulsion, CW laser application, Absorption of electromagnetic radiation.

DESCRIPTORS: (U) CONTINUOUS WAVE LASERS, RADIATION
ABSTRACT: (U) In automatic radar detection, digital integration of the envelope detector outputs is often used as a good approximation to the optimum. This requires quantizing the envelope detector outputs. In this paper, quantizer structures for narrowband signal detection are considered. Quantizer characteristics are derived to optimize performance as measured by the detector efficacy -- an asymptotic performance measure. Asymptotic and finite sample performance results are presented. The results obtained are not limited in their application to Gaussian noise only, although this important case is given specific consideration.

Originator-supplied keywords: Optimum quantization; narrowband signals; optimum detection; non-Gaussian noise.

DESCRIPTORS: (U) *SIGNAL PROCESSING, *ANALOG TO DIGITAL CONVERTERS, RADAR SIGNALS, CONVERSION, DIGITAL SYSTEMS, DEMODULATION, DETECTION, NARROWBAND

IDENTIFIERS: (U) Quantization, Envelope Signals, WUAFSR2304A5, PE81102
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY  SEARCH CONTROL NO. EVL05A

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year.

DESCRIPTORS: (U) *SIGNAL PROCESSING, *STATISTICAL PROCESSES, NARROWBAND, SIGNALS, DETECTORS, HYPOTHESES, TEST METHODS, MATCHED FILTERS, NONLINEAR SYSTEMS, OPTIMIZATION, ESTIMATES, IMAGE PROCESSING, DETECTION, MATHEMATICAL FILTERS, NONPARAMETRIC STATISTICS, QUANTIZATION

IDENTIFIERS: (U) WAFAOSR2304A5, PEB1102F

AD-A151 230  20/0  20/5

STANFORD UNIV CA DEPT OF CHEMISTRY

(U) Rotational Analysis of the BaI C2 P1 - X2 Sigma+ (0,0) Band.

84  13P

PERSONAL AUTHORS:  Johnson, M. A.; Noda, C.; McKillop, J. S.; Zare, R. N.;

CONTRACT NO.  F49620-83-C-0033

PROJECT NO.  2303

TASK NO.  B1

MONITOR:  AFOSR

TR-85-0231

UNCLASSIFIED REPORT


ABSTRACT: (U) Rotational analysis of the BaI C superscript 2 pl - X superscript 2 sigma + (0,0) band system has been performed using molecular beam and laser spectroscopic techniques. This band is free from local perturbations, although significant interaction of the C superscript 2 pl state with several other 2 sigma + states is indicated. The spin-orbit ordering of the C state is confirmed to be regular, while the A-doubling parameters p and q are opposite in sign. Apparent anomalies in the line strengths of various branches in the two spin-orbit sub-bands are related to observed differences in the hyperfine structure of the C-state spin-orbit components. Originator supplied keywords include: Rotational analysis, BaI, Laser spectroscopy. Spectroscopic.

DESCRIPTORS: (U) *BAND SPECTRA, *MOLECULAR BEAMS, LASER APPLICATIONS, PERTURBATIONS, ROTATION, HYPERFINE STRUCTURE. CANADA

IDENTIFIERS: (U) *Laser spectroscopy, WAFAOSR230381. PEB1102F
UNCLASSIFIED

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Field-Induced Phenomena in Electrical Insulation.

DESCRIPTIVE NOTE: Annual scientific rept: no. 1, 30 Sep 83-29 Sep 84.

SEP 84 128P

PERSONAL AUTHORS: Laghari, J. R.; Sarjeant, W. J.; Gupta, R. K.

CONTRACT NO. AFOSR-83-0344

UNCLASSIFIED REPORT

ABSTRACT: (U) A review and an interpretation of the existing literature on dielectrics and dielectric breakdown was completed. Experiments were planned in light of the above interpretation and an experimental system was designed and developed. Experiments were then conducted on the time-to-break and breakdown of composite laminate insulation structures under pulsed and alternating voltages. Corona inception and extinction signatures were simultaneously obtained and evaluated. In view of the future experiments planned, theoretical and computer studies were carried out to determine the rise in temperature of laminate insulation structures under pulsed loads. Keywords include: Field, Electrical Insulation, Pulse Voltage, Corona-Interception, Corona-Extinction, Partial Discharge, Breakdown Temperature Rise.

DESCRIPTORS: (U) *ELECTRICAL INSULATION, *BREAKDOWN(ELECTRONIC THRESHOLD), *DIELECTRICS, ELECTRICAL CORONA, ELECTRIC DISCHARGES, INTERCEPTION, COMPOSITE MATERIALS, LAMINATES, PULSES, VOLTAGE, EXTINCTION, SIGNATURES

IDENTIFIERS: (U) Pulse voltage, Partial discharge

UNCLASSIFIED REPORT

ABSTRACT: (U) The area of nonlinear edge-preserving robust smoothing was one area of focus for our research. In this area a dissertation was completed. We have been able to give deterministic and statistical characterizations of the performance of some useful types of nonlinear filters which may be thought of as arising from the classical robust estimates of location (L- and M-estimates), and we have demonstrated their applicability in image processing. We are continuing to obtain new results in this area in our current work. In the area of nonparametric detection the case of narrowband signals in noise has been studied. We have established the natural counterparts of the sign-detection schemes for this class of signals. This material is currently being prepared for publication in a technical journal. A paper on quantization of data in narrowband signal detection was also published during the last grant year. On the subject of optimum quantization of data for signal detection (hypothesis testing) a comprehensive exposition has been written for publication as a chapter in a book to be published next year. These results on statistical optimization of quantization in detection systems are of considerable interest for digital implementations. Currently being revised for publication also is a paper on optimum quantization in matched filtering and smoothing of data. Finally, a paper on multi-input robust Wiener smoothing was also published during the last grant year.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

ARIZONA UNIV TUCSON DIGITAL IMAGE ANALYSIS LAB

(U) Feasibility Studies of Optical Processing of Image Bandwidth Compression Schemes.

DESCRIPTIVE NOTE: Annual rept.

JUL 84 81P

PERSONAL AUTHORS: Hunt, B. R.; Strickland, R. H.

REPORT NO. DIAL-84-00-4

CONTRACT NO. AFOSR-81-0170

PROJECT NO. 2305

TASK NO. B1

UNCLASSIFIED REPORT

ABSTRACT: (U) Research consists of several distinct and separate activities. The separate research efforts are unified by a common theme: the application of optical processing for image bandwidth compression. Within this common theme, however, the separate research projects are not completely related to each other. Therefore, this report is put together, literally, as a number of independent reports. The separate sections of the report, which follow this section, are intended to be read separately and independently of any other section. Each section has its own references and its own figure labellings, for example. The separate sections of this report, and the research problems dealt with in each section, are summarized in the following: (1) Data compression by multi-spectral staggered sampling, and data reconstruction by spatial and spectral interpolation; (2) Data compression by optical tomography, with data reconstruction by optical convolution and back projection; (3) Adaptive data compression by spatial transformations to create a spatially stationary image; and (4) Improvement of the optical data compression method known as IDPCM. Additional keywords: Computations; Algorithms.

DESCRIPTORS: (U) *IMAGE PROCESSING, DATA COMPRESSION, OPTICAL DATA, ALGORITHMS, COMPUTATIONS, FEASIBILITY

UNCLASSIFIED
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVL05A

AD-A151 280 12/1
BROWN UNIV PROVIDENCE RI DIV OF APPLIED MATHEMATICS

(U) A Spline Based Technique for Computing Riccati Operators and Feedback Controls in Regulator Problems for Delay Equations.

DEC 84 27P
PERSONAL AUTHORS: Banks, H. T.; Rosen, I. G.; Ito, K.

CONTRACT NO. DAAG29-79-C-0181, AFOSR-81-0198
PROJECT NO. 2303
TASK NO. A1
MONITOR: AFOSR
TR-85-0168

UNCLASSIFIED REPORT


ABSTRACT: (U) The general topic of this volume is ceramic materials. Yajima and coworkers, as well as others, showed that polysilanes can be converted to B-silicon carbide by a two-step pyrolysis reaction sequence. There may seem to be little connection between the pyrolysis of polysilanes and pyrolysis of polysilanes. It is, however, suggested that these two highly energetic processes, pyrolysis and photolysis, have much in common and that insights and understanding gained from one may be useful in comprehending the other. This is because these seemingly distinct processes share common reactive intermediates. The relationship between the high energy processes of mass spectrometry, pyrolysis, and photolysis in organic chemistry has been considered at length by Dougherty.

DESCRIPTORS: (U) *CERAMIC MATERIALS, *PHOTOLYSIS, *POLYSILANES, SILICON CARBIDES, REPRINTS, PYROLYSIS, MASS SPECTROMETRY

IDENTIFIERS: (U) PE81102F, WUAFOSR2303B2

UNCLASSIFIED REPORT


ABSTRACT: (U) This document considers the infinite interval regulator problem for systems with delays. A spline approximation method for computation of the gain operators in feedback controls is proposed and tested numerically. Comparison with a method based on averaging approximations is made. Keywords: Riccati equation; regulator problem; delay systems; spline approximations; reprints. (Author).

DESCRIPTORS: (U) *OPERATORS(MATHEMATICS), *RICCATI EQUATION, *SPLINES(GEOMETRY), *SPLINES, DELAY, REPRINTS, APPROXIMATION(MATHEMATICS), FEEDBACK, REGULATORS

UNCLASSIFIED
ABSTRACT: (U) The silacyclop propane 1,1-dimethyl-2,3 bis(tri methylisilyl) isilirrene reacts with aldehydes, ketones, styrenes, conjugated terminal acetylenes, benzene, terminals 1,3-dienes, and a conjugated diene to give five-membered cyclic organosilicon products in which the C=O, C=C triple bond C, or C=N bonds of the organic reactants have inserted into the Si-C bond of the silirrene ring. In the case of the C=C and C triple bond C insertions, acyclic products, isomeric with the cyclic products, are formed as well. The available evidence suggests that a radical mechanism is operative. Keywords include: Silacycloprenes, Organosilicon synthesis, and insertion reactions.

REFERENCES: (U) *SILICON, *PROPENES, *CYCLIC COMPOUNDS, *SYNTHESIS(CHEMISTRY), ALDEHYDES, STYRENES, KETONES, ISOMERS

IDENTIFIERS: (U) Silirrene/1,1-Dimethyl-2,3-Bis(Tri methylisilyl), Insertion, PE81102F, WUAFOSR2303B2
ABSTRACT: (U) This report outlines studies conducted to characterize the flow of a gas-particle mixture in an axisymmetric jet including the characterization of particle interactions with shock waves formed in the jet in compressible flow. The measurements made include profiles of axial and radial velocity components of the particles and turbulence characteristics of the flow. Flow visualization was used to measure particle concentration and the structure of the shock waves. Samples extracted from the flow provide the particle size distribution in the jet. These studies are needed because of the lack of a sufficiently detailed understanding of these flows, particularly particle-shock interactions, to verify existing computational techniques. Additional keywords: Two-phase flow; Exhaust plumes; Nozzle flow; and Jet mixing.

DESCRIPTORS: (U) *EXHAUST PLUMES, *JET MIXING FLOW, *TWO PHASE FLOW, COMPRESSIBLE FLOW, INTERACTIONS, PARTICLE COLLISIONS, RADIAL VELOCITY, TURBULENCE, FLOW VISUALIZATION, DISTRIBUTION, PARTICLE SIZE, SHOCK WAVES, NOZZLE GAS FLOW

IDENTIFIERS: (U) PE81102F WUAFOSR2308A1
UNCLASSIFIED

OTIC REPORT BIBLIOGRAPHY

AD-A151 271  7/4

DAYTON UNIV OH RESEARCH INST

(U) Threshold Electron Studies of Gas-Surface Interactions.

DESCRIPTIVE NOTE: Final rept. 1 Sep 83-31 Oct 84.

JAN 85  20P

PERSONAL AUTHORS: Murray, P. T.

REPORT NO. UDR-TR-85-08

CONTRACT NO. AFOSR-83-0280

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-85-0212

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this program was to test
the feasibility of using Threshold excitation
spectroscopy (TES) as a new method of performing surface
analysis. The TES experiments entailed bombarding the
specimen of interest with a beam of nearly monoenergetic
electrons and detecting those electrons which underwent
near total energy loss upon colliding with the target
surface. The result of such collision was a scattered
electron with a final kinetic energy close to zero. The
program involved designing and constructing a threshold
electron spectrometer which incorporated a steradiancy
filter to selectively detect low energy electrons. The
feasibility experiments entailed using lithium fluoride
thin films as the test specimen. The resulting threshold
excitation spectrum exhibited peaks at 3.5, 4.5, and 6.3
ev; this was in excellent agreement with previous
electron transmission studies in which peaks were
attributed to optically forbidden excitonic transitions at
the lithium fluoride surface. The fact that similar
structure was observed in this program (with better
energy resolution) demonstrated that TES is indeed a
feasible method of performing surface analysis. Keywords
include: Surface Analysis, Electron Energy Loss
Spectroscopy, Threshold Excitation Spectroscopy, Thin
Films, Lithium Fluoride.
boundary conditions were used, the model ran for 8 hours, did not blow up, but developed unrealistically near the boundaries.

DESCRIPTORS: (U) *EARTH ATMOSPHERE, *ATMOSPHERE MODELS, *BOUNDARY LAYER, DUST, BOUNDARY LAYER TRANSITION, ATMOSPHERIC TEMPERATURE, TEMPERATURE INVERSION, ALTITUDE, THERMAL RADIATION, ONE DIMENSIONAL, TWO DIMENSIONAL, FLUX RATE, LAYERS, TIME DEPENDENCE, DESERTS, PLANETARY ATMOSPHERES, ADVECTION, HEIGHT, INVERSION, MATHEMATICAL MODELS, TEMPERATURE, MOISTURE, SOILS, TRANSITIONS, WIND

IDENTIFIERS: (U) PEB1102F, WUAFOSR2310A1
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLOSA

UNCLASSIFIED REPORT

ABSTRACT: (U) Contents: Paradigms for Distributed Computing: Distributed Simulated; Processor Queueing Disciplines in Distributed Systems; The Effect of Queueing Disciplines on Response Times in Distributed Systems; The Drinking Philosopher's Problem; Distributed Snapshots: Determining Global States of Distributed Systems. Keywords: Distributed data processing, Asynchronous systems, Theory.

DESCRIPTORS: (U) DISTRIBUTED DATA PROCESSING, PROCESSING, QUEUEING THEORY, COMPUTATIONS, COMPUTERIZED SIMULATION, REACTION TIME, THEORY, MATHEMATICAL MODELS, ASYNCHRONOUS SYSTEMS, DISTRIBUTION, PROBLEM SOLVING

IDENTIFIERS: (U) Distributed computing, Distributed systems, Drinking philosophers problem

AD-A151 287

UNCLASSIFIED

UNCLASSIFIED REPORT

ABSTRACT: (U) One of the aims of this investigation was to develop a limited area planetary boundary layer desert model for computers of limited power. We derived a general system of vertically integrated equations, including a dust concentration equation and an inversion height equation. The boundary layer was divided into a constant flux layer, a transition layer, and an inversion layer. The model equations predict the mean (vertically averaged) winds in the transition layer, the potential temperature at the top of the surface layer, the potential temperature at the ground, the height of the inversion layer, the dust concentration at the top of the surface layer, the moisture at the top of the surface layer, and the soil moisture at the ground. The radiation flux is also calculated as a function of time. Initially, the one-dimensional version was tested (no horizontal advection). All fields showed reasonable evolution for a twenty-four hour prediction. Data (dust concentration, inversion height) are now being gathered for verification. The two dimensional version was first run with a time step of two minutes and boundary conditions held fixed in time. Although the interior fields, starting from artificial initial data, developed reasonably, the calculations blew up after 4 hours, probably due to the restrictive boundary conditions. When the radiation

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UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLOSA

AD-A151 288 CONTINUED

CIRCUITS, DIGITAL COMMUNICATIONS, ALGORITHMS, SIGNAL PROCESSING

MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF
 ELECTRONICS


DESCRIPTIVE NOTE: Final rept. 1 Nov 83-31 Oct 84.

JAN 85 34P

PERSONAL AUTHORS: Allen, J.

CONTRACT NO. F49620-84-C-0004

PROJECT NO. 2305

TASK NO. 83

MONITOR: AFOSR

TR-85-0175

UNCLASSIFIED REPORT

ABSTRACT: (U) This project is devoted to the development of computer-aided design techniques at a fundamental and basic level for the creation of high-performance custom integrated circuits to be used for digital signal processing. The project takes a fundamental point of view in considering the design process to consist of a set of transformations between abstract representations at various levels. There are five major areas of work: First, research on specification languages that characterize the functionality of the algorithms to be performed by the chip are considered. The second focus is on architectural exploration, whereby architectures derived from the input functional specification can be modified without any possibility of changing the desired input functionality. In the third area, we have focused on techniques for generation and composition of cells. The fourth area of emphasis is the characterization and generation of optimum circuit performance. Finally, attention has been focused on the design and construction of special architectures for computer aided design. The report describes these activities in detail and unifies them together in an overall perspective of computer aided design for high performance digital signal processing applications.

DESCRIPTORS: (U) *COMPUTER AIDED DESIGN, *INTEGRATED
During the past twenty-five years a large number of articles on maintenance policies have appeared. Most of these papers overlook two important factors in real-world maintenance operations: the possibility of errors on the part of the maintenance performer and limitations, physical or otherwise, which make complete overhaul of the unit needing repair impossible. Recently, however, several authors have treated imperfect maintenance, that is, maintenance in which one or both the factors just mentioned play a role. T. Nakagawa in discusses several models in which the repaired unit never has effective age zero and several other models in which the maintenance performer accomplishes planned periodic maintenance perfectly (i.e., the repaired unit is in as good as new) with probability p and performs only minimal repair (the unit is repaired so that it functions again, but has the same failure rate and the same effective age as at the time of failure) with probability 1-p. Got yhr isyrt models, Nakagawa also assumes that unplanned maintenance, the repair of intermittent failures, is always perfect. Two other authors, M. Brown and F. Proshian, discuss general features of imperfect maintenance and inspection in and develop properties of an imperfect repair model in. For their imperfect repair model, the authors assume that unplanned repair is perfect with probability p and is minimal repair with probability q=1-p. The main interest of the authors in is in studying
A-Optimal Incomplete Block Designs for Control-Test Treatment Comparisons.

ABSTRACT: (U) A-optimal design for comparing v test treatments with a control in b blocks of size k each are considered. Several series of A-optimal are given when the parameters are in the range 2 < or = k < or = 8. k < or = v < or = 30, v < or = b < or = 50. A-optimal designs in blocks of size 2 are extensively studied through a combination of theoretical results and numerical investigations. Tables of approximately A-optimal designs are given when A-optimal design are not easily available for the case k + 2. Keywords include: Control-test treatment comparisons; A-optimal designs; BTIB designs; and Augmented BIB designs.

DESCRIPTORS: (U) *CONTROL THEORY, OPTIMIZATION, NUMERICAL ANALYSIS

IDENTIFIERS: (U) *Block designs, PE81102F, WUAF0SR2304A5

ABSTRACT: (U) Generalizations of median filters which combine desirable properties of both linear and nonlinear filters have recently been developed by the authors. This paper gives some results of applications of these filters in the enhancement of noisy images. The authors consider in particular the median, the alpha-trimmed mean (alpha-TM), the modified trimmed mean (MTM) and the double window (DW) MTM filters. In all but the last case iterated use of the filter has been examined. The results show that the new filters (MTM and DW MTM filters) are very good for edge-preserving enhancement of images contaminated by additive noise which includes impulsive components.

DESCRIPTORS: (U) *IMAGE PROCESSING, *ADAPTIVE FILTERS, IMPULSE NOISE, MODIFICATION

IDENTIFIERS: (U) *Image enhancement, Alpha trimmed mean filters, Modified trimmed mean filters, Double window modified trimmed mean filters, WUAF0SR2304A5, PE81102F
(U) Transition energies and rates in the L sub 1-L sub 23 M sub 1 Coster-Kronig spectrum of argon have been calculated in the intermediate-coupling scheme. Strong mixing of the final ionic states P (1) sub 1 and P (3) sub 1, caused by the spinorbit interaction, virtually removes the large discrepancy between previously calculated relative term intensities and experimental data. Transition energies also agree well. Keywords include: Coster-Kronig Transitions, Atomic Inner-shell Physics.

ABSTRACT: (U) The results are presented from research concerned with determining the mechanisms governing formation and subsequent combustion of metal/agglomerate particles throughout an aluminized solid rocket motor. Of primary concern is the influence these particles have on propellant combustion characteristics and overall motor performance. The approach taken involves making use of a laboratory scale, servo-controlled strand window bomb in conjunction with both an imaging-type, particle size analyzer and a pulse-lit photographic technique. In this paper, the servo-controlled strand window bomb is briefly described. The theory and operation of the imaging-type, particle size analyzer to be employed is detailed. Finally, the feasibility of using pulse-lit photography within a study of particle/agglomerate combustion is discussed along with the presentation of such photographs taken.

ABSTRACT: (U) Transition energies and rates in the L sub 1-L sub 23 M sub 1 Coster-Kronig spectrum of argon have been calculated in the intermediate-coupling scheme. Strong mixing of the final ionic states P (1) sub 1 and P (3) sub 1, caused by the spinorbit interaction, virtually removes the large discrepancy between previously calculated relative term intensities and experimental data. Transition energies also agree well. Keywords include: Coster-Kronig Transitions, Atomic Inner-shell Physics.

IDENTIFIERS: (U) Coster-Kronig Spectrum, Transition Energies, WUAOSR2301A4, PEB1102F

DESCRIPTORS: (U) *ATOMIC STRUCTURE, ATOMIC ENERGY LEVELS, REPRINTS, ARGON, TRANSITIONS, COUPLING(INTERACTION)

IDENTIFIERS: (U) PEB1102F, WUAOSR2308A1

DESCRIPTORS: (U) *ALUMINIZED PROPELLANTS, *COMBUSTION, *SOLID PROPELLANT ROCKETS, ENGINEERING, LABORATORY TESTS, PHOTOGRAPHY, AGGLOMERATES, METALS, PARTICLE SIZE, PARTICLES, ANALYZERS, BOMBS
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF MATHEMATICAL
SCIENCES

(U) Inference and State Estimation for Stochastic Point
Processes.

DESCRIPTIVE NOTE: Interim scientific rept. 1 Jan-31 Dec
84.

JAN 85 14P

PERSONAL AUTHORS: Karr, A. F.

CONTRACT NO. AFOSR-82-0029

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0173

UNCLASSIFIED REPORT

ABSTRACT: (U) Stochastic point processes are models of
points distributed randomly in some space; these points
may represent, for example, locations (or even
trajectories) of tracked objects, times and amounts of
precipitation events, or failure times and modes of a
complex system. This research project is directed toward
two principal problems arising in applications of point
processes: statistical inference for point processes
whose probability law is unknown entirely or in part, and
state estimation for partially observed point processes,
i.e., minimum mean squared error reconstruction,
realization-by-realization, of random variables that are
not directly observable. These problems are examined in
several (not disjoint) contexts: stationary point
processes, Cox processes, multiplicative intensity
processes and Poisson processes. Another thrust of the
research is inference for stochastic processes based on
point process samples, with the particular goal to
investigate inference and state estimation for random
fields given point process samples. This report documents
results in the research for this period. Additional
keywords: Markov processes. (Author)

DESCRIPTORS: (U) *ESTIMATES, *STATISTICAL INFERENCE,
*STOCHASTIC PROCESSES, TRAJECTORIES, SAMPLING.

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**UNCLASSIFIED REPORT**

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<td>(U) Some Theorems on the Instability of the Exponential Back-off Protocol, 84 BP</td>
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<td>PERSONAL AUTHORS: Rosenkrantz, W. A.; CONTRACT NO. AFOSR-82-0167</td>
<td>PERSONAL AUTHORS: Joe, H.; Proschan, F.</td>
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**UNCLASSIFIED REPORT**

**SUPPLEMENTARY NOTE:** Pub. in Operations Research, v32 n3 p668-778 May-Jun 84.

**ABSTRACT:** (U) A martingale method is used to study the backlog of packets awaiting to be retransmitted using the exponential backoff protocol. Under certain conditions it is shown that the backlog is a positive submartingale whose expectations become infinite as time goes to infinity (i.e., the system is unstable. On the other hand it is shown that the expected number of packets that have been blocked k times remains finite for all time and this extends a result of Hajek.

**DESCRIPTORS:** (U) *THEOREMS, *EXPONENTIAL FUNCTIONS, PACKETS, REPRINTS

**IDENTIFIERS:** (U) Martingales, Protocols, PEB1102F, WUAFOSR2304A5

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**UNCLASSIFIED REPORT**

**SUPPLEMENTARY NOTE:** Pub. in Operations Research, v32 n3 p668-778 May-Jun 84.

**ABSTRACT:** (U) The alpha percentile (0 < alpha < 1) residual life function at time t is defined as the alpha percentile of the remaining life given survival up to time t. (Note that alpha percentile is used in place of 100 alpha percentile.) Two classes of life distributions defined by the alpha percentile residual life function are the decreasing alpha percentile residual life (DPRL alpha) class and the new better used with respect to the alpha percentile (NBUP alpha) class. These two classes are, respectively, analogous to the well-known decreasing mean residual life (NBUE) class and the new better than used in expectation (NBUE) class that involve the mean residual life function. We obtain properties of the alpha percentile residual life function and of the DPRL alpha NBUP alpha and their dual classes. Some results differ notably from corresponding results for the mean residual life function.

**DESCRIPTORS:** (U) *DISTRIBUTION FUNCTIONS, REPRINTS, MEAN, RESIDUALS

**IDENTIFIERS:** (U) Alpha percentile, WUAFOSR2304A5, PEB1102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A151 213 12/1
FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS
(U) Mean, Median, Mode III.
83 5P
PERSONAL AUTHORS: Dharmadhikari,S. W.;Joag-Dev,K.;

AD-A151 212 20/4 12/1
PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING
(U) Wind Tunnel Wall Interference.

AD-A151 213
PROJECT NO. 2304
TASK NO. A5
MONITOR: AFOSR
TR-85-0193

UNCLASSIFIED REPORT

ABSTRACT: (U) Recently, Van Zwet discussed several conditions under which the celebrated mean-median-mode inequality holds. This note points out that Van Zwet's basic condition and its variants have a simple interpretation in terms of a well-known stochastic ordering. The results are slightly more general than Van Zwet's because the definition of unimodality used here (due to Khintchine) requires neither the existence of a density nor uniqueness of the mode. Keywords include: Mean-median-mode inequality; stochastic ordering; unimodality.

DESCRIPTORS: (U) INEQUALITIES, STOCHASTIC PROCESSES, MEAN, REPRINTS, VARIATIONS

IDENTIFIERS: (U) WUAFOSR2304A5, PE81102F

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DESCRIPTORS: (U) *BOUNDARY LAYER, *SUBSONIC FLOW,
+HOLES(OPENINGS), *WIND TUNNELS, SHAPE, LIFTING SURFACES,
ASPECT RATIO, COEFFICIENTS, RESISTANCE, THICKNESS,
AERODYNAMIC CHARACTERISTICS, PERFORATION, FLOW RATE,
INVIScid FLOW, BOUNDARY LAYER FLOW, FUNCTIONS(MATHEMATICS)
, POTENTIAL FLOW, SHEAR PROPERTIES, SLOTS, TRANSVERSE,
INTERFERENCE, PRESSURE GRADIENTS, SLENDER BODIES, THEORY

IDENTIFIERS: (U) Wall interference, Kernel functions,
Wind tunnel walls, Pressure differentials, Shear flow,
WUAFOGR2307A1, PEB1102

SEARCH CONTROL NO. EVLOSA

AD-A151 211 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC
PROCESSES

(U) Point Processes Associated with Extreme Value Theory.

DESCRIPTIVE NOTE: Doctoral thesis,
DEC 84 84P

PERSONAL AUTHORS: Hsing.T.

REPORT NO. TR-83

CONTRACT NO. F49620-82-C-0009

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0204

UNCLASSIFIED REPORT

ABSTRACT: (U) This work demonstrates the application of
point process theory in the context of statistical
extremes. Consider a stationary random sequence which
satisfies certain dependence restrictions. We study the
asymptotic behavior of a sequence of point processes that
record the positions at which extreme values occur.
Necessary and sufficient conditions are given for the
weak convergence of the sequence. It is found that the
usual Poisson limit when the random sequence is i.i.d. is
replaced by a Compound Poisson limit. The asymptotic
distributions of extreme order statistics are derived
from the weak convergence result using simple
combinatorial arguments. A class of point processes in
two dimensions is also considered. The weak limit is
characterized to be a cluster process which is determined
by a homogeneous Poisson Process and the local dependence
structure of the random sequence. A random sequence whose
members are the weighted maxima of i.i.d. random
variables is studied. It is shown that the sequence
satisfies our dependence restrictions, and the point
process results developed can be applied. Specific limit
forms of the various point processes of interest are
derived. (Author)

DESCRIPTORS: (U) *POINT THEOREM, STATISTICAL PROCESSES.

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OTIC REPORT BIBLIOGRAPHY

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ASYMPTOTIC SERIES, CLUSTERING, POISSON EQUATION, POISSON DENSITY FUNCTIONS, RANDOM VARIABLES, SEQUENCES, STATIONARY, CONVERGENCE

IDENTIFIERS: (U) *Point processes, WJAFOA22304AS, PEB1102F

SEARCH CONTROL NO. EVLOSA

AD-A151 209 21/2 21/8.2

MACKAY SCHOOL OF MINES RENO NV

(U) The Suppression of Afterburning in Solid Rocket Plumes by Potassium Salts.

DESCRIPTIVE NOTE: Interim rept. 30 Sep 83-29 Sep 84,

NOV 84 24P

PERSONAL AUTHOR(S): Miller, E.;

CONTRACT NO. AFOSR-83-0358

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR

TR-85-0182

UNCLASSIFIED REPORT

ABSTRACT: (U) The exhaust plume of a minimum-smoke solid rocket contains significant concentrations of hydrogen and carbon monoxide which when mixed with ambient air react at water and carbon dioxide producing visible flame and increased infrared radiation. Both reactions produce undesirable signatures and interference with optical guidance systems. Potassium salts have been added to propellant charges to inhibit afterburning in both guns and rockets. They have not always been effective, the inhibiting effect of the salt being related to gas composition and temperature in a complex manner which is not completely understood. Further, there is disagreement as to whether it is KOH, KO2, or K that is most important in the afterburning suppression. The results are presented here of the first year of the investigation on the efficacy of each of these on the combustion of diluted H2/CO-02-02 mixtures. Potassium added the fuel-side of a H2-02-02 flat diffusion flame at near stoichiometry is more effective in inhibiting the flame reactions than KOH added to a H2-02-02 flame at a stoichiometric ratio of 0.81. A description is given of burner, optical and flow metering system used in experiments. Originator supplied keywords include: Rocket plume afterburning, Combustion, and Flame spectroscopy

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BURNERS, FLAMES, SPECTROSCOPY, FLOWMETERS, COMBUSTION,
SOLID PROPELLANT ROCKET ENGINES

IDENTIFIERS: (U) WUAFOSR2308A1, PE81102F

UNCLASSIFIED REPORT

AD-A151 208 9/5

MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF
ELECTRONICS

(U) Automated Circuit Extraction from Mask Descriptions of
MOS Networks.

DESCRIPTIVE NOTE: Master's thesis 15 Mar 81-29 Sep 83,
FEB 84 128P

PERSONAL AUTHORS: McCormick, S. P.

REPORT NO. TR-503

CONTRACT NO. F49620-81-C-0054, F49620-84-C-0004

PROJECT NO. 2305

TASK NO. B3

MONITOR: AFOSR
TR-85-0174

ABSTRACT: (U) An automated circuit extractor generates
an equivalent circuit description of an integrated

circuit (IC) entirely from the geometric mask information.
By analyzing the circuit description, IC performance can
be estimated without having the IC design implemented.

This thesis presents a methodology for accurate

evacuation of interconnection resistor, inter-nodal
capacitance, ground capacitance, and transistor

dimension-circuit parameters important in characterizing

in speed, noise-immunity, and static performance of
designs for modern MOS technologies. Extracting each
circuit parameter follows a general, numerical extraction
algorithm with high accuracy. However, where possible,
the general algorithms are replaced with simple
techniques that do not sacrifice accuracy but execute
much faster. Vital to the extraction methodology is a
geometric operation that decomposes regions into domains
appropriate for specialized algorithms and general

algorithms.

DESCRIPTORS: (U) COMPUTER AIDED DESIGN, INTEGRATED
CIRCUITS, GEOMETRY, MASKS, PERFORMANCE(ENGINEERING),
ELECTRICAL RESISTANCE, CAPACITANCE, ALGORITHMS,
EQUIVALENT CIRCUITS, EXTRACTION, THESES
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

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IDENTIFIERS: (U)  WUAF0SR2305B3, PE81102F

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OREGON STATE UNIV  CORVALLIS  DEPT OF PHYSICS

(U)  Atomic Physics with Synchrotron Radiation,

JUN 84  9P

PERSONAL AUTHORS:  Crasemann, B.; Willeumier, F.;

CONTRACT NO.:  F49620-84-C-0039, ARPA Order-4087

PROJECT NO.:  2301

TASK NO.:  A4

MONITOR:  AFOSR

TR-85-0208

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:  Original contains color plates: All

DTIC and NTIS reproductions will be in black and white.

Pub. in Physics Today, p1-8 Jun 84.

ABSTRACT:  (U)  A powerful probe of the structure and
dynamics of atoms promises not only to help solve
problems in applied physics, but to test our
understanding of quantum electrodynamics, relatively and
many-body phenomena.  Author keywords include:  Synchrotron
radiation, X ray physics.

DESCRIPTORS:  (U)  *NUCLEAR PHYSICS, *SYNCHROTRONS,

*QUANTUM ELECTRODYNAMICS, REPRINTS, STRUCTURAL PROPERTIES,

N BODY PROBLEM, X RAYS

IDENTIFIERS:  (U)  WUAF0SR2301A4, PE81102F
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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLOSA

AD-A151 195 12/1
NORTH CAROLINA STATE UNIV AT RALEIGH
(U) Convergence of a Direct-Iterative Method for Large-Scale Least-Squares Problems,
84 14P
PERSONAL AUTHORS: Markham, T. L.; Neumann, M.; Plemmons, R. J.;
CONTRACT NO. AFOSR-83-0255
PROJECT NO. 2304
TASK NO. A3
MONITOR: AFOSR TR-85-0170

UNCLASSIFIED REPORT

ABSTRACT: (U) In 1975 Chen and Gentleman suggested a 3-block SOR method for solving least-squares problems, based on a partitioning scheme for the observations matrix A where A sub 1 is square and nonsingular. In many cases A sub 1 obvious from the nature of the problem. This combined direct-iterative method was discussed further and applied to angle adjustment problems in geodesy, where A sub 1 is easily formed and is large and sparse, by Plemmons in 1979. Recently, Neithammer, de Pillis, and Varga have rekindled interest in this method by correcting and extending the SOR convergence interval. The purpose of this paper is to discuss an alternative formulation of the problem leading to a 2-block SOR method. For this formulation it is shown that the resulting direct-iterative method always converges for sufficiently small SOR parameter, in contrast to the 3-block formulation. Formulas for the optimum SOR parameter and the resulting asymptotic convergence factor are given. Furthermore, it is shown that this 2-cyclic block SOR method always gives better convergence results than the 3-cyclic one for the same amount of work per iteration. The direct part of the algorithm requires only a sparse-matrix factorization of A sub 1. The authors' purpose here is to establish theoretical convergence results, in line with the purpose of the recent paper by Neithammer.

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MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) 1,1,1,5,5,5-Hexamethyldisiloxane: Preparation and some Reactions.

84 8P

PERSONAL AUTHORS: Seyferth,D.; Prud'Homme,C. C.; Wang,W.

CONTRACT NO. AFOSR-83-0003

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR

TR-85-0232

UNCLASSIFIED REPORT


ABSTRACT: (U) 1,1,1,5,5,5-Hexamethyldisiloxane (I) was prepared by reaction of (Me3SiO)2Mg or of Me3SiOM with dichlorosilane. Its selective chlorination to give mostly Me3SiOSiClO3SiMe3 and only a small amount of Me3SiOSiCl2OSiMe3 was effected by its PdCl2-catalyzed reaction with CCl4. Originator supplied keywords include: Siloxanes, Silicon hydrides, Organosilicon synthesis.

DESCRIPTIONS: (U) *SILOXANES, *SYNTHESIS(CHEMISTRY), ORGANIC COMPOUNDS, SILICON COMPOUNDS, HYDRIDES, METHYL RADICALS, SILANES, CHLORINATION, CATALYSIS, REPRINTS

IDENTIFIERS: (U) WUAFOSR2303B2, PE81102F

SEARCH CONTROL NO. EVLO5A

STANFORD UNIV CA DEPT OF AERONAUTICS AND ASTRONAUTICS

(U) Unsteady Gas Dynamics Problems Related to Flight Vehicles.

DESCRIPTIVE NOTE: Final rept. 1 Apr 79-31 Mar 84.

MAY 84 1OP

PERSONAL AUTHORS: Ashley, H.

CONTRACT NO. AFOSR-79-0061

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR

TR-85-0166

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes research effort in unsteady aerodynamics and aeroelasticity. Keywords include: Vertical axis wind turbines; Chordwise forces; Wind tunnel wall interference.

DESCRIPTIONS: (U) *AEROELASTICITY, *AERODYNAMICS, UNSTEADY FLOW, INTERFERENCE, WALLS, WIND TUNNELS, TURBINES, VERTICAL ORIENTATION, GAS DYNAMICS, AERODYNAMIC FORCES

IDENTIFIERS: (U) Unsteady aerodynamics, Wind turbines, Chordwise forces, Flight vehicles, PE81102F, WUAFOSR2307A1
LEHIGH UNIV BETHLEHEM PA

(U) Mechanisms of Corrosion Fatigue in High Strength I/W
(Ingot Metallurgy) and P/M (Powder Metallurgy)
Aluminum Alloys.

DESCRIPTIVE NOTE: Final technical rept. 1 Jan 81-30 Sep
84.

NOV 84 145P

PERSONAL AUTHORS: Wei, R. P.; Pao, P. S.

REPORT NO. IFSM-85-133

CONTRACT NO. F49620-81-K-0004

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR

TR-85-0163

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with
McDonnell Douglas Research Labs., St. Louis, MO.

ABSTRACT: (U) High strength aluminum alloys are employed
extensively in the primary structure of current and
projected Air Force and civilian aircraft. The service
lives and reliability of these aircraft depend to a
great extent on the corrosion fatigue resistance of the
structural alloys. Significant efforts are underway to
develop powder metallurgy (P/M) alloys that would provide
improved corrosion fatigue resistance along with
improvements in other mechanical properties. The
objective of this study was to understand the chemical
and metallurgical aspects of environmentally assisted
fatigue crack growth (or corrosion fatigue) that can
serve (i) as a basis for guiding the development of new
and improved alloys, and (ii) as a basis for developing
rational design procedures for service life predictions.
The kinetics of fatigue crack growth, as a function of
water vapor pressure and for water vapor-oxygen mixtures,
and the accompanying fractographic observations on 7050-
T7451, 7050-T651 and 7075-T651 (I/W) alloys and on 7091-
T7E89 and 7091-T7E70 (P/M) alloys are described and

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DTIC REPORT BIBLIOGRAPHY

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discussed.

DESCRIPTORS: (U) *POWDER METALLURGY, *CORROSION,
*FATIGUE(MECHANICS), *ALUMINUM ALLOYS, *HIGH STRENGTH
ALLOYS, CHEMICAL ATTACK(DEGRADATION), STRENGTH(MECHANICS),
MICROSTRUCTURE, CRACK PROPAGATION, MECHANICAL PROPERTIES,
RELIABILITY, AIRCRAFT, CIVIL AVIATION, CORROSION
RESISTANCE, AIR FORCE, LIFE EXPECTANCY(SERVICE LIFE),
VAPOR PRESSURE, WATER VAPOR

IDENTIFIERS: (U) Corrosion fatigue, Ingot metallurgy,
PE81102F, WUAFOSR2306A1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLOSA

MARYLAND UNIV COLLEGE PARK DEPT OF AEROSPACE ENGINEERING


DESCRIPTIVE NOTE: Final rept. 1 Sep 82-30 Jun 84.

OCT 84 145P

PERSONAL AUTHORS: Christensen, E. R.; Lee, S. W.;

CONTRACT NO. AFOSR-82-0288

PROJECT NO. 2307

TASK NO. B1

MONITOR: AFOSR

TR-85-0183

UNCLASSIFIED REPORT

ABSTRACT: (U) An efficient finite element model and solution technique have been developed for the analysis of unrestrained flexible structures undergoing large elastic deformations coupled with gross nonsteady translational and rotational motions with respect to an inertial reference frame. The nonlinear coupled differential equations resulting from the finite element approximation are integrated timewise using an implicit-explicit split operator numerical integration scheme which treats the stability sensitive terms of the equation implicitly while the rest of the equation is treated explicitly. The motion of simple spacecraft structures consisting of flexible beams attached to rigid masses and including the effect of control forces has been studied using three-node eighteen-degree-of-freedom three dimensional beam elements based on the total Lagrangian description. Additional keywords: Space structures; Equations of motion; Stiffness matrix; Flexible spacecraft. (Author).

DESCRIPTORS: (U) *FINITE ELEMENT ANALYSIS, *MATHEMATICAL MODELS, *FLEXIBLE STRUCTURES, INERTIAL SYSTEMS, DEFORMATION, ELASTIC PROPERTIES, SOLUTIONS/GENERAL, MATRICES(MATHEMATICS), EQUATIONS OF MOTION, SPACECRAFT, LAGRANGIAN FUNCTIONS, NONLINEAR DIFFERENTIAL EQUATIONS, STIFFNESS

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AD-A151 175  20/4  12/1
IOWA STATE UNIV AMES ENGINEERING RESEARCH INST
(U) Application of Adaptive Grids in Solving the Partial
DESCRIPTION NOTE:  Final rept. 1 May 83-31 Jul 84.
SEP 84  80P
PERSONAL AUTHORS:  Anderson, D. A.; Hindman, R. G.
REPORT NO.  ISU-ERI-AMES-85412
CONTRACT NO.  AFOSR-83-0187
PROJECT NO.  2307
TASK NO.  A1
MONITOR:  AFOSR
TR-85-0186
UNCLASSIFIED REPORT

ABSTRACT:  (U) A brief review of the goals and progress
of the research on adaptive grid generation is presented.
The principal results of the research are given by four
papers supported by Grant AFOSR-83-0187 which comprise
the appendix:  Adaptive Grid Methods for Partial
Differential Equations from Advances on Grid Generation,
and AIAA papers 84-1606, 84-1610, and 84-1668.  Keywords:
Grid generation; Adaptive grids; Multidimensional; Finite
difference methods.

DESCRIPTORS:  (U) FLUID FLOW, PROBLEM SOLVING, ADAPTIVE
SYSTEMS, GRIDS, FINITE DIFFERENCE THEORY, NUMERICAL
METHODS AND PROCEDURES, PARTIAL DIFFERENTIAL EQUATIONS
IDENTIFIERS:  (U) Adaptive grid method.  PE61102F.
WUAFOSR2307A1

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SEARCH CONTROL NO.  EVLOSA

AD-A151 162  17/10  18/3
TELEDYNE GEOTECH ALEXANDRIA VA ALEXANDRIA LABS
(U) Testing the Hypothesis of TTBT (Threshold Test Ban
Treaty) Compliance, and Magnitude-Yield Regression for
Explosions in Granite.
DESCRIPTION NOTE:  Final technical rept.  15 Nov 82-30 Dec
84.
DEC 84  53P
PERSONAL AUTHORS:  Shumway, R. H.; Rivers, D. W.
REPORT NO.  AL-84-7
CONTRACT NO.  F49620-83-C-0040, ARPA Order-4493
PROJECT NO.  4493
TASK NO.  00
MONITOR:  AFOSR
TR-85-0241
UNCLASSIFIED REPORT

ABSTRACT:  (U) Verification of the Threshold Test Ban
Treaty (TTBT) cannot be performed merely by estimating
explosive yields on the basis of observed seismic
magnitudes and concluding that a violation has occurred
if one or more yield estimates exceed the TTBT limit of
150 KT.  It is necessary to take into account the
uncertainties in the seismic magnitudes, in the magnitude
-yield relation, and especially in the magnitude bias
between the test site at which the magnitude - yield
calibration explosions were detonated and the test site
of the explosions being monitored.  For monitoring one
explosion at a time, these uncertainties can be taken
into account by placing confidence limits around the
yield estimates.  For verifying TTBT compliance of an
ensemble of explosions considered as a whole, however,
this technique cannot be used, since the confidence
limits placed around the yield estimates of different
explosions are correlated due to the use in every case of
the same values of the parameters relating magnitude to
yield.  In order to examine TTBT compliance for groups of
explosions, a test can be performed of the hypothesis
that the yields have some fixed distribution in which all
the values are less than 150 KT.

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AD-A151 159 6/1

WYOMING UNIV LARAMIE DEPT OF BIOCHEMISTRY

(U) Purification and Sequence of an Opioid Peptide Derived from Ovine Proenkephalin.

JAN 84 6P

PERSONAL AUTHORS: Micanovic, R.; Ray, P.; Krugel, W.; Lewis, R. V.;

CONTRACT NO. AFOSR-83-0208

PROJECT NO. 2917

TASK NO. A4

MONITOR: AFOSR
TR-85-0178

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Biochemical and Biophysical Research Communications, v118 n1 p299-303, 13 Jan 84.

ABSTRACT: (U) An enkephalin-containing peptide originating from adrenal proenkephalin has been purified and sequenced. The sequence of the peptide is: GLY-GLY-GLU-VAL-LEU-GLY-LYS-ARG-TYR-GLY-GLY-PHE-MET (proenkephalin 128-140) which represents a portion of peptide F (proenkephalin 107-140). This peptide has a sequence identical to that of bovine proenkephalin 128-140 while it differs from the corresponding human sequence in positions 129, 131, and 133.

DESCRIPTORS: (U) *PEPTIDES, PURIFICATION, REPRINTS

IDENTIFIERS: (U) *Opioid peptides, Proenkephalin, Enkephalin, PEB1102F. WUFORS2917A4
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVLOSA

MASSACHUSETTS INST OF TECH CAMBRIDGE FRANCIS BITTER
NATIONAL MAGNET LAB

(U) Synthesis and Characterization of Superconducting
Electronic Materials.

DESCRIPTION NOTE: Final technical rept. 1 Jul 82-30 Sep
84.

NOV 84  17P

PERSONAL AUTHORS: Meservey, R. H.; Tedrow, P. M.; Orlando, T.
P.

PROJECT NO. 2308

CONTRACT NO. F49620-82-K-0028

TASK NO. C1

MOTOR: AFOSR TR-85-0117

UNCLASSIFIED REPORT

ABSTRACT: (U) Specialized vacuum deposition systems were
developed with the necessary monitoring and control to
synthesize or react refractory superconducting films. NbN,
VN, NbTi, and VTI films of high quality have been
produced and their transport and tunneling properties
studied. Ultra-thin films of pure Nb have been
successfully made to study spin-orbit scattering in
transition metals. The structural properties and
penetration depth of NbN films prepared by reactive
sputtering have been studied. Many-body effects which are
important in superconductivity have been observed by spin-
polarized tunneling and the antisymmetric Fermi liquid
parameter has been measured for the first time in Al. The
technique of deconvoluting tunneling conductance curves
to obtain the superconducting density of states has been
improved. A comprehensive study was made of amorphous Ge
tunnel barriers between superconductors. (Author).

DESCRIPTORS: (U) "SUPERCONDUCTORS, SPIN STATES, DENSITY,
REFRACTORY COATINGS, SYNTHESIS, SPUTTERING, SCATTERING,
TRANSITION METALS, DEPTH, PENETRATION, FILMS, STRUCTURAL
PROPERTIES, SUPERCONDUCTIVITY, TUNNELING, VACUUM
DEPOSITION, THIN FILMS"
UNCLASSIFIED

OTIC REPORT BIBLIOGRAPHY

COLUMBIA UNIV NEW YORK COLUMBIA ASTROPHYSICS LAB

(U) A Program of Ground-Based Astronomy to Complement Einstein Observations.

DESCRIPTIVE NOTE: Annual scientific rept. 1 Oct 83-30 Sep 84.

NOV 84 22P

PERSONAL AUTHORS: Helfand, D. J.;

REPORT NO. CAL-1553

CONTRACT NO. AFOSR-82-0014, 82-00208

PROJECT NO. 2311

TASK NO. A1

MONITOR: AFOSR
TR-85-0180

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of the funded research is the formulation and execution of ground-based astronomical observations and interpretive studies complementary to the X-ray data accumulated with the Einstein satellite, to be used in addressing a number of questions of current astrophysical interest. During the past year, the program focussed on two main topics: the processes leading to high energy emission in the winds and coronae of late-type stars, and the structure and evolution of supernova remnants and the neutron stars they may contain. The stellar work encompasses the development of a complete, X-ray flux-limited sample of stars which, when combined with our complete, magnitude-limited optical sample will provide the best available description of the distribution of coronal activity in stars of spectral types F through M. A principal corollary of this work is the determination of the contribution of coronally active M-dwarfs to the diffuse X-ray background. Star cluster studies are combined with the survey work toward the goal of specifying the critical factors governing the production and evolution of magnetically dominated coronae in late-type stars. The supernova remnant work concentrates on the twin problems of the evidence for and frequency of neutron stars.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

STANFORD UNIV CA DEPT OF MATERIALS SCIENCE AND
ENGINEERING

(U) An Investigation of the Structure and High Temperature
Mechanical Properties of Oxide Dispersion Strengthened
Alloys.

DESCRIPTIVE NOTE: Interim scientific rept. 1 Oct 83-30
Sep 84.

DEC 84 47P

PERSONAL AUTHORS: Nix, W. D.;

CONTRACT NO. AFOSR-81-0022

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR
TR-85-0184

UNCLASSIFIED REPORT

ABSTRACT: (U) The structure and high temperature mechanical properties of oxide dispersion strengthened alloys are being studied. We have studied the creep and fracture properties of Inconel 713 at very high temperatures. These properties depend both on the size distributions of the Y2O3 dispersoids (which have been measured with small angle X-ray scattering) and on the morphology of the grain structure. We have also studied the high temperature flow properties of Al-Fe-C alloys made by RSR techniques. We have shown that the particles which strengthen this alloy are monoclinic Al13Fe4. The high temperature strength of the alloy is found to be limited both by coarsening of the precipitates and by precipitate twinning. Efforts to improve the high temperature strength of Al-Fe-C alloys by mechanical alloying are underway. These studies include the development of techniques for making TEM thin foils from powders. Originator-supplied keywords include: Oxide dispersion strengthened metals, Solute strengthening, Dispersion strengthening, ODS superalloys, Superplasticity, and Creep strength.

DESCRIPTORS: (U) THERMAL PROPERTIES, GRAIN STRUCTURES(METALLURGY), ALLOYS, CREEP STRENGTH, HIGH TEMPERATURE, DISPERSION HARDENING, OXIDES, STRENGTH(MECHANICS), FRACTURE(MECHANICS), FLOW, PRECIPITATES, TWINNING(CRYSTALLOGRAPHY), PLASTIC PROPERTIES, SUPERALLOYS

IDENTIFIERS: (U) WUAF0SR2306A1, PEB1102F

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TEMPERATURE, DISPERSION HARDENING, OXIDES,
STRENGTH(MECHANICS), FRACTURE(MECHANICS), FLOW,
PRECIPITATES, TWINNING(CRYSTALLOGRAPHY), PLASTIC
PROPERTIES, SUPERALLOYS

IDENTIFIERS: (U) WUAF0SR2306A1, PEB1102F

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DTIC REPORT BIBLIOGRAPHY

SPECTRON DEVELOPMENT LABS INC COSTA MESA CA

(A) Aerodynamic Droplet Breakup.

DESCRIPTIVE NOTE: Annual technical rept. 1 Feb 82-30 Jan 83.

MAY 83 28P

PERSONAL AUTHORS: Craig, J. E.

REPORT NO. SDL-83-2193-09

CONTRACT NO. F49620-81-C-0032

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-83-0206

UNCLASSIFIED REPORT

ABSTRACT: (U) As a result of previous research, we felt that accurate droplet velocity measurements would help produce scaling laws and provide better interpretation of the holographic droplet images. Therefore, we proceeded with a series of velocimetry experiments designed to provide accurate droplet profile and trajectory data. After completing the velocimetry experiments with conventional liquids, we proceeded with the liquid metals experiments. The results of the velocimetry experiments are summarized. The experiments with liquid metals are described in detail. Keywords include: Droplet breakup, Fragmentation; Droplet dynamics/Nozzles; Scaling law--Critical Weber number, Breakup time; Fragment size; and Liquid metals--Mercury and Aluminum.

DESCRIPTORS: (U) *DROPS, AERODYNAMICS, LIQUIDS, MEASUREMENT, VELOCITY, FRAGMENTATION, LIQUID METALS, TRAJECTORIES, ALUMINUM, NOZZLES, FRAGMENTS, SIZES/DIMENSIONS, HOLOGRAPHY, IMAGES, SCALING FACTORS, VELOCIMETERS, PARTICLE SIZE, MERCURY

IDENTIFIERS: (U) Holographic images, Droplet breakup, Breakup time, Weber number, WUAFOSR2308A1, PE61102F

UNCLASSIFIED REPORT

SPECTRON DEVELOPMENT LABS INC COSTA MESA CA

(U) Droplet Sizing Research.

DESCRIPTIVE NOTE: Annual rept. 15 Jan 83-15 Jan 84.

MAR 84 79P

PERSONAL AUTHORS: Hess, C. F.

REPORT NO. SDL-84-2286-08

CONTRACT NO. F49620-83-C-0080

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR
TR-85-0207

ABSTRACT: (U) The objective of this research program is to advance the understanding of droplet sizing technology in combustion environments using light scattering. Two techniques which offer great potential in the measurement of sprays are studied. The first, referred to as IMAX, consists of a nonintrusive pulse height analyzer. The second, referred to as visibility/intensity (V/I), performs a size measurement by examining the visibility and the pedestal intensity of a Doppler burst. Research conducted this past year indicated that the IMAX technique provided a larger dynamic range and higher accuracy than V/I. It also showed that the two-color IMAX concept provided a higher S/N primarily because of the high efficiency in spectrally separating the two signals. Results obtained with these techniques for two kinds of sprays are discussed. Excellent resolution and self-consistency was experienced with IMAX when measuring the same spray using three different size ranges. Both techniques showed excellent resolution when measuring biomodal and trimodal sprays. A probe volume algorithm was developed and tested, and it appears to be very promising in the measurement of mass flux and local number density. Keywords include: Single particle counter, Doppler, Particle size velocity; and Mass flux.

DESCRIPTORS: (U) *PARTICLE SIZE, *DROPS, COMBUSTION.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A151 104 CONTINUED

SEARCH CONTROL NO. EVL05A

AD-A151 100 12/1

FLORIDA UNIV GAINESVILLE DEPT OF MATHEMATICS

(U) Progress Report. Grant AFOSR-84-0385.

DESCRIPITIVE NOTE: Rept. for 1 Sep-31 Dec 84.

JAN 85 3P

PERSONAL AUTHORS: Lasiecka, I.

CONTRACT NO. AFOSR-84-0385

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR

UNCLASSIFIED REPORT

TR-85-0172

ABSTRACT: (U) Results have been obtained for certain
second order hyperbolic systems with viscous dumping
which imply that one can increase 'at will' the margin of
stability of arbitrarily finite modes of the damped wave
equation (those presumed 'dominant') by means of certain
type of the boundary feedback, while the remaining new
modes approach asymptotically the original ones from the
left of the vertical axis Rez = -k. Numerical testing of
the constructive procedure is in the process of being
implemented by a Ph.D. student. (Author)

DESCRIPTORS: (U) *DAMPING, *WAVE EQUATIONS, PARTIAL
DIFFERENTIAL EQUATIONS, BOUNDARIES, FEEDBACK, STABILITY,
HYPERBOLAS, VISCOSITY, NUMERICAL ANALYSIS

IDENTIFIERS: (U) Boundary feedback, PE61102F,
WUAFOSR2304A1

UNCLASSIFIED
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A151 091 8/11 18/3

ENSICO INC SPRINGFIELD VA SIGNAL ANALYSIS SYSTEMS DIV

(U) Relative Lg and P-Coda Magnitude Analysis of the
Largest Shagan River Explosions.

DESCRIPTIVE NOTE: Final rept. 2 Apr-31 Oct 84.

DEC 84 9IP

PERSONAL AUTHORS: Baumgardt, D. R.;

REPORT NO. SAS-TR-84-03

CONTRACT NO. F49620-84-C-0040. ARPA Order-4691

PROJECT NO. 4691, 3A10

TASK NO. 02

MONITOR: AFOSR
TR-85-0235

UNCLASSIFIED REPORT

ABSTRACT: (U) Characteristics of P-coda and Lg
measurements at the NORSAR (Norwegian Seismic Array) and
Graefenburg (West Germany) arrays were studied for
presumed underground nuclear explosions in the
Semipalatinsk region of the Soviet Union. The main
objectives were to investigate the effects of the
propagation paths in western Russia on the narrowband and
broadband recordings of Lg at teleseismic distances and
to study the relative P-coda and Lg amplitudes recorded
at these two arrays for the largest (m sub b > or = 6.0)
Shagan River explosions. Comparison of broadband
recordings of teleseismic Lg at Graefenburg (Delta = 42
deg) with narrowband NORSAR (Delta = 38 deg) and filtered
Graefenburg recordings of Lg from Shagan River events
reveals that Lg is more obvious, relative to the
preceding P-coda, on broadband seismograms than on high-
frequency seismograms. Broadband recordings of Lg at
Graefenburg are about 0.5 log units stronger in the 0.2 -
1.0 Hz band than in the 0.8 - 3.0 Hz range although noise
is also correspondingly higher. The early P-coda at
NORSAR is stronger, relative to Lg, than that at
Graefenburg. Also, the coda-envelope shapes are quite
different for the two arrays.

DESCRIPTORS: (U) *SEISMIC ARRAYS, SEISMIC DETECTION,

AD-A151 091
An Iterative Scheme for Approximating Optimal Replacement Policies.

ABSTRACT: (U) A system subject to wear and/or damage is modeled by a stochastic process X. A replacement policy is a Markov time which determines system replacement in terms of the wear/damage history. In this paper, an iterative scheme for obtaining approximately optimal replacement policies is developed. The implementation of the scheme for certain Markovian wear/damage models is discussed and is implemented for exponentially distributed compound Poisson processes.

ABSTRACT: (U) Studies are being conducted to define and characterize the basic fluid mechanics and heat transfer mechanism controlling the coupling between acoustic and radial profiles of the mean and oscillatory velocity are being measured at several axial stations in a cold flow rocket simulator. Recent studies have concentrated on measuring the structure of the acoustic waves and how this structure relates to the oscillatory heat flux data reported earlier. In particular, the radial profiles of the magnitude and phase (relative to the head end acoustic pressure) of the acoustic velocity have been measured at several axial stations. At low acoustic pressures (i.e., 0.05%) the acoustic waves extend across the entire cross-section in the region upstream of the transition in the mean velocity profile. Nonplanar and nonlinear behavior is also observed in the near surface regions. Downstream of the velocity transition, the acoustic waves do not penetrate through the near wall turbulence. At higher acoustic pressures (i.e., 0.4%) the upstream nonlinearities increase in magnitude and extend across the entire port. Downstream of the velocity transition the core nonlinearities decay while the linear component penetrates through the turbulence to the wall.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A151 081 CONTINUED

Originator-supplied keywords include: Velocity coupling; and Combustion instability.

DESCRIPTORS: (U) *SOLID PROPELLANT ROCKET ENGINES, *COMBUSTION STABILITY, *COUPLING(INTERACTION), *VELOCITY, SOLID ROCKET PROPUELLANTS, HEAT FLUX, RADIAL FLOW, ACOUSTIC WAVES, FLUID MECHANICS, HEAD(FLUID MECHANICS), ACOUSTIC VELOCITY, COLD FLOW, SIMULATORS, NONLINEAR SYSTEMS, HEAT TRANSFER, TURBULENCE, SOUND PRESSURE, OSCILLATION, COMBUSTION

IDENTIFIERS: (U) WUAFOSR2308A1, PE81102F

UNCLASSIFIED REPORT


ABSTRACT: (U) Reprints we give a careful derivation of the f-dimensionl classical scalar 'string' equation which involves linearization about a horizontal reference or equilibrium position. We then derive a model for small motion about a nonhorizontal reference. The implications of our findings to modelling of flexible antenna surfaces such as that in the Maypole Hoop/Column antenna are discussed. The investigations are motivated by our interest in equations governing the antenna surface in large space antennas such as the Maypole Hoop/Column configuration. This antenna consists of a gold-plated molybdenum reflective mesh surface stretched over a collapsible hoop that supplies the rigidity necessary to maintain the outer circular shape of the antenna. Of fundamental interest in estimation and control of the antenna are accurate models for the flexible membrane-like mesh surface. Rather than attempt a full 3-dimensional model for the surface, we analyze carefully a f-dimensional flexible 'membrane' - i.e., a 'string'. One might view this string as a section of the antenna surface obtained by passing a vertical plane through the antenna.

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *FLEXIBLE

UNCLASSIFIED

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SEARCH CONTROL NO. EVLOSA
AD-A151 079 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF STATISTICS
(U) An Asymptotic Comparison between Maximum Likelihood
and Method of Moments in a Particular Errors-in-
Variables Regression Model.
84 11P

PERSONAL AUTHORS: Carroll, R. J.; Gallo, P. P.

CONTRACT NO. F49620-82-C-0009
PROJECT NO. 2304
TASK NO. A5
MONITOR: AFOSR
TR-86-0053

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. In Design of Experiments, p269-
278 1984.

ABSTRACT: (U) The authors study a particular functional
errors-in-variables regression model. In the case of no
equation error (all randomness due to measurement errors),
they show that the maximum likelihood estimator computed
assuming normality is asymptotically better than the
usual moments estimator, even if the errors are not
normally distributed. Keywords includes: Errors-in-
variable regression model; Randomness: Maximum likelihood
estimator; and Reprints.

DESCRIPTORS: (U) *MATHEMATICAL MODELS, *REGRESSION
ANALYSIS, *VARIABLES, COMPARISON, METHOD OF MOMENTS,
MAXIMUM LIKELIHOOD ESTIMATION, EQUATIONS, ERRORS,
NORMALITY, REPRINTS

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

CALIFORNIA UNIV IRVINE DEPT OF PHARMACOLOGY

(U) Neuronal Mechanisms of Intelligence.

DESCRIPTIVE NOTE: Final technical rept. 30 Jun 81-29 Jun 84.

NOV 84 74P

PERSONAL AUTHOR(S): Stein, L.; Belluzzi, J. D.;

PROJECT NO. F49620-81-K-0015

TASK NO. A1

MONITOR: AFOSR

TR-85-0073

UNCLASSIFIED REPORT

ABSTRACT: (U) The aim of this research program was to identify the functional unit in the brain for reward or positive reinforcement. On the assumption that the simplest possible unit is the single brain cell, we have attempted to reinforce individual neuronal firing patterns by direct applications of neurotransmitters or drugs to the cell soma. Our most satisfactory experiments have been performed on large pyramidal cells in hippocampal brain slices. The probability of neuronal firing increased sharply when reinforced by contingent applications of dopamine or cocaine; the same injections applied independently of neuronal firing had no such effect and in fact tended to suppress activity. There is an indication of pharmacological specificity; included among substances that are ineffective are GABA, serotonin, acetylcholine, imipramine, ethanol, and saline. Some features of behavioral operant conditioning are not observed in the neuronal experiments; reinforcement schedules are ineffective and relearning is not enhanced. Such features thus may reflect properties of neuronal systems rather than individual cells. Finally, we have begun to consider the biochemical events that may mediate the cellular reinforcement process. Proteins that control cellular firing rates may be modified (phosphorylated) via biochemical cascade involving the conjunction of Ca(++) influx and dopamine receptor stimulation.


DESCRIPTORS: (U) *CONDITIONING(LEARNING), *BRAIN, *INTELLECT, *NERVE CELLS, *NEUROCHEMICAL TRANSMISSION, ADAPTATION(PHYSIOLOGY), HIPPOCAMPUS, NEURAL NETS, PHOSPHORYLATION, ACETYLCHOLINE, DOPAMINE, COCAINE, DOPAMINE, SENSE ORGANS, BIOCHEMISTRY, FIRING RATES

IDENTIFIERS: (U) Brain cells, Operant conditioning, Neuronal conditioning, Dopamine receptors, Pyramidal cells, Reward, Reinforcement(Learning), PE81102F, NUAFOSR2912A1
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A151 070 12/1

PITTSBURGH UNIV PA DEPT OF MATHEMATICS AND STATISTICS

(U) Convolution of the IFRA (Increasing Failure Rate Average) Scaled-Mins Class.

DESCRIPTIVE NOTE: Technical rept.

JAN 85 10P

PERSONAL AUTHORS: El-Neweini,E.; Savits,T. H.;

CONTRACT NO. NO0014-84-K-0084, AFOSR-84-0113

MONITOR: AFOSR TR-85-0109

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Illinois Univ. at Chicago Circle, Dept. of Mathematics, Statistics and Computer Science under Grant AFOSR-80-0170.

ABSTRACT: (U) In recent years various multivariate extensions of the univariate classes of life distributions that are important in reliability theory have been proposed. A survey of many of these classes may be found in Block and Savits (1981). In this paper we focus on one particular extension of the IFRA (Increasing Failure Rate Average) class due to Esary and Marshall (1978). Supplied-keywords include: increasing failure rate average; characterizations; convolution, and equations.

DESCRIPTORS: (U) MULTIVARIATE ANALYSIS, CONVOLUTION, EQUATIONS, FAILURE, RATES, RELIABILITY, THEORY

IDENTIFIERS: (U) IFRA (Increasing Failure Rate Average)

AD-A151 069

FLORIDA UNIV GAINESVILLE DEPT OF ELECTRICAL ENGINEERING

(U) Study of 1/f Noise in Solids.

DESCRIPTIVE NOTE: Final rept. 16 Jun 83-31 Jul 84.

OCT 84 70P

PERSONAL AUTHORS: Van Vliet, C. M.; Bosman, G.;

CONTRACT NO. AFOSR-82-0228

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR TR-85-0121

UNCLASSIFIED REPORT

ABSTRACT: (U) In the introduction an overview is given of the status of 1/f noise at the end of the contract period. We indicate that the 1/f noise observed in our laboratory, as well as in other places, quite often yields Hooge parameters of order 10^-5 to 10^-8, i.e., two to five orders less than a decade ago. Much of this noise can be seen as quantum 1/f noise which is the limiting noise that can be observed. Our measurements on submicron gallium arsenide devices, microwave narrow base transistors, and gold films at below the Debye temperature scattering noise in gallium arsenide devices and partition 1/f noise, all point in this direction. Over and above this limiting noise, additional 1/f-like noise is often observed. For this, the standard physical mechanisms, involving activation energy processes or tunneling processes, usually apply. More research on this larger 1/f noise is still needed. In the section on experimental work, we discuss the status of 1/f noise in transistors and in gold films. Also, we discuss the high frequency intervalley scattering noise in gallium arsenide devices. Good agreement with Monte Carlo simulations is obtained. New results are also presented for noise in radioactive decay. Both 1/f noise and Lorentzian flicker noise are observed. The flicker floor is lower for lower alpha-particle energies. In agreement with the quantum theory of 1/f noise, in the theory section of quantum 1/f noise is applied to electron phonon scattering. Explicit results for the resulting mobility-fluctuation noise and
for the Hooge parameters involved are obtained. Numerical computations are in progress. Keywords include: 1/f noise, metal films, transistors, radioactive decay, intervalley noise, GaAs.

DESCRIPTORS: (U) NOISE, SEMICONDUCTOR DEVICES, NOISE(ELECTRICAL AND ELECTROMAGNETIC), ACTIVATION ENERGY, ELECTRON SCATTERING, PHONONS, GALLIUM ARSENIDES, HIGH FREQUENCY, METAL FILMS, MONTE CARLO METHOD, GOLD, MICROWAVE EQUIPMENT, TRANSISTORS, QUANTUM THEORY, SCATTERING, TUNNELING, RADIOACTIVE DECAY, SOLIDS

IDENTIFIERS: (U) PE81102F, WUAFO8R2305C1

ABSTRACT: (U) A 7-ft cubical sample of dry sand was tested using the triaxial device constructed by Kopperman et al (1982) and Knox et al (1982). The sand was the same as that used by Kopperman and Knox. A new raming device was fabricated and used to construct this sand sample which resulted in a more uniform sample than prepared earlier. Improvements were also made to the excitation ports in order to have better control. Extensive tests were performed under the following different stress states: isotropic, biaxial and triaxial. In each case, velocities of P-waves propagating along all principal stress directions were measured. Results from these tests lead to the following conclusions: (1) the effect of stress history on P-wave velocity is negligible (2) the sample can be treated as a cross-anisotropic material under isotropic confinement due to structural anisotropy. (3) complete anisotropy resulted by the coupling of stress anisotropy and structural anisotropy, and (4) P-wave velocity depends on the principal effective stress in the direction of propagation with principal stresses perpendicular to the direction of propagation having a negligible effect on velocity.

DESCRIPTORS: (U) WAVE PROPAGATION, SHOCK WAVES, SOIL
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLOSA

AD-A150 957 22/2 12/1

INTEGRATED SYSTEMS INC. PALO ALTO CA

(U) Adaptive Techniques for Control of Large Space Structures.

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

DEC 84 141P

PERSONAL AUTHORS: Kosut, R. L.; Lyons, M. G.;

CONTRACT NO. F49620-83-C-0107

PROJECT NO. 2307

TASK NO. 81

MONITOR: AFOSR

TR-85-0078

UNCLASSIFIED REPORT

ABSTRACT: (U) This report is a collection of published papers reporting on research supported by AFOSR. These papers deal primarily with theoretical aspects of adaptive control of systems which cannot be precisely modeled, e.g., unmodeled dynamics and disturbances. These latter characteristics are fundamental issues in adaptive (and nonadaptive) control design for large space structures (LSS). Some of the general topics covered include: LSS modeling and model error, decentralized control, robust adaptive control, global stability, local stability, and persistent excitation. Keywords include: Large space structures; adaptive control; robust control; equations.

DESCRIPTORS: (U) *ADAPTIVE CONTROL SYSTEMS. *SPACECRAFT. *CONTROL THEORY. *STABILIZATION SYSTEMS. DYNAMICS. ERRORS. DECENTRALIZATION. STABILITY. PERURBATIONS. CONTROL. SYSTEMS. EXCITATION. MATHEMATICAL MODELS. EQUATIONS

IDENTIFIERS: (U) Large space structures, Robust control.

PEB1102F, WUAFOSR230781

AD-A150 959

AD-A150 957

UNCLASSIFIED PAGE 145 EVLOSA
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLOSA

AD-A150 959 5/10 8/3

MASSACHUSETTS UNIV AMHERST DEPT OF PSYCHOLOGY

(U) Biological Investigations of Adaptive Networks. Neuronal Control of Conditioned Responding.

DESCRIPTIVE NOTE: Annual technical rept. 31 May 83-30 Apr 84.

MAY 84 12P

PERSONAL AUTHORS: Moore, J. W.

CONTACT NO. AFOSR-83-0215

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR

TR-85-0071

UNCLASSIFIED REPORT

ABSTRACT: (U) Neurobiological investigations of adaptive neural networks were initiated using the classically conditioned nictitating membrane (NM CR) of rabbit. One experimental approach involved recording from single brain neurons from awake, behaving animals for the purpose of determining the loci and characteristics of neurons with activity correlated with the NR CR or its inhibition. A second approach involved in the use of discrete brain lesions that selectively eliminate the NM CR while at the same time sparing the basic reflex pathway. A third approach employed fiber-tracing anatomical techniques designed to clarify the interconnectivity among brain regions essential for the NM CR. These regions include discrete portions of the cerebellum and brain stem. Information from physiological studies have been incorporated into mathematical models of learning used by adaptive network researchers, and anatomical findings have guided the development of related neuronal models.

DESCRIPTORS: (U) *CONDITIONED RESPONSE, *NEURAL NETS, *NERVE CELLS, ADAPTATION, CONDITIONING(LEARNING), MEMBRANES(BIOLOGY), ELECTROENCEPHALOGRAPHY, SPINAL CORD, REFLEXES, BRAIN, CEREBELLM, LESIONS, MATHEMATICAL MODELS, RABBITS
GRID (COORDINATES), THREE DIMENSIONAL, STRESS ANALYSIS.
NUMERICAL METHODS AND PROCEDURES, AXISYMMETRIC, DIGITAL
COMPUTERS, FOUNDATIONS (STRUCTURES), ELASTIC PROPERTIES,
FINITE ELEMENT ANALYSIS

IDENTIFIERS: (U) SLAB model, ILLI-Slab computer program,
FIDIES computer program, CFES computer program

UNCLASSIFIED REPORT

ABSTRACT: (U) It was proposed that changes in tRNA metabolism are required for cells to progress through the stages of carcinogenesis, and a comprehensive hypothesis was formulated to describe tRNA-mediated endogenous promotion of carcinogenesis. This hypothesis offers a viable explanation for the lengthy time frame observed between carcinogen exposure and neoplastic transformation. A role was defined for 7-methylguanine as an endogenous promoting agent, whereby this natural RNA catabolite induces guanine hypomethylation in the tRNA anticodon by inhibiting the guanine insertion enzyme tRNA-guanine ribosyltransferase. Subsequently, 7-methylguanine induces neoplastic transformation. A cell culture system was developed which allows the study of tumor promoter-induced transformation with normal human cells, and using this system, phorbol ester tumor promoters were also demonstrated to induce guanine hypomethylation of tRNA. However, in this case, the hypomethylation occurred as a specific phorbol ester inhibition of guanine transport into the cells. Most importantly, overcoming the tumor promoter-induced hypomethylation of tRNA by supplying the cells with excess guanine, blocked the expression of a transformed phenotype by the human cells. Therefore, guanine may be an anti-promoting compound, and a role for guanine hypomethylation in the expression (promotion) of carcinogenesis appears likely.
UNCLASSIFIED

OTIC REPORT BIBLIOGRAPHY

AD-A150 966  20/12  20/8

MASSACHUSETTS INST OF TECH  CAMBRIDGE

(U) Infrared Nonlinear Processes in Semiconductors.

DESCRIPTIVE NOTE: Annual technical rept. 1 Dec 83-30 Nov 84.

JAN 85  8P


CONTRACT NO.  F49620-84-C-0010

PROJECT NO.  23O6

TASK NO.  C2

MONITOR:  AFOSR  TR-85-0120

UNCLASSIFIED REPORT

ABSTRACT: (U) Intervalance band relaxation times have been measured, in the picosecond range, in p-type GaAs and Ge. These measured times are in agreement with those calculated for optics phonon mediated processes. An anticrossing, predicted by People and Wolff, has been observed between As donor levels of opposite spin in Ge. A theory has been developed, which, with no adjustable parameters, provides good agreement with experiment. Originator-supplied keywords include: Infrared, Nonlinear optics, and Semiconductors.

DESCRIPTORS: (U)  *SEMICONDUCTORS,  *INFRARED RADIATION, ELECTROOPTICS, GALLIUM ARSENIDES, GERMANIUM, NONLINEAR SYSTEMS, PHONONS, BIBLIOGRAPHIES

IDENTIFIERS: (U)  PE81102F, WUAFOSR2306C2

AD-A150 966

SEARCH CONTROL NO. EVLOSA

AD-A150 965  13/2  9/2

ILLINOIS UNIV AT URBANA DEPT OF CIVIL ENGINEERING

(U) Analysis of Slabs-on-Grade for a Variety of Loading and Support Conditions.

DESCRIPTIVE NOTE: Annual rept. 1 May 83-30 Sep 84.

DEC 84  565P

PERSONAL AUTHORS: Ioannides, A. M.; Donnelly, J.; Thompson, M. R.; Barenberg, E. J.;

CONTRACT NO.  AFOSR-82-0143

PROJECT NO.  2307

TASK NO.  C1

MONITOR:  AFOSR  TR-85-0083

UNCLASSIFIED REPORT

ABSTRACT: (U) This study is concerned with analytical and numerical procedures applied to slab-on-grade pavements, treated as plates on elastic foundation, with particular emphasis on the possibilities offered by the automated digital computer. In the first part of the report, analyses employing the dense liquid foundation are examined. This includes an exhaustive reexamination of Westergaard's work, which established conclusively the correct form of the Westergaard equations and pointed out that the New edge stress formula should be used. Closed-form solutions for a plate on a dense liquid or an elastic solid foundation are assembled in a computerized compendium called WESTER. The second part of the study focuses on elastic solid analyses of the same problem. Pickrell's Chart for edge stress is recalculated using computerized numerical integration, and the results is incorporated in computer program HSTES. Three additional computer codes are developed: 1) A method using the concept of concordant deflections for axisymmetric plates (program CFES); 2) A finite difference approach for rectangular plates (program FIDIES); and 3) A finite element solution for rectangular plates (incorporated into program ILLI-SLAB).

DESCRIPTORS: (U)  *PAVEMENTS,  *MODELS,  *COMPUTER PROGRAMS, RIGIDITY, NONLINEAR ANALYSIS, INPUT OUTPUT PROCESSING.

AD-A150 965

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLO5A

AD-A150 975 7/3 11/10

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES

(U) Preparation of 1-Silyl- and 1,3-Disilyl-Adamantanes. 

84 6P


CONTRACT NO. AFOSR-82-0333

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR

TR-85-0147

UNCLASSIFIED REPORT


ABSTRACT: (U) 1-Dimethylsilyl- and 1,3-bis(dimethylsilyl) adamantan e have been prepared in low yield by Wurtz reaction of dimethylchlorosilane with 1-chloroadamantane or 1,3-dichloroadamantane, respectively. On the other hand, reaction of phenyl-dimethylsilyllithium with 1-bromoadamantane or 1,3-dibromoadamantane gives essentially quantitative yields of 1-phenyl(dimethylsilyl)adamantane or 1,3-bis-(phenyl(dimethylsilyl))adamantane, respectively. Originator keywords included: Silyl adamantane derivatives.

DESCRIPTORS: (U) *ADAMANTANES, *SYNTHESIS (CHEMISTRY), SILICON, REPRINTS

IDENTIFIERS: (U) 8E1102F, WUAFO8R230382

AD-A150 976

AD-A150 975
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 980 7/4 8/1
COLORADO UNIV AT BOULDER

(U) International Conference on Coordination Chemistry
(23rd) Held at Boulder, Colorado on 29 July-3 August,
1984.

DESCRIPTIVE NOTE: Final rept. 1 May 84-30 Apr 85.
SEP 84
8P

PERSONAL AUTHORS: Sievers, R.

CONTRACT NO. AFOSR-84-0094

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-0148

UNCLASSIFIED REPORT

ABSTRACT: (U) The International Conference on
Coordination Chemistry was held in the United States. It
took place at the University of Colorado, Boulder, on
July 29 through August 3, 1984. The number of active
participants was 784 and the number of accompanying
guests was 145. Thirty-seven countries were represented.
Sixty-five percent of the attendees were from the United
States, and the remaining thirty-five percent were from
other countries. Those areas where the largest interest
and most papers were presented are in the areas as
follows: (1) Energetics and Dynamics-Kinetics and
Mechanisms; (2) Energetics and Dynamics-Electrochemistry/
Thermodynamics; (3) Bioinorganic-Metalloenzymes; (4)
Synthesis-Special Ligands; (5) Techniques and
Applications-Electronic Structure. Originator supplied key
words include: International conference, Coordination
chemistry, Energetics and dynamics, Bioinorganic,

DESCRIPTORS: (U) *ELECTROCHEMISTRY, *BIOCHEMISTRY,
THERMOCHEMISTRY, THERMODYNAMICS, ELECTRONIC STATES,
ENZYMES, LIGANDS, CATALYSIS, SYMPOSIA

IDENTIFIERS: (U) PE81102F, WUAFOSR2303B2

AD-A150 980

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PAGE 140 EVLOSA
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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLOSA

AD-A150 989 20/11

UTAH UNIV SALT LAKE CITY COLL OF ENGINEERING

(U) On the Corner Singularity of a 3-D Griffith Crack.

DESCRIPTIVE NOTE: Final rept. 15 Sep 82-14 Mar 84,
MAR 84 34P

PERSONAL AUTHORS: Follas, E. S.; Wang, J. J.;

REPORT NO. UTEC-84-027

CONTRACT NO. AFOSR-82-0324

PROJECT NO. 2307

TASK NO. B2

MONITOR: AFOSR
TR-85-0138

UNCLASSIFIED REPORT

ABSTRACT: (U) This report discusses some further
developments of an analytical solution to the 3-D
Griffith crack problem. The analysis shows the stresses
at the corner points to be singular of the order (1/2 + 2
nu). Moreover, the stress boundary conditions at the
plate faces are shown to be proportional to (h-z), at the
upper face, and to (h+z), at the lower face. Originator-
supplied keywords included: Three-dimensional Griffith
crack, Linear elastic fracture mechanics, Three-
dimensional stress singularities.

DESCRIPTORS: (U) *CRACKS, *THREE DIMENSIONAL,
SOLUTIONS(GENERAL), ELASTIC PROPERTIES,
FRACTURE(MECHANICS), LINEARITY, BOUNDARIES, STRESSES,
PROBLEM SOLVING

IDENTIFIERS: (U) PE81102F, WUAFOSR230782
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

STANFORD UNIV CA EDWARD L GINZTON LAB OF PHYSICS

(U) Studies on Radiative Collisional and Ultraviolet Lasers.

DECISION NOTE: Annual technical rept. 1 Oct 83-30 Sep 84.

PERSONAL AUTHOR: Harris, S. E.; Young, U. F.

REPORT NO. GL-3812

PROJECT NO. F49620-83-C-0018

TASK NO. A1

MONITOR: AFOSR

TR-85-0134

UNCLASSIFIED REPORT

ABSTRACT: (U) This program has supported theoretical and experimental studies in several areas of research on XUV physics and laser technology. The highlight of our work during the previous year has been the definition and experimental confirmation of a new class of levels which we term as quasi-metastable. These levels allow significant simplification in our store and transfer methods and, of more importance, will, in certain cases, allow lasing in the extreme ultraviolet without the need for a transfer laser. Our work on these levels is summarized in Appendices A and B of this report. Section 2 of this report summarizes the status of our other projects. Section 3 lists the publications which have resulted under this contract, and Section 4 lists personnel who are presently supported by this contract. Originator supplied keywords include: XUV physics, Laser technology.

DESCRIPTORS: (U) *ULTRAVIOLET LASERS, COLLISIONS, FAR ULTRAVIOLET RADIATION, PHYSICS, METASTABLE STATE, RADIATIVE TRANSFER

IDENTIFIERS: (U) WUAFOSR2301A1, PEB1102F

AD-A151 004

UNCLASSIFIED

SEARCH CONTROL NO. EVL05A

AD-A151 002

POLYTECHNIC INST OF NEW YORK BROOKLYN MICROWAVE RESEARCH INST

(U) Basic Research in Electronics (JSEP).

DECISION NOTE: Annual rept. 1 Apr-31 Dec 84.

PERSONAL AUTHOR: Oliner, A. A.

REPORT NO. POLY-MRI-1432-83

PROJECT NO. F49620-82-C-0084

TR-85-0122

UNCLASSIFIED REPORT

ABSTRACT: (U) This report presents a summary of the scientific progress and accomplishments on research projects funded by the Joint Services Electronics Program (JSEP) for the contract period from 1 April 1984 through 31 December 1984. It does not contain information regarding accomplishments on research projects funded in other ways. The Joint Services Electronics Program at the Polytechnic is the core of interdisciplinary research in electronics encompassing projects in the Departments of Electrical Engineering and Physics under the aegis of the Microwave Research Institute. The research encompassed by this program is grouped under three broad categories: Electromagnetics, Solid State Electronics and Information Electronics. The detailed projects (research units) comprising the complete program are listed in the Table of Contents. Additional keywords: Diesietics, Millimeter waves, Waveguides, Optics, X rays, Surface acoustic waves, Surfaces, Pattern recognition, Image processing.

DESCRIPTORS: (U) *ELECTRONICS, *REPORTS, ELECTROMAGNETISM, SOLID STATE ELECTRONICS, MICROWAVES, MILLIMETER WAVES, DIELECTRIC WAVEGUIDES, OPTICS, X RAYS, SURFACE ACOUSTIC WAVES, IMAGE RESTORATION, AIR FORCE RESEARCH

AD-A151 002
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A151 018 5/10 6/16

BERNARD M BARUCH COLL NEW YORK PSYCHOPHYSIOLOGY LAB

(U) Psychophysiological Studies I. Performance and
Physiological Response in Learning, Short-Term Memory
and Discrimination Tasks.

DESCRIPTIVE NOTE: Annual rept. no. 1, 1 Oct 83-30 Sep 84,
NOV 84 91P

PERSONAL AUTHORS: Andreassi, J. L.; Juszczyk, N. M.

CONTRACT NO. AFOSR-83-0304

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR
TR-85-0070

UNCLASSIFIED REPORT

ABSTRACT: (U) The report details the background,
findings and conclusions of three studies completed in
the Psychophysiology Laboratory of Baruch College, City
University of New York, over the past twelve months. The
first experiment was concerned with the effects of varied
frequency of light stimulation upon verbal learning and a
number of physiological responses, including: heart rate
(HR), electromyogram (EMG), pulse wave velocity (PWV)
and skin temperature (ST). The main findings were that HR was
sensitive to task difficulty, while EMG was affected by
frequency of light stimulation. Another finding was that
lower baseline HR was related to better learning
performance. The second study examined the effects of
intensity of light stimulation on performance in a short
term memory task (Sternberg paradigm) and a variety of
physiological measures, including the event-related brain
potential (ERP), HR, EMG, PWV, and ST. The major findings
were that the endogenous component of the ERP (the P3
response) was delayed in latency with increased memory
set size under the condition of no light stimulation. In
the third study, we focused upon an examination of
possible differences between the left and right
hemispheres of the brain in processing verbal (words)
versus spatial (areal size estimation) materials.
Originator supplied keywords include: Event related
potentials, Heart rate (HR), Electromyogram (EMG), Skin

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SEARCH CONTROL NO. EVLOSA

AD-A151 018 CONTINUED

temperature (ST), Pulse wave velocity (PWV), Verbal
learning, Sternberg paradigm, Hemispheric asymmetries,
Light stimulation, and Areal discrimination.

DESCRIPTORS: (U) *PERFORMANCE(HUMAN), *DISCRIMINATION,
*LEARNING, *PSYCHOPHYSIOLOGY, *MEMORY(PSYCHOLOGY),
STIMULATION(PSYCHOLOGY), INTENSITY, ELECTROPHYSIOLOGY,
BRAIN, ELECTROMYOGRAPHY, HEART RATE, LIGHT, HEMISPHERES,
PULSES, VELOCITY, WAVES, BODY TEMPERATURE,
RESPONSE(BIOLOGY), VERBAL BEHAVIOR

IDENTIFIERS: (U) Event related potentials, PEB1102F,
WUAFOSR2313A4

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EVLOSA
The dispersed phases in the Al-8Fe, Al-10Fe-1.5Mo-1V, Al-8.8Fe-3.7Ce and Al-8.9Fe-6.9Ce RSP P/M alloys have been examined for composition and coarsening rate. Additionally, effects of prior heat treatment and deformation on particle coarsening have been studied. Energy dispersive spectroscopy on extracted particles from the Al-8Fe and Al-10Fe-1.5Mo-1V alloys in the as-received condition as well as after aging at 316 C indicated that the particles have compositions close to Al16Fe. In these two alloys, aging 240 hours at 425 C gives particles close to Al13Fe4 in composition. In Al1Fe-Ce alloys aged at 425 C, two kinds of particles are present with composition close to Al13Fe4 and Al10Fe2Ce. Some Al16Fe is seen in these alloys in the as-received condition and also after aging at 316 C. Overall coarsening rates of the dispersed phases indicate that at 375 and 425 C the Al-Fe-Mo-V alloy coarsens more slowly than the other three alloys. Creep deformation of the Al-8.8Fe-3.7Ce alloy enhances particle coarsening rates while no such effect is noted after fatigue deformation. A high temperature age preceding a low temperature age gives a stable microstructure at the lower temperature. The improved lattice matching previously observed in the equilibrium, tetragonal Al3(Y0.875Zr0.125) over the unalloyed Al3Zr phase was also found in the respective
ABSTRACT: (U) Both experimental and analytical investigations of 1-D and 2-D, coherent and incoherent space-variant optical processors have been conducted. The investigations included 1) continuation of a previous work on multiplexed holograms with phase-coded reference beams, 2) construction of a computer-controlled laser plotter, 3) design of incoherent processors which use color as an extra parameter, 4) applications of acousto-optical modulators and time-integrating detectors to space-variant processors, 5) initiation of piecewise-isoplanatic model investigations, and 6) initiation of studies on the use of space-variant systems for binary numerical optical computing. Keywords include: Space- Variant Optical Processing, Multiplex Holography, Numerical Optical Processing, Hologram Optical Elements, Computer-Generated Holograms, Incoherent Optical Processing.

DESCRIPTORS: (U) *IMAGE PROCESSING, *BINARY PROCESSORS, *HOLGRAMS, *OPTICAL PROCESSING, ACOUSTO-OPTICS, MODULATORS, COMPUTER APPLICATIONS, CONTROL, LASERS, PLOTTERS, OPTICAL EQUIPMENT COMPONENTS, HOLOGRAPHY, MULTIPLEXING, INCOHERENCE, NUMERICAL ANALYSIS, LASER BEAMS, COLORS, PHASE, CODING, INTEGRATORS, TIME, ONE DIMENSIONAL, TWO DIMENSIONAL

IDENTIFIERS: (U) *Space variant optical processors.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A151 038  12/1  5/1

CONNECTICUT UNIV STORRS DEPT OF ELECTRICAL ENGINEERING AND COMPUTER SCIENCE


DESCRIPTIVE NOTE: Technical rept..

JAN 85  19P

PERSONAL AUTHORS: Georgiadis, L.; Papantoni-Kazakos, P.

REPORT NO.  UCT/DEEC/TR-85-1

CONTRACT NO. AFOSR-83-0229

PROJECT NO.  2304

TASK NO.  A5

MONITOR: AFOSR

TR-85-0108

UNCLASSIFIED REPORT

ABSTRACT: (U) Generalized stationary Markov chains with denumerable state space are considered. For irreducible and aperiodic such chains, some sufficient conditions for ergodicity and steady state equilibrium are developed. The conditions for ergodicity are generalizations of previously proposed such conditions, and they are more tractable for certain applications. (Author)

DESCRIPTORS: (U) *CHAINS, *MARKOV PROCESSES, ERGODIC PROCESSES, STATIONARY, STEADY STATE

IDENTIFIERS: (U) WUAFOSR2304A5, PE81102F

UNCLASSIFIED REPORT

Availability: Document partially illegible.

ABSTRACT: (U) One of the most widely used approaches to computing systems reliability is to represent the system structure in terms of a Boolean sum of all minpaths. This expression is then transformed into a sum of disjoint terms. The probability of each term is then summed to obtain the reliability of the system. A key question with respect to the difficulty of this process relates to the ability to transform the initial sum into a sum of disjoint products. In this paper, the authors show that for the class of shellable systems, there always exists a disjoint product expression with a number of terms equal to the number of minpaths. The authors provide several examples of shellable systems for which an expression can be efficiently found.

DESCRIPTORS: (U) *NUMERICAL METHODS AND PROCEDURES, *COMPUTATIONS, *SYSTEMS ANALYSIS, *RELIABILITY, BOOLEAN ALGEBRA, APPROXIMATION(MATHEMATICS), PROBABILITY, COHERENCE, LINEAR SYSTEMS, ALGORITHMS

IDENTIFIERS: (U) *Shellable systems, *Shellability, Minpaths, PE81102F, WUAFOSR2304A5

AD-A151 033
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLOSA

AD-A151 045 21/2 20/4

IDENTIFIERS: (U) WUAFOSR2304A1, PE81102F

SHEFFIELD UNIV (ENGLAND) DEPT OF CHEMICAL ENGINEERING AND FUEL TECHNOLOGY

(U) Fundamental Study of Three Dimensional Two Phase Flow in Combustion Systems.

DESCRIPTIVE NOTE: Final rept. 15 May 82-31 May 83.

JUN 83 81P

PERSONAL AUTHORS: Swithenbank, J.; Ewan, B. C. R.; Boysan, F.; Ayers, W. H.

CONTRACT NO. AFOSR-82-0272

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR

TR-85-0102

UNCLASSIFIED REPORT

ABSTRACT: (U) Details are presented on the latest developments in the mathematical modelling of turbulence with particular reference to the pressure strain transport term. Comparisons are made of the radial variation of normal and shear stress with published data for a round jet and for decay of turbulence for selected flow fields. Work is also reported on the measurement and calculation of flow fields inside a dump combustor using swirl and baffle stabilisation. The value of the different turbulence approximations in predicting the flow are discussed. Original supplied keywords include: Combustion modelling, Turbulence modelling, Dump combustor, Swirling flow.

DESCRIPTORS: (U) *THREE DIMENSIONAL FLOW, *TH PHASE FLOW, *TURBULENT FLOW, *COMBUSTORS, *COMBUSTION, SHEAR STRESSES, JET FLOW, BAFFLES, COMPUTATIONS, FLOW FIELDS, DECAY, TURBULENCE, MATHEMATICAL MODELS, APPROXIMATION(MATHEMATICS), PRESSURE, STRAIN(MECHANICS), TRANSPORT

IDENTIFIERS: (U) Dump combustors, Swirling flow, WUAFOSR2308A2, PE81102F

AD-A151 047
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A151 059 CONTINUED

MECHANICS, +SAND, +STRESSES, VELOCITY, STRESS
CONCENTRATION, STRUCTURAL MECHANICS, ANISOTROPY, DRY
MATERIALS, AMPLITUDE, COMPRESSION, ORIENTATION(DIRECTION)

IDENTIFIERS: (U) WUAFOSR2307C1, PEG1102F

UNCLASSIFIED REPORT

ABSTRACT: (U) During the period covered by the grant
four papers were written. Titles include,
Parameterization issues in multivariable adaptive control,
A computational technique for inverse kinematics, and
Deadbeat control using periodic feedback. A unified
treatment of direct and indirect strategies for
parameterizing multivariable adaptive controllers was
given. By considering unknown, but linear and time
invariant systems in a deterministic setting, virtually
all commonly employed adaptive control strategies were
derived using pole placement notions. A new numerical
solution to the general version of the inverse kinematic
problem in robotics was obtained. Research within the
Laboratory for Engineering Man/Machine Systems at Brown
University focussed on the development of a general
purpose 88000 based microprocessor controller which could
be employed in a variety of control environments. At
present, a preliminary version of such a unit has been
constructed and is being used to control a single axis of
an IBM RS11 Cartesian robot. (Author)

DESCRIPTORS: (U) +ADAPTIVE CONTROL SYSTEMS,
+MULTIVARIATE ANALYSIS, MICROPROCESSORS, COMPENSATION,
SETTING(ADJUSTING), KINEMATICS, SOLUTIONS(GENERAL),
COMPUTATIONS, INVARIANCE, LINEAR SYSTEMS, FEEDBACK,
ROBOTICS

BROWN UNIV PROVIDENCE RI DIV OF ENGINEERING

AD-A151 047 12/1

(U) Practical Methods for the Compensation and Control of
Multivariable Systems.

DESCRIPTIVE NOTE: Final rept. 15 Sep 83-14 Sep 84,
JAN 85 8P

PERSONAL AUTHORS: Wolovich,W. A. ;Cometta,C. ;

PROJECT NO. AFOSR-83-0359

TASK NO. A1

MONITOR: AFOSR

TR-85-0106
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DTIC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. EVLOSA

AD-A150 948 12/1
SOUTH CAROLINA UNIV COLUMBIA DEPT OF MATHEMATICS AND
STATISTICS

(U) Nonparametric Estimation of Density and Hazard Rate
Functions when Samples are Censored.

DESCRIPTIVE NOTE: Technical rept.

JAN 85 33P

PERSONAL AUTHORS: Padgett, W. J.

REPORT NO. TR-103

CONTRACT NO. AFOSR-84-0158

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-85-0107

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this article is to present
the different types of nonparametric density estimates
that have been proposed for the situation that the sample
data are censored or incomplete. This type of data arises
in many life testing situations and is common in survival
analysis problems. Many of the methods of nonparametric
density and hazard rate estimation from right-censored
observations are discussed. These include histogram and
kernel-type procedures, likelihood methods, Fourier
series methods, and Bayesian nonparametric approaches.
Examples of kernel density estimates are given for
mechanical switch life data where data-based choices of
the bandwidth values are used. Originator-supplied
keywords included: Nonparametric density estimation;
Random censorship; Failure rate; Kernel density estimator;
Likelihood methods.

DESCRIPTORS: (U) NONPARAMETRIC STATISTICS, MAXIMUM
LIKELIHOOD ESTIMATION, EXPERIMENTAL DATA, HISTOGRAMS,
FOURIER SERIES, LIFE TESTS, CENSORSHIP, FAILURE, HAZARDS,
KERNEL FUNCTIONS, DENSITY, ESTIMATES

IDENTIFIERS: (U) Nonparametric density estimation,
Random censorship, Kernel density estimator, Hazard rate
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 945  4/1

UTAH STATE UNIV  LOGAN CENTER FOR ATMOSPHERIC AND SPACE
SCIENCES

(U)  High Time-Resolution Studies of the Auroral Ionosphere.

DESCRIPTIVE NOTE:  Final rept. 1 Feb 82-31 May 84.
SEP 84  9P

PERSONAL AUTHORS:  Foster, J. C.

PROJECT NO.  AFOSR-82-0093

TASK NO.  A2

MONITOR:  AFOSR
TR-85-0149

UNCLASSIFIED REPORT

ABSTRACT: (U)  Monostatic radar experimental technique
and analysis software were developed to permit spatial
mapping of high-latitude ionospheric parameters across a
1000 km region. Details of the midnight and noon sectors
were examined. MITHRAS electric field analysis, supported
the development of predictive ionospheric models and
addressed global imaging of the convection electric field.

DESCRIPTORS:  (U)  *IONOSPHERE, TIME, HIGH RESOLUTION,
AURORAE, IONOSPHERIC MODELS, MAPPING, SPATIAL
DISTRIBUTION, CONVECTION, ELECTRIC FIELDS, MONOSTATIC
RADAR, COMPUTER PROGRAMS

IDENTIFIERS:  (U)  Mithras electric field analysis,
PEB1102F, WUAFOSR2310A2

AD-A150 945

SEARCH CONTROL NO. EVLOSA

AD-A150 944  20/9  20/3  14/2

AMAF INDUSTRIES INC  COLUMBIA MD

(U)  Experimental Investigation of Neutral Plasma Beam
Propagation Across a Magnetic Field.

DESCRIPTIVE NOTE:  Final rept.
SEP 84  78P

PERSONAL AUTHORS:  Spight, C.; Miller, R. W.

REPORT NO.  8409-X1900-200

CONTRACT NO.  F48620-83-C-0091

MONITOR:  AFOSR
TR-85-0097

UNCLASSIFIED REPORT

ABSTRACT: (U)  The conversion, described herein, of a pre-
existing Hypervelocity Plasma Generator Facility to
operate in a regime of importance to particle beam
research has been completed. The facility is now capable
of producing a plasma flow-magnetic field environment
that in a scaled manner simulates the exoatmospheric
propagation of a plasmoid across the geomagnetic field. A
full set of flow and field diagnostics have been
implemented and calibrated. It includes magnetic field
probes for the slowly varying transverse background and
the fast varying motionally induced fields, a laser
Schlieren system for monitoring density gradient structure
of the beam and time-of-flight fast photodiode probes for
beam velocity measurements. Port access is available for
monitoring directly electrostatic or electromagnetic
fields associated with beam propagation. In tandem with
experimental activity a theoretical analysis effort has
been initiated, an interaction with theoreticians at Los
Alamos Scientific Laboratory, which intends a significant
contribution to the stability analysis of a bounded
plasma beam which can exhibit polarization and/or
diamagnetic effects. No satisfactory theory or numerical
simulations are currently available for that
intrinsically three-dimensional dynamics. Originator-
supplied keywords include: Diagnostic; Current; Magnetic
field; Plasma(Physics); Plasmoid. (Author).

DESCRIPTORS:  (U)  *PLASMA GENERATORS, *ELECTROMAGNETIC
WAVE PROPAGATION, *PLASMAS(PHYSICS), *MAGNETIC FIELDS,

AD-A150 944

UNCLASSIFIED  PAGE  147  EVLOSA
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

CONTINUED

AD-A150 944

POLARIZATION, FLOW FIELDS, PROBES (ELECTROMAGNETIC), SIMULATION, BEAMS (RADIATION), ELECTROMAGNETIC FIELDS, ELECTROSTATIC FIELDS, DIAGNOSIS (GENERAL), GEOMAGNETISM, DENSITY, GRADIENTS, DIAMAGNETISM, EXOSPHERE, MONITORING. THREE DIMENSIONAL, TRANSVERSE, NEUTRAL, PARTICLE BEAMS, PHOTODIODES

IDENTIFIERS: (U) Plasmoids, Time of flight probes, *Plasma beams, Neutral plasma beam propagation, Bounded plasma beams

AD-A150 939

GEORGIA INST OF TECH ATLANTA SCHOOL OF GEOPHYSICAL SCIENCES

(U) Influence Scattering and Q in the Lithosphere.

DESCRIPTION NOTE: Final technical rep. 15 Nov 82-14 Nov 84.

NOV 84 82P

PERSONAL AUTHORS: Dainty, A. M.; Duckworth, R. N.; Tie, A.

CONTRACT NO. AF05R-83-0037, ARPA Order-4397

PROJECT NO. 2309

TASK NO. A1

MONITOR: AF05R

TR-85-0101

UNCLASSIFIED REPORT

ABSTRACT: (U) This project examined the contribution of scattering to the attenuation of short pulses within the crust. Coda decay and excitation for local events were examined at Mammoth Lakes and Morgan Hill, Calif., Monticello, SC, and New Brunswick, Canada, in the frequency range 3-50 Hz. For short times (less than 10 seconds), the total turbidity determined from coda decay was about 0.1/\text{km} for all regions, applying a magnitude bias of 0.2 in \text{sub b} if 10 \text{km} of such material is traversed. Since the total turbidity is independent of frequency, implying geometrical scattering, this would not be detectable by spectral radio methods. The backscattering turbidity determined from coda excitation at short times indicates strong scattering in the upper crust, especially for frequencies in the 3-10 Hz range. At times longer than 10-15 seconds for the codas from the eastern North American regions, Monticello and New Brunswick, the coda energy appeared to be channeled into a horizontally propagating mode such as Lg. The total turbidity for this portion of the coda was lower than for the short codas, about 0.01/\text{km}, indicating less scattering, a result born out by the backscattering turbidity. Codas from California, however, did not show this phenomenon, indicating either that this mode is not present or that it is more strongly scattered. This result indicates that attenuation for Lg can be estimated
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 939 CONTINUED

from the coda after 10 seconds, as proposed by other
workers.

DESCRIPTORS: (U) RADIO TRANSMISSION, WAVE PROPAGATION,
EARTH CRUST, SOUTH CAROLINA, BACKSCATTERING, TURBIDITY,
NEW BRUNSWICK, ATTENUATION, LITHOSPHERE

IDENTIFIERS: (U) WJAOSR2309A1, PE61102F

AD-A150 932 20/4 12/1 22/3

PEDA CORP PALO ALTO CA

(U) Forebody and Baseflow of a DragBrake OTV (Orbital
Transfer Vehicle) by an Extremely Fast Single Level
Implicit Algorithm.

JUN 84 13P

PERSONAL AUTHORS: Lombard, C. K.; Venkatapathy, E.; Bardina,
J.;

CONTRACT NO. F49620-83-C-0084

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR

TR-85-0114

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in American Inst. of Aeronautics
and Astronautics, p1-11 Jun 84.

ABSTRACT: (U) We present a new, computationally
efficient single level effectively explicit implicit
algorithm for gasdynamics. The method meets all the
requirements for unconditionally stable global iteration
over flows with mixed supersonic and subsonic zones
including bluff body flow and boundary layer flows with
strong interaction and streamwise separation. For
hyperbolic (supersonic flow) regions the method is
automatically equivalent to contemporary space marching
methods. For elliptic (subsonic flow) regions, rapid
convergence is facilitated by alternating direction
solution sweeps which bring both sets of eigenvectors and
the influence of both boundaries of a coordinate line
equally into play. Point by point updating of the data
with local iteration on the solution procedure at each
spatial step as the sweeps progress not only renders the
method single level in storage but, also, improves
nonlinear accuracy to accelerate convergence by an order
of magnitude over related two level linearized implicit
methods. The properties and performance of the technique
are demonstrated in a variety of quasi 1-D nozzle flows
including completely subsonic or supersonic or mixed
subsonic/supersonic with sonic points and shocks. The
technique is applied as a method of lines in two

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EVLOSA
hypersonic blunt body flow problems: a classical sphere
cylinder problem previously studied experimentally and
computationally and the coupled forebody and base flow of
a model drag brake ADT. The early results support the
belief that the new algorithm has the potential to make
accurate computations of ADT flowfields substantially
faster and less costly than currently available explicit
or two level time dependent implicit methods. Keywords
include: Reprints.

DESCRIPTORS: (U) *BASE FLOW, INTERACTIONS, FLOW
SEPARATION, NUMERICAL METHODS AND PROCEDURES, ONE
DIMENSIONAL FLOW, NOZZLE GAS FLOW, SHOCK, HYPERSONIC FLOW,
BOUNDARY LAYER FLOW, COMPUTATIONS, GAS DYNAMICS, BLUNT
BODIES, ITERATIONS, MIXING, ALGORITHMS, ORBITS, TRANSFER,
REPRINTS, SUBSONIC FLOW, SUPersonic FLOW, BRAKES, DRAG,
CONVERGENCE, EIGENVECTORS

IDENTIFIERS: (U) Orbital transfer vehicles. Space
marching methods, Forebody flow, Drag brake, WUAFOSR2304A3,
Peb1102F

SUPPLEMENTARY NOTE: Pub. In International Jnl. for

ABSTRACT: (U) A simply-supported rhombic plate with
obtuse angle equal to 150 degrees is analysed by the
finite element method, using both the h-version and the
newer p-version. Results obtained using the computer code
CONE (C(1)-continuity) for plate bending problems are
compared with the particular predictions and with
computational results reported in the literature. If
accuracy in terms of the number of degrees-of-freedom is
used as a criterion, the solutions presented here are the
most efficient that have been published to date. Keywords
include: Reprints. (Author).

DESCRIPTORS: (U) *FINITE ELEMENT ANALYSIS, PLATES,
BENDING, COMPUTATIONS, DEGREES OF FREEDOM,
SOLUTIONS (GENERAL), ACCURACY, REPRINTS

IDENTIFIERS: (U) *Rhombic plates. WUAFOSR2304A3,
Peb1102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 930  12/1

CALIFORNIA UNIV SANTA BARBARA

(U) Unitarily Invariant Generalized Matrix Norms and Hadamard Products.

84     19P

PERSONAL AUTHORS: Marcus, M.; Kidman, K.; Sandy, M.;

CONTRACT NO. AFOSR-83-0150

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR

TR-85-0115

UNCLASSIFIED REPORT


Reprint: Unitarily Invariant Generalized Matrix Norms and Hadamard Products.

DESCRIPTORS: (U) *LINEAR ALGEBRA, *MATRICES(MATHEMATICS), NORMALITY, INVARIANCE, THEOREMS, REPRINTS

IDENTIFIERS: (U) Hadamard products, Matrix norms, WJAFOSR2304A3, PEG1102F

SEARCH CONTROL NO. EVL05A

AD-A150 928  8/13  20/11

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Response of Saturated Soils to Dynamic Loading.

DESCRIPTIVE NOTE: Annual rept. 1 Feb 83-31 Jan 84.

JUN 84  67P

PERSONAL AUTHORS: Sandhu, R. S.; Hong, S. J.; Aboustit, B. L.;

REPORT NO. OSURF-715107-84-4

CONTRACT NO. AFOSR-83-0055

PROJECT NO. 2307

TASK NO. C1

MONITOR: AFOSR

TR-85-0082

UNCLASSIFIED REPORT

ABSTRACT: (U) The transient response of saturated porous soils to time dependent boundary conditions is analyzed. Galerkin finite element method is used to set up the spatial discretization of Biot's equations of wave propagation through linearly elastic fluid-saturated porous medium. Wilson's beta-gamma-theta algorithm is used to integrate the equations of motion. The procedure is applied to several one-dimensional steady state and transient problems. Excellent agreement with the analytic solutions was obtained with 'proper' selection of time-integration parameters.

DESCRIPTORS: (U) *SOIL MECHANICS, *DYNAMIC LOADS, *SOILS, MATHEMATICAL ANALYSIS, EQUATIONS OF MOTION, FINITE ELEMENT ANALYSIS, POROUS MATERIALS, TIME DEPENDENCE, WAVE PROPAGATION, ONE DIMENSIONAL, STEADY STATE, SATURATION, TRANSIENTS

IDENTIFIERS: (U) WJAFOSR2307C1, PEG1102F, LPN-OSURF-763420/715107

AD-A150 926

UNCLASSIFIED  PAGE  151  EVL05A
UNCLASSIFIED

SEARCH CONTROL NO. EVLOSA

AD-A150 922 20/14

KANSAS UNIV/CENTER FOR RESEARCH INC LAWRENCE REMOTE SENSING LAB

(U) Analytical Studies and Experimental Measurements of Amplitude and Phase of Near-Field Range Antenna Probes.

DESCRIPTIVE NOTE: Final rept. 1 May 83-30 Jun 84,

MAY 84 19P

PERSONAL AUTHORS: Biggs, A. W.;

REPORT NO. CRINC/RSL-TR-8190-F

CONTRACT NO. AFOSR-83-0190

PROJECT NO. 2305

TASK NO. D9

MONITOR: AFOSR

TR-85-0119

UNCLASSIFIED REPORT

ABSTRACT: (U) The effects of probe antenna errors in the basic theory of probe compensated near-field measurements for arbitrary antenna are presented. The study encompasses: (1) measurements made in the near-field of the arbitrary test antenna; (2) directional effects of probe antennas on reception by test antennas; and (3) computed patterns of test antennas that span a solid angle instead of one or two principal plane cuts. Results of experimental measurements conducted are reported with both advantages and disadvantages discussed. Fields from the test and probe antennas are expressed in elementary plane wave expansions and the Lorentz reciprocity theorem is used to calculate the output.

DESCRIPTORS: (U) *PROBES(ELECTROMAGNETIC), *ANTENNAS, AMPLITUDE, PHASE, ERRORS, NEAR FIELD

IDENTIFIERS: (U) WUAFOSR2305D9, PE81102F

AD-A150 924

UNCLASSIFIED
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 920  20/2  20/4  20/1

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MECHANICAL
ENGINEERING

(U) Basic Instability Mechanisms in Chemically Reacting
Subsonic and Supersonic Flows.

DESCRIPTIVE NOTE: Final rept. 30 Sep 78-29 Sep 83,
NOV 83  22P

PERSONAL AUTHORS: Toong, T. Y.

CONTRACT NO. AFOSR-78-3862

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-85-0104

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the main results
and conclusions obtained in a research program on basic
instability in chemically reacting subsonic and
supersonic flows. Problems studied included (1) Nonlinear
wave-kinetic interactions (2) Sustenance, structure and
initiation of gaseous detonations (3) Sustenance of low-
frequency instability in dump combustors (4) Onset of
instability in reacting shear flows and (5) Temporal
development of turbulence-combustion interactions. Both
linear and nonlinear coupling between chemical kinetics
and gas dynamics were found to play important roles in
triggering and sustaining instabilities in these problems.
Of special significance were the effects due to non-
dimensional activation energy and Damkohler's similarity
parameters and possible selective amplification within
specific frequency bands as governed by chemical kinetics.

Originator supplied keywords include: Instability
Mechanisms; Wave-kinetic Interactions; Linear and
Nonlinear Coupling; Sustenance, Structure and Initiation
of Gaseous Detonations; Low-Frequency Instability in Dump
Combustors; Onset of Instability in Reacting Shear Flows;
Turbulence-Combustion Interactions.

DESCRIPTORS: (U) *COMBUSTION, *SUBSONIC FLOW,
*SUPERSONIC FLOW, COMBUSTION STABILITY, REACTION KINETICS,
INTERACTIONS, COUPLING(INTERACTION), COUPLING(INTERACTION)

AD-A150 920

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AD-A150 920  CONTINUED

IDENTIFIERS: (U) WUAFOSR2308A2. PE81102F

UNCLASSIFIED

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EVLOSA

84 8P

PERSONAL AUTHORS: Rootzen, H.; Sternby, J.;

PROJECT NO. 2304

TASK NO. A5

UNCLASSIFIED REPORT


ABSTRACT: (U) In a previous paper the convenience of using Martingale theory in the analysis of Bayesian least-squares estimation was demonstrated. However, certain restrictions had to be imposed on either the feedback structure or on the initial values for the estimation. In the present paper these restrictions are removed, and necessary and sufficient conditions for strong consistency (in a Bayesian sense) are given for the Gaussian white noise case without any assumptions on closed loop stability or on the feedback structure. In the open-loop case the poles are shown to be consistently estimated, almost everywhere, and in the closed loop case certain choices of control law are shown to assure consistency. Finally adaptive control laws are treated, and implicit self-tuning regulators are shown to converge to the desired control laws. This is a reprint. Key words include: Least squares; Bayesian statistics; convergence analysis; adaptive control; Martingale approach.

DESCRIPTORS: (U) *BAYES THEOREM, *ESTIMATES, *LEAST SQUARES METHOD, REPRINTS, TUNING, SELF OPERATION, STATISTICS, CLOSED LOOP SYSTEMS, STABILITY, FEEDBACK, ADAPTIVE CONTROL SYSTEMS, CONSISTENCY, CONVERGENCE, OPEN LOOP SYSTEMS, WHITE NOISE
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 904 9/2 12/1
WASHINGTON UNIV ST LOUIS MO SCHOOL OF ENGINEERING AND APPLIED SCIENCE

(U) Implementation of a CI Triangular Element Based on the p-Version of the Finite Element Method,
84 13P


PROJECT NO. 2304

UNCLASSIFIED REPORT

ABSTRACT: (U) The implementation of a computer code CONE (for Ci(1) continuity) based on the p-version of the finite element method is described. A hierarchic family of triangular finite elements of degree p > or = 5 is used. This family enforces Ci(1) continuity across inter-element boundaries, and the code is applicable to fourth order partial differential equations in two independent variables, in particular to the biharmonic equation. Applications to several benchmark problems in plate bending are presented. Sample results are examined and compared both with theoretical predictions and with the computations of other programs. Significant improvements are shown for the results obtained using CONE.

DESCRIPTORS: (U) COMPUTER PROGRAMS, FINITE ELEMENT ANALYSIS, PROBLEM SOLVING, PARTIAL DIFFERENTIAL EQUATIONS, FUNCTIONS (MATHEMATICS), VARIABLES, COMPUTATIONS, FORTRAN, DERIVATIVES (MATHEMATICS), REPRINTS

IDENTIFIERS: (U) Cone computer program, Shape functions, WUAFOSR2304A3, PEB1102F

AD-A150 904

UNCLASSIFIED REPORT

ABSTRACT: (U) High-temperature materials that exhibit small phonon conduction can exhibit the highest figures of merit. A thermoelectric model based on small phonon transport has been developed. The model predicts that broadband semiconductors with small phonon hopping along inequivalent sites of distorted sublattices can result in increases in both the electrical conductivity and the Seebeck coefficient with increasing temperature without significant increases in thermal conductivity. High figures of merit (ZT), greater than 1 at 1000K, that increase with increasing temperatures are predicted. The model is being applied to the divalent metal containing (Y,La)CrO3(3) systems with an AB0(3) perovskite structure. Transport properties have been determined for various compositions and for different compositions. These data are being used for the evaluation of this model. Additional keywords: rare earth, oxysulfides.

DESCRIPTORS: (U) ELECTRICAL CONDUCTIVITY, THERMAL CONDUCTIVITY, SEMICONDUCTORS, RARE EARTH ELEMENTS, FIGURE OF MERIT, HIGH TEMPERATURE, DOPING, SULFIDES, SEEBECK EFFECT, MODELS

IDENTIFIERS: (U) Polaron, PEB1102F, WUAFOSR2306A2

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UNCLASSIFIED PAGE 155 EVLOSA
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DTIC REPORT BIBLIOGRAPHY
SEARCH CONTROL NO. EVLOSA

UNCLASSIFIED REPORT

ABSTRACT: (U) A set of second order partial differential equations for the generation of three-dimensional grids around and between arbitrary shaped bodies has been proposed. These equations basically depend on the Gauss equations for a surface and have been structured in such a way that an automatic connection is established between the succeeding generated surfaces. The vanishing of the Riemann curvature tensor has been used to isolate those fundamental equations which every coordinate system in either two- or three-dimensional Euclidean space must satisfy. Keywords include: Reprints. (Author)

DESCRIPTORS: (U) *PARTIAL DIFFERENTIAL EQUATIONS, *GRIDS (COORDINATES), SURFACES, REPRINTS, THREE DIMENSIONAL, CURVATURE, TENSORS

IDENTIFIERS: (U) PEB1102F, WUAFOSR2304A3

UNCLASSIFIED REPORT

ABSTRACT: (U) Let a sequence of independent uniformly distributed random variables be the spacings induced by the order statistics of U sub 1, ..., U sub (n-1). The exact distribution is determined, and based on analysis of something called Fibonacci distribution, the weak and almost sure convergence of the sequence are discussed. Furthermore, the limiting distribution is determined for any fixed l and the equation is shown for some sequence (1 sub n). Keywords include: Reprints.

DESCRIPTORS: (U) *SEQUENCES (MATHEMATICS), EQUATIONS, DISTRIBUTION, RANDOM VARIABLES, CONVERGENCE, ORDER STATISTICS, REPRINTS

IDENTIFIERS: (U) *Spacings, PEB1102F, WUAFOSR2304A5
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 889 7/4 21/8 21/2

MACKAY SCHOOL OF MINES REND NV DEPT OF CHEMICAL AND METALLURGICAL ENGINEERING

(U) The Vapor Pressure of HCl - Water and Salt - HCl - Water Solutions Below 0C.

DESCRIPTIVE NOTE: Final rept. 1 Dec 81-30 Nov 83.

JAN 84 11P

PERSONAL AUTHORS: Miller, E. ;

CONTRACT NO. AFOSR-77-3333, AFOSR-82-0049

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR TR-85-0084

UNCLASSIFIED REPORT

ABSTRACT: (U) Liquid solution analyses were completed. The complete vapor-liquid equilibria data are tabulated for hydrochloric acid solutions ranging in molality from 5.0 to 15.7, saturated with CaCl2 at nominal temperatures ranging from 0 to -40C. The CaCl2-HCl-water system exhibits a maximum pressure azetropes under these conditions. Pure hydrochloric acid and NaCl-HCl-water systems exhibit minimum pressure azetropes in the same temperature range. At high molalities greater than about 9, the vapor phase contains about 94% HCl and for all molalities there is an increase in the partial pressures of HCl and water over what is observed with pure hydrochloric acid. Because of these characteristics, it is observed that the presence of CaCl2 in reduced smoke plumes will not contribute as strongly to secondary smoke as will NaCl. Originator supplied keywords include: Plumes, Salt solutions, Partial pressures, Hydrochloric acid, Sodium chloride.

DESCRIPTORS: (U) *HYDROCHLORIC ACID, *SALINE SOLUTION, *VAPOR PRESSURE, *EXHAUST PLUMES, *ROCKET EXHAUST, SMOKE ABATEMENT, EQUILIBRIUM (GENERAL), CALCIUM COMPOUNDS, CHLORIDES, AZETROPS, SODIUM CHLORIDE, PARTIAL PRESSURE, SMOKE, VAPOR PHASES

IDENTIFIERS: (U) PE81102F, WUAFOsr2308A1

AD-A150 889

UNCLASSIFIED

SEARCH CONTROL NO. EVLOSA

AD-A150 884 20/3 7/5 20/8

WISCONSIN UNIV-MADISON DEPT OF PHYSICS

(U) Experimental and Theoretical Studies of Optogalvanic Effects in Neon Discharges.

NOV 83 12P

PERSONAL AUTHORS: Lawler, J. E.;Doughty, D. K. ;

CONTRACT NO. AFOSR-81-0208

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR TR-85-0128

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl De Physique, conf C7 suppl 11 V44 pC7-45/C7-54 Nov 83.

ABSTRACT: (U) An experimental and theoretical investigation of the 584.5 nm optogalvanic effect in the Ne positive column is described. The effect is a decrease in discharge conductance due to a laser induced depletion of metastable atoms. Absolute measurements of the effect per unit of absorbed laser power are reported for a wide range of discharge conditions. Positive column discharges with radius-pressure products of 0.1 cm-Torr to 1.0 cm-Torr and with sustaining direct currents of 1 to 16 ma are studied. The effect is modeled in this regime by applying perturbation theory to key rate equations that describe discharge. The model predictions are in agreement with an experimental measurements. Absolute densities of atoms excited to the 2p53s levels are also reported. The studied regime covers the transition from a discharge sustained primarily by single-step electron impact ionization to a discharge sustained primarily by two-step ionization via the 2p53s metastable levels. The global power balance of the discharge is dominated by wall losses of atoms excited to the 2p53s levels at all pressures and currents studied.

DESCRIPTORS: (U) *GAS DISCHARGES, *NEON, ATOMIC ENERGY LEVELS, EXCITATION, MATHEMATICAL MODELS, REPRINTS, DENSITY, LASERS, ATOMS, CONDUCTIVITY, METASTABLE STATE, ELECTRON IMPACT SPECTRA, IONIZATION

AD-A150 884

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UNCLASSIFIED

UNCLASSIFIED

ABSTRACT: (U) Theoretical methods of predicting ordering parameters of carbon metal based systems have been investigated. Preliminary methods of calculating the critical ordering temperature, and the maximum degree of order have been used to examine the characteristics of C-Zr, C-Ho, C-Ti and C-V systems. Based upon these calculations, the C-Ti system has been chosen as the most promising system in which the ultrahigh strength, ductility and temperature resistance, properties desired for space power generation materials, can be obtained. Fifteen titanium based alloys have been manufactured using an arc melting furnace to compare experimentally the effect of carbon content on the ordering parameters of carbon metal alloys with theoretical predictions. The alloys produced contained between 0 and 83 atom percent (0 to 22 weight percent) carbon. This first group of alloys did not contain transition and rare earth additions required for ductility improvement. This will allow an unperturbed comparison of ordering parameter theory with experimental results. Optical metallography and hardness tests have been completed on these alloys with interesting results for alloys containing between 35 and 83 atomic percent (12 to 22 weight percent) carbon. These all were found to contain significant amounts of phases not predicted from the phase diagrams. X-ray diffraction tests are being conducted to identify these
constituents. An additional ten alloys have been manufactured using a new induction generator purchased under the contract. Originator supplied keywords include: Cluster-variation, Concentration waves and Band theory.

DESCRIPTIONS: (U) *MATHEMATICAL PREDICTION, *COMPUTATIONS, *CARBON ALLOYS, DUCTILITY, POWER SUPPLIES, SPACE ENVIRONMENTS, HARDNESS, METALLOGRAPHY, THERMAL RESISTANCE, TITANIUM ALLOYS

ABSTRACT: (U) Tensile and creep tests of unidirectional and cross piled specimens were conducted and all tests were monitored for acoustic emission. Failure of unidirectional composites is related directly to failure of fibers which can be regularly and reproducibly correlated with acoustic emission count. A relationship had been postulated earlier relating emission rate and total emission count. A parameter n has been added to this relationship which still allows remarkable correlation even for some nonunidirectional laminates. As the angles of fiber layup increase and mechanisms other than fiber breakage become more important the value of n decreases from unity. For unidirectional laminates a model for total number of fiber breaks can be related to a critical load transfer length using certain probabilities of fiber breakage given no adjacent fiber breaks, one adjacent fiber break, two adjacent fiber breaks, and so on. The resulting predictions correlate very well with a Weibull distribution description of the actual data with a Weibull shape parameter of four. From the model this would indicate that three adjacent breaks lead to final failure, which is considered highly likely. The effects of time and temperature on load transfer length are very important since the gradual increase in load transfer length has the effect of increasing the stresses in unbroken fibers. Originator-supplied keywords
UNCLASSIFIED

OTIC REPORT BIBLIOGRAPHY

GEORGIA INST OF TECH ATLANTA SCHOOL OF AEROSPACE ENGINEERING

(U) Behavior of Advanced and Composite Structures.

DESCRIPTIVE NOTE: Final scientific rept. 1 Jan 82-31 Jan 83,
MAR 83 13P

PERSONAL AUTHORS: Rehfield, L. W.

CONTRACT NO. AFOSR-82-0080

PROJECT NO. 2307

TASK NO. 82

MONITOR: AFOSR
TR-85-0137

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report summarizes the objectives and accomplishments of three tasks performed under one year grant from AFOSR to complete ongoing research. Task 1 is concerned with the development and validation of new bending and buckling theories for composite structures. Task 2 is the experimental investigation of the effects of delamination on the compressive buckling and postbuckling of composite laminated panels. Task 3 is an experimental evaluation of damage tolerance of composite isogrid panels. Isogrid is a stiffening concept that employs a repetitive triangular pattern of ribs. Papers, reports, and presentations resulting from this research are listed. In Task 1, new theories which include the effects of transverse shear strain, transverse normal strain, stretching related warping and bending related warping on composite laminates, orthogonally stiffened composite plates and composite isogrid plates have been developed, validated and applied. In case of isogrid panels, comparisons of predictions for compressive buckling have been made with experiment and found to be quite good. In Task 2, the data indicate that delaminations reduce initial postbuckled stiffness. They do not influence, however, the failure process. This is because they were placed in the center of the panels and ultimate failure begin at the corners. Originator-supplied keywords include:

AD-A150 817

ADVANCED STRUCTURES, COMPOSITE STRUCTURES, COMPOSITE LAMINATES, COMPOSITE PLATE THEORY, DELAMINATION, ISOGRID STRUCTURES, STIFFENED STRUCTURES.

DESCRIPTORS: (U) *COMPOSITE STRUCTURES, *GRIDS, *LAMINATES, AIR FORCE RESEARCH, FAILURE(MECHANICS), BENDING, GRANTS, BUCKLING, THEORY, PLATES, DAMAGE, TOLERANCE, STIFFENING, SHEAR STRENGTH, STRAIN(MECHANICS), TRANSVERSE, COMPRESSIVE PROPERTIES, RIBS, VALIDATION

IDENTIFIERS: (U) Composite laminates, Delamination, Composite plate theory, Isogrid structures, PE61102F, WUAFOSR230782

AD-A150 817 CONTINUED

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UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 819 11/2 11/4 20/11
MATERIALS SCIENCES CORP SPRING HOUSE PA
(U) Fracture Behavior of Ceramic Composites.

PERSONAL AUTHORS: Buesking, K. W.; Chatterjee, S. N.;
REPORT NO. MSc/TR/1402/1503
CONTRACT NO. F49620-82-C-0041
PROJECT NO. 2307
TASK NO. 82
MONITOR: AFOSR
TR-85-0044

UNCLASSIFIED REPORT

ABSTRACT: (U) A combined experimental and analytical study is described which investigated the strength and fracture toughness of whisker reinforced ceramics. Experiments were performed on Al2O3 reinforced with SiC whiskers mechanically loaded in four-point flexure. The results showed an increase in flexural strength and KIC as the whisker content of the composites was increased. Several fracture and strength theories were compared to the experimental results. The hypothesis which appeared most consistent with the data treated the composites as though they contained inherent flaws which were the length of the mean free path between reinforcing whiskers. Using this crack size, the measured flexural strength of the composites could be predicted by applying linear elastic fracture mechanics. Originator-supplied key words include: Ceramic matrix composites.

DESCRIBERS: (U) *CERAMIC MATERIALS. *COMPOSITE MATERIALS. *FRACTURE(MECHANICS). *TOUGHNESS. WHISKER COMPOSITES. DEFECTS(MATERIALS). HYPOTHESES. MATRIX MATERIALS, CRACKS, FLEXURAL STRENGTH, ELASTIC PROPERTIES, REINFORCING MATERIALS

IDENTIFIERS: (U) Ceramic Matrix composites. PE81102F, WUAFOSR230782

AD-A150 820

UNCLASSIFIED

AD-A150 820 CONTINUED

calculations.

DESCRIBERS: (U) *ANIONS. *REACTION KINETICS. *PLASMAS(PHYSICS). SURFACES. QUANTUM THEORY. ION SOURCES. HYDROGEN. DEUTERIUM. DENSITY. POTENTIAL ENERGY

IDENTIFIERS: (U) Ion molecule interactions. WUAFOSR2301A7, PE81102F

AD-A150 820

UNCLASSIFIED PAGE 172 EVLOSA
implanted silicon are included which demonstrate the
resolution and sensitivity of this technique.

DESCRIPTORS: (U) *ACOUSTIC IMAGES, *PHOTOTHERMAL
PROPERTIES, IMAGE PROCESSING, EQUATIONS, ACOUSTIC LENSES,
HIGH RESOLUTION, FILMS, SILICON, HIGH FREQUENCY

IDENTIFIERS: (U) *Photoacoustics, Thermoacoustic field
equations. WUAFOSR2308A2. PE81102F

ABSTRACT: (U) This technical program constitutes a
theoretical research investigation of the kinetic
mechanisms of negative ion formation in plasmas. This
study was directed toward elucidating the mechanisms of
the most important volume-dependent reactions that occur
in hydrogen-ion H- (D-) source devices, primarily of the
Belchenko-Dimov-Dudnikov (BDD) type. The primary goal of
this research program was to identify the most important
reactions leading to H- (D-) production or destruction
and to estimate these reaction rates as a function of
system parameters such as density, composition and
temperature. A further goal was to explore new chemical
sources for the production of light mass negative atomic
ions. The results of this program furnish data and
provide direction for more detailed investigations into
the kinetics of both gas phase and gas-surface reaction
rates of importance in ion source devices and provide
input for reliable modeling of such systems. This
investigation was carried out using quantum mechanical
methods. Both ab initio and density functional approaches
were employed in these studies. Originator-supplied
keywords included: potential energy surface, negative ion,
configuration-interaction, density-functional method, ion-
molecule reactions, density-functional, ab initio
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY  SEARCH CONTROL NO. EVLOSA

AD-A150 827  CONTINUED

STANFORD UNIV  CA EDWARD L GINZTON LAB OF PHYSICS

IDENTIFIERS: (U) WUAFOSR2308A1, PE81102F

(U) Photoacoustic Imaging.

ABSTRACT: (U) This is the final report on the work done in the area of high resolution photoacoustic and photothermal imaging. It contains recent advances in photoacoustic and photothermal theory and the experimental demonstration of new techniques. Photoacoustic and photothermal theories have been extended to include the effects of the highly focused optical power sources necessary for high resolution imaging and three high frequency techniques (kHz) have been demonstrated and used to characterize the material properties of solids. The formalism behind photothermal characterization of solids is established under general focusing conditions. The three dimensional thermoacoustic field equation is derived and discussed. Two high resolution photoacoustic techniques have been demonstrated. These techniques involve the use of an acoustic lens for collection for the acoustic power generated by a highly focused optical beam modulated at 1 GHz frequency. Images of gold and laser recrystallized silicon films are presented demonstrating the high resolution and sensitivity of these techniques. A high resolution photothermal probe has been demonstrated. This optical technique provides a means of photothermal characterization with sub-micrometer resolution and high sensitivity. The theory behind the probe is presented along with the experimental verification. Images of boron

AD-A150 823

UNCLASSIFIED REPORT

AD-A150 823  14/5  20/8
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 834 CONTINUED

SEARCH CONTROL NO. EVLOSA

AD-A150 827 19/1 21/9.2

JET PROPULSION LAB PASADENA CA

(U) Non-Steady Combustion of Composite Solid Propellants.

DESCRIPTIVE NOTE: Final rept. 1 Oct 80-31 Mar 84.

MAY 84 54P

PERSONAL AUTHORS: Cohen, N. S.; Strand, L. D.;

REPORT NO. JPL-D-1602

CONTRACT NO. AFOSR-issa-83-00052

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR

TR-85-0103

UNCLASSIFIED REPORT

ABSTRACT: (U) Analytical models were developed for the linearized pressure-coupled and velocity-coupled combustion response functions of composite propellants. The theory is that compositional fluctuations occur in the course of composite propellant burning, that these fluctuations originate from the inherent heterogeneity of the propellant microstructure, and that they will contribute to the nonsteady combustion under oscillating pressure (and velocity) conditions. Properties of the response to compositional fluctuations were determined and compared with responses to pressure and velocity fluctuations in series of parametric studies. The response to compositional fluctuations was found to be relatively strong response. Each response tended to increase with increasing AP particle size and pressure, and with decreasing mean crossflow velocity. A series of experiments was carried out with three propellants to determine whether or not certain features of the microstructure could be measured and correlated with response function behavior. Additional tasks pertaining to nonlinear combustion response and high frequency combustion response were performed and are described in the text. A list of publication generated by or in the course of this program is presented.

DESCRIPTORS: (U) COMPOSITE PROPELLANTS, COMBUSTION,

AD-A150 827

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DTIC REPORT BIBLIOGRAPHY

AD-A150 838 20/3 20/10 20/12

TEXAS UNIV AT AUSTIN ELECTRONICS RESEARCH CENTER

(U) Annual Report on Electronics Research at the
University of Texas at Austin.

DESCRIPTIVE NOTE:  Rept. no. 31. 1 Apr 83-31 Mar 84.
MAY 84 109P

PERSONAL AUTHORS:  Powers, E. J.

CONTRACT NO.  F49620-82-C-0033

UNCLASSIFIED REPORT

MONITOR:  AFOSR
TR-85-0180

ABSTRACT:  (U)  This report summarizes progress on
projects carried out at the Electronics Research Center
at The University of Texas at Austin and which were
supported by the Joint Services Electronics Program. In
the area of Information Electronics progress is reported
for projects involving (1) nonlinear estimation and
detection, (2) electronic time-variant signal processing,
and (3) digital time series analysis with applications to
nonlinear wave phenomena. In the Solid State Electronics
area recent findings in (1) solid state interface
reactions and instabilities, (2) electronic properties
and structure of metal silicides and interfaces, and (3)
implantation and interface properties of InP and related
compounds are described. In the Quantum Electronics area
progress is reported for the following projects: (1)
quantum effects in laser induced damage, (2) nonlinear
Raman scattering from molecular ions and (3) nonlinear
optical interactions. In the Electromagnetics area
progress in guided waves in composite structures is
summarized.

DESCRIPTORS:  (U)  *ELECTROMAGNETISM.  *ELECTRONICS.
*QUANTUM ELECTRONICS.  *SOLID STATE ELECTRONICS.  DETECTION.
ELECTROMAGNETIC FIELDS,  ELECTRONIC EQUIPMENT.  SIGNAL
PROCESSING.  RESEARCH FACILITIES,  INTERFACES,  MOLECULAR
IONS,  COMPOSITE STRUCTURES,  DIGITAL SYSTEMS,  TIME SERIES
ANALYSIS,  WAVEFORMS,  LASER DAMAGE,  ESTIMATES,  NONLINEAR
ANALYSIS.  LIGHT SCATTERING,  NONLINEAR SYSTEMS.  RAMAN
SPECTRA.  SILICIDES

IDENTIFIERS:  (U)  WUAFOSR2305A9,  PEB1102F

AD-A150 836

UNCLASSIFIED

SEARCH CONTROL NO. EVLOSA

AD-A150 834 20/4 12/1

BOSTON UNIV NA CENTER FOR COMPUTATIONAL AND APPLIED
DYNAMICS

(U) Flutter Taming - A New Tool for the Aeroelastic
Designer.

DESCRIPTIVE NOTE:  Final rept. 1 Apr 83-30 Apr 84.
JUN 84 77P

PERSONAL AUTHORS:  Morino, L.

REPORT NO.  CCAD-TR-84-01

CONTRACT NO.  AFOSR-83-0183

PROJECT NO.  2307

TASK NO.  D8

MONITOR:  AFOSR
TR-85-0140

UNCLASSIFIED REPORT

ABSTRACT:  (U)  A new concept for the design of
aeroservoelastic systems is introduced: flutter taming by
nonlinear control, i.e., use of nonlinear terms in the
equation to ensure that the behavior of the system beyond
the flutter speed is of benign rather than destructive
nature. This is accomplished by using a very simple
nonlinear control law. It is shown (using a singular
perturbation analysis about the stability boundary) that
flutter taming is always possible for an aeroservoelastic
system that can be represented by a system of nonlinear
differential equations with analytical nonlinearities. It
is important to emphasize it the control system for
flutter taming is fully nonlinear and therefore it does
not affect the linear behavior (in particular the
stability characteristics) of the system. Hence, flutter
taming can be used in conjunction with flutter suppression
by active control to increase the flutter speed.
Applications of the theory to the case of an airfoil in
supersonic flow are presented. In addition to an active
control modification (use of control surface with
nonlinear feedback), passive modifications (e.g. a
nonlinear damper) are also investigated. Originator-
supplied key words include: Nonlinear analysis, and Limit
cycle.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 838 12/1
NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC
PROCESSES
(U) Attainable Rates of Convergence of Maxima,
AUG 84 4P
PERSONAL AUTHORS: Rootzen, H.;
CONTRACT NO.: F49620-82-C-0009
PROJECT NO.: 2304
TASK NO.: A5
MONITOR: AFOSR
TR-85-0142

UNCLASSIFIED REPORT

ABSTRACT: (U) Any exponential rate of convergence can be
obtained for maxima of i.i.d. random variables, while
faster than exponential convergence implies that the
variables have extreme value distribution. Key words
include: Maxima of i.i.d. sequences, Rate of convergence,
and Reprints. (Author)

DESCRIPTORS: (U) *CONVERGENCE, *EXPONENTIAL FUNCTIONS,
*RATES, SEQUENCES (MATHEMATICS), VALUE, DISTRIBUTION,
REPRINTS, RANDOM VARIABLES

IDENTIFIERS: (U) Maxima, WUAOSR2304A5, PE81102F

SEARCH CONTROL NO. EVLOSA

AD-A150 837 7/4 7/5
ROCHESTER UNIV NY DEPT OF CHEMISTRY
(U) Theory of Laser-Induced Surface Chemistry with
Applications to Microelectronics and Heterogeneous
Catalysis,
SEP 84 12P
PERSONAL AUTHORS: Lin, J. T.; Murphy, W. C.; George, T. F.;
CONTRACT NO.: AFOSR-82-0048
PROJECT NO.: 2303
TASK NO.: A2
MONITOR: AFOSR
TR-85-0152

UNCLASSIFIED REPORT

ABSTRACT: (U) Theory and experiments are reviewed for
how laser radiation can stimulate various component
mechanisms which contribute to the complex chemistry
involved in heterogeneous catalysis. These mechanisms
include the processes of adsorption, desorption,
migration and chemical reactions at a gas-solid interface.
Applications of laser-induced surface chemistry to
microelectronics in circuit deposition, lithography,
annealing and final testing of the circuit are discussed.
In addition to the review, some new theory is presented.
Originator-supplied keywords include: Review article,
Laser-induced surface chemistry, Microelectronics,
Heterogeneous catalysis, Adsorption, Migration,
Desorption, Chemical reactions, Lithography, and
Annealing.

DESCRIPTORS: (U) *LASERS, *SURFACE CHEMISTRY,
MICROELECTRONICS, CATALYSIS, HETEROGENEITY, REF-INTS
IDENTIFIERS: (U) WUAOSR2303A2, PE81102F

AD-A150 838

UNCLASSIFIED
PAGE 187 EVLOSA
ABSTRACT: (U) This thesis presents a practical design method for highly-loaded blades in an isolated cascade. The flow is assumed to be incompressible and inviscid. The upstream inlet flow condition is taken to be uniform. The goals of this research are to provide a practical numerical code for the design problem, and a non-linear theory which can be easily expanded to three-dimensions. The theory is based in part on the Clebsch formulation. The blade profile is determined iteratively through the blade boundary conditions using a 'smoothing' technique. A practical numerical code is presented for the design problem using 'partial smoothing'. The program gives very fast convergence solutions with satisfactory accuracy for practical solidity range. Originator-supplied keywords include: Turbomachinery: Cascades; Inviscid flow; and Computational fluid dynamics.

DESCRIPTORS: (U) *TURBINE BLADES, *CASCADE STRUCTURES, INCOMPRESSIBLE FLOW, NONLINEAR ANALYSIS, LOADS(FORCES), COMPUTER AIDED DESIGN, TURBOMACHINERY, INVISCID FLOW, NUMERICAL ANALYSIS, CONVERGENCE, SOLUTIONS(GENERAL), COMPUTATIONS, FLUID DYNAMICS, THEORY, THESES, INLETS

IDENTIFIERS: (U) Computational fluid dynamics, Blade
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 848 20/8 7/4

PITTSBURGH UNIV PA DEPT OF CHEMISTRY

(U) Vibrational Relaxation of Highly Excited Diatomics. IV. HF(v=1-7) + CO2, N2O, and HF, OCT 83 10P

PERSONAL AUTHORS: Dzelzkalns, L. S.; Kaufman, F.

CONTACT NO. AFOSR-80-0207

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-85-0154

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. In Jnl. of Chemical Physics, v79 n8 p3835-3844, 15 Oct 83. See also AD-A150 806.

ABSTRACT: (U) Vibrational relaxation rate constants are measured for HF v=1-4) with Q = CO2, N2O, and HF by the fast flow infrared chemiluminescence technique using four HF(v) generating reactions whose initial vibrational distributions are found to be unrelaxed. The data are combined with earlier results for v = 5, 6, and 7 to provide information on v dependence and quenching mechanism. The rate constants k superscript Q sub V, V-1 range from 1.2 x 10 to the -12 power to 4.5 x 10 to the -10 power cc/s and increase with power law exponents n of 2.7 to 3.0 in directly proportional to V superscript n for all three quenchers. The relaxation is principally V-V for CO2 and N2O, but mainly V-R,T for HF, at least for the higher levels. The relaxation rate constants are compared with theoretical estimates and from a valuable data base for future theoretical work. Originator supplied keywords include: Vibrational relaxation rate constants; Flow infrared chemiluminescence technique; and Vibrational distributions.

DESCRIPTORS: (U) MOLECULAR VIBRATION, CHEMILUMINESCENCE, RELAXATION, DIATOMIC MOLECULES, REACTION KINETICS, HYDROGEN FLUORIDE, CARBON DIOXIDE, NITROUS OXIDE, REPRINTS, QUenching, FLOW, INFRARED RADIATION, CONSTANTS, RATES

AD-A150 848

AD-A150 848 CONTINUED

IDENTIFIERS: (U) PEB1102F WUAFOSR2303B1
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 854 20/11 11/4

FLORIDA UNIV GAINESVILLE DEPT OF ENGINEERING SCIENCES

(U) Stress Distribution of Aligned Short-Fiber Composites under Axial Load,

APR 84 15P

PERSONAL AUTHORS: Sun. C. T.; Wu, J. K.

CONTRACT NO. AFOSR-83-0154

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR

TR-85-0158

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Reinforced Plastics and Composites, v3 p130-144 Apr 84.

ABSTRACT: (U) The objective of this paper is to investigate the normal and interfacial shear stress distribution of short-fiber composites under a force either parallel to the fiber or making some angle with the fiber. Different geometrical shapes of fiber end were taken into account. The geometrical shapes under investigations were: rectangular, semi-circular, V-shaped and wedge-shaped respectively. Analytical solutions of this problem were achieved by using finite-element numerical scheme. Numerical results of normalized stress sigma sub f and shear stress tau were plotted as a function of the coordinate along the fiber direction. It was observed that, the distributions of sigma sub f and tau were in good agreement with existing results obtained experimentally by using photoelasticity method. It was also observed that shear stress concentration is very high near the fiber tip. This phenomenon is particularly true for wedge and V-shaped fiber ends. A possible application of this investigation is to optimize internal damping of short-fiber composites by properly adjusting fiber end geometry. Originator supplied keywords include: Interfacial shear stress; Short-fiber composites; Geometrical shapes; Photoelasticity method; Viscoelastic matrix.

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *SHEAR STRESSES.
ELLIPSES, MATHEMATICAL MODELS, SPATIAL DISTRIBUTION, THREE DIMENSIONAL, EXTERNAL, INTERNAL, SURFACES

IDENTIFIERS: (U) CRAY-1 computers, Body fitted coordinates systems, Elliptic partial differential equations

UNCLASSIFIED

OTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLOSA

AD-A150 855  20/10  12/1

FLORIDA UNIV GAINESVILLE QUANTUM THEORY PROJECT

(U) Coupled-Cluster Methods for Molecular Calculations,

84  34P

PERSONAL AUTHORS: Bartlett, R. J.; Dykstra, C. E.; Paldus, J.

CONTRACT NO. AFOSR-82-0026

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR

TR-85-0074

UNCLASSIFIED REPORT


ABSTRACT: (U) Coupled-cluster (CC) theory for the accurate treatment of electron correlation is presented including its similarities and differences from configuration interaction (CI). Topics addressed include computational aspects of the CC method; extended CC methods that include single, double, and triple excitation operators; and a multi-reference CC technique. Numerical examples illustrate CC results for correlation energies compared to those from full CI and multi-reference CI calculations. (Author)

DESCRIPTORS: (U) *NUMERICAL METHODS AND PROCEDURES, *MOLECULES, COUPLING (INTERACTION), CLUSTERING, QUANTUM THEORY, ELECTRONIC STATES, REPRINTS, CORRELATION, ENERGY, EXCITATION, CONFIGURATIONS, INTERACTIONS
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 888  20/B
FLORIDA UNIV  GAINESVILLE  DEPT OF NUCLEAR ENGINEERING SCIENCES
(U) Feasibility of Optical Instruments Based on Multiaperture Optics.

DESCRIPTIVE NOTE: Final rept. 15 Jun 83-30 Sep 84,
OCT 84 18P

PERSONAL AUTHORS: Cox, J. D.; Schneider, R. T.; Jamed, J. H.

CONTRACT NO.  AFOSR-83-0240

PROJECT NO.  2305

TASK NO.  B1

MONITOR: AFOSR
TR-85-0111

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper deals with a recognition system specialized for low pixel numbers. It is assumed that the image consists of 15 x 15 pixels. Using such a low pixel number, the object is distorted beyond recognition if its straight edges are not lined up with the grid. This is especially important if the previously described method based on interpretation of each pixel row as a binary number is used. Therefore, it is shown that a given image of a randomly oriented object can be rotated by a subroutine requiring only little processing time. The resultant image deviates only to a minute degree from the image which would have been observed with its straight edges lined up with the pixel grid. Originator-supplied key words included: Low Pixel Numbers, Pattern Recognition, Multiaperture Optics, Recognition Coefficient.

DESCRIPTORS:  (U)  *OPTICAL INSTRUMENTS, FEASIBILITY STUDIES, PATTERN RECOGNITION, APERTURES, OPTICS, COEFFICIENTS, SUBROUTINES

IDENTIFIERS:  (U)  Pixels, Multiaperture optics, PE81102F, WUAF05R230581

AD-A150 888

UNCLASSIFIED REPORT

SEARCH CONTROL NO. EVLOSA

AD-A150 861  12/1  20/4  1/3
MISSISSIPPI STATE UNIV  MISSISSIPPI STATE  DEPT OF AEROPHYSICS AND AEROSPACE ENGINEERING


DESCRIPTIVE NOTE: Final rept. 1 Oct 83-30 Sep 84,
OCT 84 63P

PERSONAL AUTHORS: Warsi, Z. U. A.

CONTRACT NO.  AFOSR-80-0185

PROJECT NO.  2304

TASK NO.  A3

MONITOR: AFOSR
TR-85-0148

UNCLASSIFIED REPORT

ABSTRACT: (U) The problem of numerical generation in surfaces and in three-dimensional configurations through elliptic Partial Differential Equations has been pursued under this grant. The developed mathematical model has been programmed on CRAY-1 and has been tested for single and two-body configurations enclosed in a single boundary and for generation of coordinates in a single surface. The main aim of this research has been to develop and implement a technique for the generation of spatial coordinates in 3D regions enclosed by arbitrary smooth surfaces for ultimate use in the numerical solution of the Navier-Stokes equations. In this regard, a mathematical model based on a set of elliptic PDE's has been developed, which has been used to generate smooth coordinates in the region formed by arbitrary inner and outer surfaces of known shapes, around multibodies, particularly around a wing-body combination. These equations have also been used to generate surface coordinates in arbitrary surfaces and are also capable of coordinate redistribution in any desired manner both in 3D regions and in 2D surface regions.

DESCRIPTORS: (U)  *WING BODY CONFIGURATIONS, *GRIDS/COORDINATES, *PARTIAL DIFFERENTIAL EQUATIONS, *VISCOUS FLOW, NUMERICAL METHODS AND PROCEDURES, NAVIER STOKES EQUATIONS, AERODYNAMIC CONFIGURATIONS, ELLIPSOIDS.

AD-A150 881

UNCLASSIFIED

PAGE 162  EVLOSA
Laser Annealing of Ion Implanted HgCdTe.

**ABSTRACT:** (U) The structural and electrical changes caused by the implantation and annealing of donor and acceptor ions into Hg1-xCdTe (x=0.2-0.3) were studied by a variety of ion-beam probing (RBS or PIXE combined with channeling) and electrical (C-V, Hall, photodiodes) techniques. Several annealing procedures (furnace, Q-switched Ruby laser and CW CO2 laser) were tried. Best annealing was obtained when the implanted HgCdTe was heated for 0.4 seconds to 380 deg C by exposing it to a flash of photons delivered by a CW CO2 laser. This novel mode of Rapid Thermal Annealing is shown to recover the crystal structure without causing changes in stoichiometry and to electrically activate both donor (B) and acceptor (P) implants. Mesa and planar p on n photodiodes, sensitive to IR radiation (3.5-5 micrometers), were obtained when this annealing procedure was employed to P implanted (200keV, 2X10 to the 14th power/sq.cm) n-Hg.71Cd.29Te. Originator supplied keywords include: Ion Implantation, Laser annealing, HgCdTe, Radiation damage, Defects in semiconductors.
ABSTRACT: (U) Experimental results of a study to explore millimeter-wave beam-steering by techniques of diffraction are presented. When periodic structures, such as metallic gratings, are brought into proximity with a dielectric waveguide, radiation or reception of radiation at a controlled angle is possible. The direction of the beam is controlled by the period of the grating while the half-power beamwidth is controlled by the total length of the grating. Results are given for a variety of gratings formed by metallic blocks, ferro-fluid, and springs. Photoconductive gratings, varistors, and bulk acoustic wave devices were among other techniques researched in this program. Results indicate that the laser-excited photoconductive grating has promising potential for rapid beam steering. Additional keywords: Silicon, Cadmium, Sulfides, Ferrites, Semiconductors, Gallium arsenides.

DESCRIPTORS: (U) *DIFFRACTION ANALYSIS, *BEAM STEERING, *MILLIMETER WAVES, EXPERIMENTAL DATA, PHOTOCONDUCTIVITY, LASER APPLICATIONS, EXCITATION, ACOUSTIC WAVES, FERRITES, SEMICONDUCTORS, SPRINGS, CADMIUM, DIELECTRICS, WAVEGUIDES, GALLIUM ARSENIDES, GRATINGS(SPECTRA), RADIATION, SILICON, SULFIDES, VARISTORS

IDENTIFIERS: (U) PE81102F, WUA2FOSR230682
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVLOSA

AD-A150 815 6/15

SOUTHERN ILLINOIS UNIV SCHOOL OF MEDICINE SPRINGFIELD

(U) Acute Effects of Anticholinesterase Agents on Pupillary Function.

DESCRIPTIVE NOTE: Progress rept. 15 Mar-15-Sep 84,
SEP 84 14P

PERSONAL AUTHORS: Glasicin,E ;

CONTRACT NO. AFOSR-83-0051

PROJECT NO. 2312

TASK NO. A3

MONITOR: AFOSR

TR-85-0072

UNCLASSIFIED REPORT

ABSTRACT: (U) Three main directions of our research have been pursued. First, we have accumulated new pharmacological evidence for a mechanism of acetylcholine release related to a muscarinic autoreceptor present in the rat iris. Secondly, we have continued our study drug effect on the release of acetylcholine, adding a new group of drugs, the aminopyridines, which enhance calcium ions influx into the neuron. Finally, we have studied the effect of aging on pupillary function and ACh metabolism. These three lines of work have each produced novel and intriguing results which are summarized in the following section. The results described in this report have been communicated at several national and international meetings. The abstracts of the communications are attached to the progress report.

DESCRIPTORS: (U) *CHOLINES, *ACETYLCHOLINE,
*CHOLINESTERASE INHIBITORS, CHEMORECEPTORS, PHYSIOLOGICAL EFFECTS, CALCIUM, IONS, RELEASE, PHARMACOLOGY, METABOLISM, NERVE CELLS, IRIS, RATS

IDENTIFIERS: (U) Muscarinic receptors, PE81102F,
WUAFOSR2312A3

UNCLASSIFIED REPORT

AD-A150 808 12/1

SOUTH CAROLINA UNIV COLUMBIA DEPT OF MATHEMATICS AND STATISTICS

(U) Nonparametric Estimation from Accelerated Life Tests with Random Censorship,

84 14P

PERSONAL AUTHORS: Padgett, W. L ;McNichols, D. T ;

CONTRACT NO. AFOSR-81-0186

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR

TR-85-0144

UNCLASSIFIED REPORT


ABSTRACT: (U) For an accelerated life test, let V sub 1 . . .V sub k denote k fixed accelerated stresses and let V sub 0 be the normal stress. It is assumed that the probability distributions corresponding to the accelerated stresses differ from the nonaccelerated life distribution only by a scale factor. A simple nonparametric consistent estimator of the life distribution at the normal stress is developed for randomly right-censored data. The estimator also applies to accelerated life test data for items with two independent failure modes (or competing risks) at each stress level. An example is given to illustrate the estimation procedure. Reprints. (Author).

DESCRIPTORS: (U) *ACCELERATED TESTING, *LIFE TESTS,
*NONPARAMETRIC STATISTICS, PROBABILITY DISTRIBUTION FUNCTIONs, REPRINTS, STRESSES, EXPERIMENTAL DATA, ESTIMATES, SCALING FACTORS

IDENTIFIERS: (U) *Random censorship. WUAFOSR2304A5,
PE81102F
(U) Vibrational Relaxation of Highly Excited Diatomics. V. The V-V Channel in HF(v)+HF(0) Collisions.

OCT 83 5P

PERSONAL AUTHORS: Dzelzkalns, L. S.; Kaufman, F.;

PROJECT NO. 2303

TASK NO. B1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v70 n7 p3363-3368. 1 Oct 83.

ABSTRACT: (U) The V-V fraction in HF self-relaxation is determined in fast-flow infrared chemiluminescence experiments through the consistent accounting of all HF(v) populations in partially relaxed mixtures. The v-level specific, fractional V-V probabilities f sub v are measured for v = 2 and 3 using the F+H2 and F+CH4, generating reactions, and estimates are obtained for v = 4 to 7 using F+HBr and H+F2 data. A consistent set of f sub v's is 0.55 + or - 0.10, 0.30 + or - 0.10, 0.15 + or - 0.10, and zero for v = 2.3.4. and 5 to 7, respectively. These values are compared with one recent laser measurement for v = 2 and with the theoretical predictions of semiclassical trajectory calculations.

Originator supplied keywords include: HF self-relaxation, Fast-flow infrared chemiluminescence, Semiclassical trajectory calculations.

DESCRIPTORS: (U) HYDROGEN FLUORIDE, MOLECULAR VIBRATION, CHEMILUMINESCENCE, DIATOMIC MOLECULES, RELAXATION, COLLISIONS, REPRINTS, TRAJECTORIES, COMPUTATIONS

IDENTIFIERS: (U) WUAFOSR2303B1, PE61102F

AD-A150 806
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 802 11/9 20/11

TEXAS A AND M UNIV COLLEGE STATION MECHANICS AND
MATERIALS RESEARCH CENTER

(U) Research on Composite Materials for Structural Design.

DESCRIPTIVE NOTE: Final technical rept. 1 Jan 82-15 Feb 84,
APR 84 311P

Harbert, B.;

REPORT NO. MM-4865-84-5

CONTRACT NO. F49620-82-C-0057

PROJECT NO. 2307

TASK NO. 82

MONITOR: AFOSR
TR-85-0228

UNCLASSIFIED REPORT

ABSTRACT: (U) Summarized are research activities related
to advanced fiber reinforced plastics in the areas of
fracture, delamination, distributed damage, residual
stresses, moisture effects, and toughening mechanisms in
elastic and viscoelastic materials. Also included are
abstracts of the six M.S. theses and one Ph.D.
dissertation completed during the project period. The
Appendix contains full papers and additional abstracts of
work done on the project. Additional keywords: Resins,
Adhesives, Fracture(Mechanics), Structural mechanics,
Polymers. (Author)

DESCRIPTORS: (U) *FIBER REINFORCEMENT, *REINFORCED
PLASTICS, STRUCTURAL PROPERTIES, TOUGHNESS, ADHESIVES,
FRACURE(MECHANICS), ELASTIC PROPERTIES, VISCOELASTICITY,
RESIDUAL STRESS, DAMAGE, MOISTURE, COMPOSITE MATERIALS

IDENTIFIERS: (U) PE81102F, WUAFOSR2307B2

AD-A150 802

SEARCH CONTROL NO. EVLOSA

AD-A150 801 8/11 17/10 18/3

RONDOUT ASSOCIATES INC STONE RIDGE NY

(U) Regional Seismic Wave Propagation.

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 82-30 Sep
84,
NOV 84 254P

PERSONAL AUTHORS: Carter, J. A.; Peseckis, L. L.; Pomeroy, P.
W.; Sutton, G. H.;

CONTRACT NO. F49620-83-C-0017, ARPA Order-4493
PROJECT NO. 4493
TASK NO. 01

MONITOR: AFOSR
TR-85-0004

UNCLASSIFIED REPORT

ABSTRACT: (U) Work has involved evaluation of method for
using regional seismic waves, particularly Lg for yield
determination. The Wake Island Hydrophone Array digital
recording continues to provide high quality data.
Polarization and array analyses have been made of
Catskill Seismic Array and Regional Seismic Test Network
data. For continental models, whole waveform synthetics
demonstrate clearly the large dependence of the amplitude
and spectral shape on the focal depth and the smaller
dependence of these factors on focal mechanism. The
broadband digital seismic station, SRNY has been in
operation since 18 May 1984. Digital data are recorded
magnetic cartridge tapes each capable of holding 67
Megabytes or 38 hours of data. Many programs have been
developed for data handling and analysis. Keywords
include: Pn and Sn, Yield determination, and Depth
discrimination.

DESCRIPTORS: (U) *SEISMIC WAVES, *SEISMIC DATA,
*YIELD(NUCLEAR EXPLOSIONS), DETERMINATION, POLARIZATION,
DEPTH, DISCRIMINATION, REGIONS, SEISMIC ARRAYS, NETWORKS,
BROADBAND, WAVE PROPAGATION, REGIONS, UNITED STATES, USSR,
DATA PROCESSING, WAVE ANALYZERS, NUCLEAR EXPLOSION
TESTING, UNDERGROUND EXPLOSIONS, SYNTHESES, EARTH MODELS

IDENTIFIERS: (U) Lg wave propagation, Teleseismic waves.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

Regional seismic waves, Synthetic seismograms, PE82714E,
WUAFOSR448301

AD-A150 801
CONTINUED

AD-A150 800
20/14
12/1

TEXAS UNIV AT AUSTIN GEOTECHNICAL ENGINEERING CENTER

(U) Wave Propagation in Heterogeneous Media.

DESCRIPTION NOTE: Annual rept. 1 Feb 83-15 Feb 84,
JUN 84 197P

PERSONAL AUTHORS: SudhakarKarn, C.

CONTRACT NO. AFOSR-83-0082

PROJECT NO. 2307

TASK NO. C1

MONITOR: AFOSR

TR-85-0099

UNCLASSIFIED REPORT

ABSTRACT: (U) The propagation of stress wave due to a point type excitation in the form of a sinusoidal pulse in an infinite medium with inclusions having different properties is studied. The solution is carried out using the boundary element method in the frequency domain with a discrete Fourier transform. The inclusion-medium interfaces are discretized using a constant element which assumes a uniform stress and displacement field over the element. Studies were conducted primarily with a two-dimensional plane strain model but some were also performed in the three-dimensional case, focusing on the attenuation characteristics and the velocity of the wave in terms of the arrival time for both the free field and the case with inclusions. Results are presented in the form of a dimensionless displacement and arrival times at the target under consideration. With a point excitation, as used in this study, the free field attenuation follows the geometrical damping law for both the two and three-dimensional cases, except at distances in the neighborhood of one wavelength or closer, where a more complex pattern of waves is developed. Originator-supplied keywords: Wave propagation, Effect of Inclusions, Soil dynamics, Propagation velocities, Attenuation.

DESCRIPTORS: (U) +NUMERICAL METHODS AND PROCEDURES,
+STRESS WAVES, +WAVE PROPAGATION, MATHEMATICAL MODELS,
INTERFACES, THREE DIMENSIONAL, DISCRETE FOURIER
TRANSFORMS, FREE FIELD, FREQUENCY, HETEROGENEITY, MEDIA,
ABSTRACT: (U) Combustion efficiency of aluminized propellants in solid rocket motors is reduced by incomplete aluminum combustion and two-phase nozzle flow losses. Combustion of these propellants can produce large Al/Al2O3 agglomerates. As a direct result of agglomerate breakup, the aluminum combustion rate is increased, and the thermal energy released is more efficiently transferred into exhaust kinetic energy. This research sought to obtain physical data to characterize the mechanisms of aerodynamic droplet breakup. Experiments have been completed in which conventional liquids and a liquid metal (mercury) was studied. The primary goal of the conventional liquid experiments was to examine the effect of liquid properties (viscosity and surface tension) on the breakup mechanism, time scale, and fragment size distribution. The goal of the mercury experiments was to examine the effect of the much higher surface tension more characteristic of liquid aluminum. A key element of the experimental effort is the use of nonintrusive laser diagnostics including pulsed laser holography (PLH) and laser Doppler velocimetry (LDV). The exceptional temporal and spatial resolution of PLH provided the ability to resolve the mechanism of breakup and the size distribution of the fragments. LDV was used to determine drop velocity distributions along the nozzle revealing the rapid acceleration of the flattened droplets and then, surprisingly, the milder acceleration of the fragments.

DESCRIPTORS: (U) +DISINTEGRATION, +COMBUSTION, +AERODYNAMICS, +DROPS, PARTICLE SIZE, BURNING RATE.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 791 CONTINUED

ACCELERATION, EFFICIENCY, DISTRIBUTION, ALUMINIZED
PROPELLANTS, INTERFACIAL TENSION, LASER VELOCIMETERS,
LIQUID METALS, HOLOGRAPHY, SOLID PROPELLANT ROCKET
ENGINES, MERCURY, VISCOSITY

UNCLASSIFIED REPORT

AD-A150 773 12/1

NORTH CAROLINA UNIV AT CHAPEL HILL CENTER FOR STOCHASTIC
PROCESSES

(U) Prediction of Stable Processes: Spectral and Moving
Average Representations.

84 21P

PERSONAL AUTHORS: Cambani, S.; Soltani, A. R.

REPORT NO. TR-11

CONTRACT NO. F49620-82-C-0009

MONITOR: AFOSR
TR-85-0143

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Zeitschrift fuer
Wahrscheinlichkeitstheorie und verwandte Gebiete, v66

ABSTRACT: (U) For stable processes which are Fourier
transforms of processes with independent increments, we
obtain a wave decomposition, we characterize their
regularity and singularity, and, in the discrete-
parameter case, we derive their linear predictors. In
sharp contrast with the Gaussian case, regular stable
processes which are Fourier transforms of processes with
independent increments are not moving averages of stable
motion. The currently available representations of
stationary stable processes do not seem well suited for
use in tackling the prediction problem. Here we focus on
those regular stationary stable processes which have
moving average representations, i.e. moving averages
of stable motion, and those which have spectral
representations, i.e. are Fourier transforms of processes
with independent stable instruments.

DESCRIPTORS: (U) *MATHEMATICAL PREDICTION, *FOURIER
TRANSFORMATION, LINEARITY, DECOMPOSITION, STABILITY,
REPRINTS, MOTION, STATIONARY

IDENTIFIERS: (U) Moving average representations,
P681102P, WU2304A5
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 772  12/1  20/4  8/13

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS


DESCRIPTIVE NOTE: Annual rept. 1 Feb 83-31 Jan 84.
APR 84 47P

PERSONAL AUTHORS: Sandhu, R. S.; Aboustit, B. L.; Hong, S. J.

REPORT NO. OSURF-715107-84-2

CONTRACT NO. AFOSR-83-0055

PROJECT NO. 2307

TASK NO. C1

MONITOR: AFOSR
TR-85-0079

UNCLASSIFIED REPORT

ABSTRACT: (U) Numerical performance of Ghaboussi's isoparametric bilinear quadrilateral element, for analysis of quasi-static flow of an incompressible fluid through a linear elastic saturated porous soil, is compared with that of Sandhu's composite element in which the displacement has bi-quadratic interpolation. Application of both procedures to solution of one-dimensional consolidation and plain strain consolidation of the half-space under a strip load shows that Ghaboussi and Wilson's procedure gives results almost identical to those from the higher order element but is significantly more economical to use.

DESCRIPTORS: (U) *SOIL MODELS, *FINITE ELEMENT ANALYSIS, *MATHEMATICAL MODELS, INCOMPRESSIBLE FLOW, LINEARITY, ELASTIC PROPERTIES, SATURATION, POROSITY, DISPLACEMENT, FLUIDS, STATICS

IDENTIFIERS: (U) LPN-OSURF-783420/715927, PE81102F, WUAFOSR2307C1

AD-A150 789

UNCLASSIFIED

SEARCH CONTROL NO. EVLOSA

AD-A150 789  9/2  8/7

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS


DESCRIPTIVE NOTE: Interim rept. 1 Feb 83-31 Jan 84.
JUN 84 163P

PERSONAL AUTHORS: Hiramath, M. S.; Sandhu, R. S.

REPORT NO. OSURF-715107-84-3

CONTRACT NO. AFOSR-83-0055

PROJECT NO. 2307

TASK NO. C1

MONITOR: AFOSR
TR-85-0088

UNCLASSIFIED REPORT

ABSTRACT: (U) The Engineering Approach to dynamic response analysis of saturated sand deposits is investigated. The logic on which the methodology is based is described and implemented in a computer program. Application of the procedure to obtain dynamic response of a saturated sand layer, including pore pressure, shear stress, and acceleration variations under two different ground excitation histories given. Two alternative numerical procedures are investigated. The results are compared with those reported by Finn. Limitations of the approach are discussed. Originator-supplied keywords: Computer Simulation, Dynamic Response, Explosion Effects, Finite Difference Method, Layered Sands, Seepage, Liquefaction, and Seismic Response.

DESCRIPTORS: (U) *COMPUTER PROGRAMS, *COMPUTERIZED SIMULATION, *SANDBED, LIIQUEFACTION, SEEPAGE, DYNAMIC RESPONSE, FINITE DIFFERENCE THEORY, LIMITATIONS, METHODOLOGY, PORE PRESSURE, LAYERS, EXPLOSION EFFECTS, EXCITATION, GROUND LEVEL, NUMERICAL METHODS AND PROCEDURES, DEPOSITS, SATURATION, SHEAR STRESSES

IDENTIFIERS: (U) *Layered sand, LPN-OSURF-783420, LPN-OSURF-715927, PE81102F, WUAFOSR2307C1

AD-A150 789
The Complexity of Reliability Computations in Planar and Acyclic Graphs.

ABSTRACT: (U) The author shows that the problem of computing source-sink reliability is NP-hard, in fact P-complete, even for undirected and acyclic directed source-sink planar graphs having vertex degree at most three. Thus the source-sink reliability problem is unlikely to have an efficient algorithm, even when the graph can be laid out on a rectilinear grid. Keywords include: Reliability, complexity, planar graph, acyclic graph; NP-hard, P-complete.

IDENTIFIERS: (U) Planar graphs, Acyclic graphs, WUAFOSR2304A5, PE61102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 755 CONTINUED

Soot, flames

IDENTIFIERS: (U) Picosecond rate, WUAFOSR2308A3,
PE81102F

SEARCH CONTROL NO. EVLOSA

AD-A150 742 9/2 12/1

MARYLAND UNIV COLLEGE PARK DEPT OF COMPUTER SCIENCE

(U) Functional Analysis of Programs.

DESCRIPTIVE NOTE: Technical rept.

OCT 84 40P

PERSONAL AUTHORS: Hamlet, R. ; Millis, H.

REPORT NO. CS/E-84-008

CONTRACT NO. F49620-83-K-0018

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-85-0054

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Oregon Graduate Center, Beaverton, OR 97006.

ABSTRACT: (U) Analysis of computer programs using a semantics that combines features of the operational and denotational methods is described. The method is an explanatory, analytic tool, a program calculus that allows program meaning to be obtained from program syntax, then compared to a desired meaning by a simple set-theoretic methods. Meanings are functional, sets of ordered (input, output) pairs. A subset of Pascal is used to illustrate the theory. (Author).

DESCRIPTORS: (U) FUNCTIONAL ANALYSIS, COMPUTER PROGRAMS, SYNTAX, CALCULUS, SEMANTICS, SET THEORY

IDENTIFIERS: (U) PE81102F, WUAFOSR2308A2
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

SOUTHERN METHODIST UNIV DALLAS TX DEPT OF GEOLOGICAL SCIENCES

(U) Near-Field Source Characterizations of Explosions.

DESCRIPTIVE NOTE: Annual rept. 15 Oct 83-14 Oct 84.

NOV 84 123P

PERSONAL AUTHORS: Stump, B. W.

REPORT NO. SMUG-1

CONTRACT NO. AFOSR-84-0018

PROJECT NO. 2309

TASK NO. A1

MONITOR: AFOSR

TR-84-1279

UNCLASSIFIED REPORT

ABSTRACT: (U) Work in three areas is summarized in this report. The first deals with the quantification of source burial depth effects as observed in the near-field. The interplay of source burial depth effects with other physical processes is discussed. Preliminary data analysis and synthetics are presented. The increase in P wave amplitude and decrease in Rayleigh wave amplitude with increasing source depth is completely modeled with linear models. The second area of work summarizes a set of forward calculation models attempting to include spall in equivalent elastic source models. The study concludes that energy involved in cylindrically symmetric spall can account for 50% of near source waveforms. Finally the subject of inverse studies of small scaled chemical explosions is presented. The utility of small scaled explosion experiments in determining equivalent elastic sources is shown. The resulting source from a 253 pound chemical explosion in alluvium illustrates the partition of the explosive energy into spherical and cylindrical components. Keywords include: Seismology, explosion sources, equivalent elastic sources, depth of burial, spall, elastic wave propagation.

DESCRIPTORS: (U) *EXPLOSION EFFECTS, *SEISMIC DATA, *SEISMIC WAVES, PRIMARY WAVES(SEISMIC WAVES), SYNTHESIS.

AD-A150 741

UNCLASSIFIED
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY  SEARCH CONTROL NO. EVLOSA

AD-A150 739  21/2  20/4  14/2

SHEFFIELD UNIV (ENGLAND) DEPT OF CHEMICAL ENGINEERING
AND FUEL TECHNOLOGY

(U) Fundamental Study of Three Dimensional Two Phase Flow
in Combustion Systems.

DESCRIPTIVE NOTE: Final rept. 1 Oct 83-30 Sep 84.
NOV 84  181P

PERSONAL AUTHORS: Swithinbank, J. ; Vasquez, S. A.; Wild, P.

CONTRACT NO. AFOSR-84-0011

PROJECT NO. 2308

TASK NO.  A2

MONITOR: AFOSR
TR-85-0082

UNCLASSIFIED REPORT

ABSTRACT: (U) Combustion systems involve the complex
interaction between several fundamental phenomena. In
this investigation, the basic science underlying the
interactions between the two-phase flow, fluid dynamics,
and chemical kinetics have been investigated. The studies
have required the development of new diagnostic systems
and significant progress has been made in the following
areas:- The development of a technique for making
accurate droplet measurements in dense sprays. The
application of this technique to an F101 air blast
atomizer. The use of LDA for the precise characterization
of swirl from the F101 swirler. Development of shear
stress mathematical models for non-isotropic turbulence.
The application of this model to the F101 swirler. The
development of a mercury vapour pulse tracer for
residence time distribution measurement in combustors.
The development of a mathematical modelling technique
whereby the residence time distribution can be computed.
Closing of the gap between stirred reactor models and
finite difference models of combustion systems. Proposal
of a new fundamental approach to the problem of
simultaneous mixing and reaction using a quantitative
coalessence/dispersion eddy concept which has the
potential to represent all the high order correlations of
the interaction. Originator-supplied keywords include:

Combustion modelling; Droplet sizing; Swirling flow;
Algebraic stress modelling.

DESCRIPTORS: (U) *REACTION KINETICS; *COMBUSTION; *TWO
PHASE FLOW; THREE DIMENSIONAL FLOW; PARTICLE SIZE;
ATOMIZATION; COMBUSTORS; SPRAYS; FINITE DIFFERENCE THEORY;
MATHEMATICAL MODELS; DROPS; FLUID DYNAMICS; TURBULENCE;
SHEAR STRESSES

IDENTIFIERS: (U) Swirling flow. PE81102F. WUAFOSR2308A2

AD-A150 739  CONTINUED
produces a model with smoothly varying effective parameters for mass density, local tension, and damping that represents a flexible structure with a uniform homogenized internal structure. Originator-supplied keywords include: Active controls; Vibration control; Distributed feedback control; Spectral methods.

DESCRIPTORS: (U) CONTROL SYSTEMS, FLEXIBLE STRUCTURES, MATHEMATICAL MODELS, VIBRATION, CONTROL THEORY, FEEDBACK, DISTRIBUTION, OPTIMIZATION, LINEAR SYSTEMS, STABILIZATION SYSTEMS, TRAVELING WAVES, TWO DIMENSIONAL, DYNAMIC RESPONSE, STRUCTURAL ANALYSIS, PERIODIC VARIATIONS, NUMERICAL METHODS AND PROCEDURES, ALGORITHMS, HOMOGENEITY, MASS, ESTIMATES

IDENTIFIERS: (U) Weiner-Hopf methods, Active controls, Vibration control, Distributed feedback control, Homogenization, Lattice structure, Periodicity, Spectral methods, Asymptotic analysis, Large flexible structures. PEB1102F, WUA05R3005A1
UNCLASSIFIED
DTIC REPORT BIBLIOGRAPHY
AD-A150 733 21/9. 2 21/2 20/13 14/2
SYSTEMS RESEARCH LABS INC DAYTON OH RESEARCH APPLICATIONS DIV
DESCRIPTIVE NOTE: Annual progress rept. 1 Aug 83-1 Aug 84.
DEC 84 27P
PERSONAL AUTHORS: Goss, L. P.; Smith, A. A.
CONTRACT NO. F49620-83-C-0138
PROJECT NO. 2308
TASK NO. A2
MONITOR: AFOSR TR-85-0077

UNCLASSIFIED REPORT
ABSTRACT: (U) Three rare-earth-ion crystals were shown to be good candidates for surface temperature measurements on energetic materials by laser-induced fluorescence. Dy3+:LaF3 displays a thermalization process with an energy gap of 1070/cm, resulting in a fluorescence intensity change of approx. 200 over a 700-K temperature range. Cr3+:Al2O3 (ruby) displays an extreme temperature sensitivity to the lifetime of the R-fluorescence lines. The lifetimes are observed to change by a factor of approx. 200 over a 500-K temperature range. Er3+:CaF2 shows a temperature sensitivity of 20 over a temperature range of 700 K, as measured by the lifetime of its energy level fluorescence line. Originator supplied keywords include: Surface-temperature measurement, Laser-induced fluorescence, Solid-fuel propellants, Rare-earth ions, Nonintrusive evaluation, Optical diagnostics.

DESCRIPTORS: (U) *COMBUSTION, *LASER INDUCED FLUORESCENCE, *SOLID PROPELLANTS, *SURFACE TEMPERATURE, IONIC CRYSTALS, MEASUREMENT, DIAGNOSISGENERAL, OPTICAL ANALYSIS, SOLID FUELS, RARE EARTH ELEMENTS

IDENTIFIERS: (U) WUHFOSR2308A2, PE81102F

AD-A150 706 20/8 7/2
JET PROPULSION LAB PASADENA CA
(U) Theoretical and Experimental Studies of Stabilized Metastable Helium.
DESCRIPTIVE NOTE: Final rept. 1 May-30 Sep 84.
NOV 84 8P
PERSONAL AUTHOR: Zmudzinas, J. S.
CONTRACT NO. AFOSR-ISSA-84-00049
PROJECT NO. 3208, 2301
TASK NO. A1
MONITOR: AFOSR TR-85-0011

UNCLASSIFIED REPORT
ABSTRACT: (U) Numerical calculations have shown that the atomic phase of He IV (bulk spin-polarized triplet helium) should have a face-centered cubic crystals structure. A new, metallic phase of He IV has been discovered and shown to have lower energy than the atomic phase. A fundamental model of metallic He IV has been formulated which includes electron spin-spin and spin-orbit interactions as well as the coupling to the radiation field. The problem of metastability of metallic He IV has been formulated mathematically and will be used for future numerical calculations. A physical mechanism has been identified which might be instrumental in stabilizing metallic He IV. Originator supplied keywords include: Metastable helium; Energy storage; Spin polarization; Metastability; Collective effects.

DESCRIPTORS: (U) *HELIUM, *METASTABLE STATE, PHASE MODELS, NUMERICAL ANALYSIS, METALS, POLARIZATION, SPIN STATES, STABILIZATION

IDENTIFIERS: (U) PE81102F, WUAFOSR2301A1

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DTIC REPORT BIBLIOGRAPHY

AD-A150 696  11/6  11/3

PITTSBURGH UNIV PA DEPT OF METALLURGICAL AND MATERIALS ENGINEERING


DESCRIPTIVE NOTE:  Annual rept. no. 4, 1 Jan 83-1 Jan 84, DEC 84  64P

PERSONAL AUTHORS:  Ashary, A.; Meier, G. H.; Pettit, F. S.

PROJECT NO.  AFOSR-80-0089

UNCLASSIFIED

PROJECT NO.  2306

UNCLASSIFIED REPORT

UNCLASSIFIED

IDENTIFIERS:  (U)  PEB1102F, WUAFOSR2306A2

SUPPLEMENTARY NOTE:  Original contains color plates. All DTIC and NTIS reproductions will be in black and white.

ABSTRACT:  (U)  Alloy systems have been investigated to determine the reaction product barriers that can be used to provide optimum resistance to high temperature oxidation. The reaction product barriers which can be used are Al(2)O(3), Cr(2)O(3), and SiO(2) with the use of Cr(2)O(3), being restricted to below about 1000 C due to formation of volatile products. The oxidation of nickel-silicon alloys has been studied over the internal 800-1100 C. Compositions of 20-22.5 Si have been found to form protective, adherent scales of SiO(2). The oxidation resistance of these alloys appears to be comparable to the most oxidation resistant alumina-forming alloys. The cracking and spalling of Al(2)O(3) scales from alloys has been described by using acoustic emission analyses to conventional analytical techniques. It has been found that acoustic emission counts can be used to indicate the damage in alumina scales. A mechanism to describe the oxidation of oxygen active elements in alloys has been developed. The effects of yttrium and hafnium on the adherence of Al(2)O(3) to NiCrAl and CoCrAl alloys has been compared. It is shown that the concentration of the oxygen active elements and the substrate composition are significant factors affecting oxide scale adherence.

AD-A150 696  CONTINUED

Originator supplied keywords include Silica scales; Isothermal oxidation; Cyclic oxidation; Acoustic emission experiments.


AD-A150 696  PAGE 187  EVLOSA
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DTIC REPORT BIBLIOGRAPHY

AD-A150 589 12/1

PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS

(U) On Limit of the Largest Eigenvalue of the Large Dimensional Sample Covariance Matrix.

DESCRIPTIVE NOTE: Technical report.

OCT 84 20P

PERSONAL AUTHORS: Yin, Y. G.; Bai, Z. D.; Krishnaiah, P. R.;

REPORT NO. TR-84-44

CONTRACT NO. F49620-82-K-0001

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR

TR-85-0008

UNCLASSIFIED REPORT

ABSTRACT: (U) The authors showed that the largest eigenvalue of the sample covariance matrix tends to a limit under certain conditions when both the number of variables and the sample size tend to infinity. The above result is proved under the mild restriction that the fourth moment of the elements of the sample sums of squares and cross products (SP) matrix exist. Key words include: Largest eigenvalue, Sample covariance matrix, Large dimensional random matrices. Limit.

DESCRIPTORS: (U) *Matrices(Mathematics). *Eigenvalues. Covariance

IDENTIFIERS: (U) WUAFOSR2304A5, PE81102F

Ad-A150 589

UNCLASSIFIED

SEARCH CONTROL NO. EVLOSA

AD-A150 588 20/5

MASSACHUSETTS INST OF TECH CAMBRIDGE RESEARCH LAB OF ELECTRONICS


JUL 84 5P

PERSONAL AUTHORS: Fajans, J.; Bekefi, G.; Yin, Y. Z.; Lax, B.;

CONTRACT NO. AFOSR-84-0026

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR

TR-85-0058

UNCLASSIFIED REPORT


ABSTRACT: (U) The outstanding capabilities of free-electron lasers (FEL) include their inherent tunability, high radiation levels, and reasonable efficiencies. It is predicted that frequency tuning of coherent, narrow-band radiation can be achieved by changing the accelerator voltage. In this paper we present what we believe is the first detailed study of the frequency versus voltage tuning of both the high- and low-frequency branches of the FEL instability under high-current-density, collective (Raman) operation, where the gain and efficiency are expected to be large. We report narrow-band spectra (delta ohms/ohms approx. 0.02) from a tunable (7 < rho< ohms/2 pi < or= 18 GHz), Raman, free-electron laser operating in a single TE11 waveguide mode, rf power levels of 100 kW at an efficiency of approx. 12% have been achieved. Measured dispersion characteristics are in good agreement with theory.

DESCRIPTORS: (U) *Tunable lasers, *Raman spectra, *Free electron lasers, Coherent radiation, Voltage, Frequency, Tuning, Narrowband, Reprints

IDENTIFIERS: (U) WUAFOSR2301A1, PE81102F

Ad-A150 588

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**DTIC REPORT BIBLIOGRAPHY**

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<td><strong>GOETTINGEN UNIV (GERMANY) INST Fuer PHYSIKALISCHE CHEMIE</strong></td>
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<tr>
<td>(U) Initiation, Stability and Limits of Detonation for Advanced Stable Airbreathing and Hybrid Propulsion Engine Design.</td>
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<td><strong>DESCRIPTIVE NOTE:</strong> Final rept. 15 Mar 82-14 Mar 83, MAY 83 29P</td>
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<td><strong>PERSONAL AUTHORS:</strong> Wagner, H. G.; Jost, W.;</td>
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<td><strong>CONTRACT NO.</strong> AFOSR-82-0145</td>
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<td><strong>MONITOR:</strong> AFOSR TR-84-1274</td>
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**UNCLASSIFIED REPORT**

**ABSTRACT:** (U) The influence of orifices on the propagation of flames in tubes has been investigated by measuring flame speeds and pressure on both sides of the orifice and by taking smear camera pictures of the flames passing through the orifice. In addition the jet ignition process was stimulated by igniting high speed jets of turbulent unburned gas with electric sparks. Pressure-time profiles and smear camera pictures give information about the flame speed in gases with very high degrees of turbulence. Originator furnished keywords include: Flames, Combustion, Detonation, Orifice plates, Initiation, Stability. |


**IDENTIFIERS:** (U) WUAFOSR23088A2, PE81102F
(U) Clustering and Ordering in III-V Alloys.

DESCRIPTION NOTE: Annual rept. 1 Jun 83-31 May 84.

PERSONAL AUTHORS: Wolfe, C. M.; Muller, M. W.; Fedders, P. A.; Hsieh, S. J.; Patten, E. A.;

REPORT NO. WU/SRL-59583A-3

UNCLASSIFIED REPORT

ABSTRACT: (U) The III-V semiconducting alloys are typically grown by epitaxial techniques at temperatures where, in the absence of substrate effects, they are thermodynamically unstable. This can result in problems associated with clustering of like atoms or ordering of unlike atoms. Long-range ordering could yield interesting III-V ternary compounds. The mixing enthalpy of III-V semiconductor alloys is fairly well described by regular solution theory, with a thermodynamic interaction parameter that is sensitive to the lattice spacing of the binary constituents. An estimate of the interaction parameter is derived from a model which ascribes the mixing enthalpy to bond distortions associated with the alloy formation, and relates these to the macroscopic elastic properties of the crystal. Numerical estimates are given for the 18 alloys with cations Al, Ga, In and anions P, As, Sb, and these are compared with experimental values and alternative models. To within a single adjustable parameter, the predictions agree with experiment and are consistent with those of the delta lattice parameter (DLP) model. Originator furnished keywords include: Alloy composition; Fluctuations; Ordering; InxGa1-xP; GaAs; ZnSnP2; Crystal structure; Chalcopyrite; Heterojunctions; Interfacial energy gaps.
ACUTE EFFECTS OF ANTI-CHOLINESTERASE AGENTS ON PUPILLARY FUNCTION

ABSTRACT: (U) The effect of anticholinesterase agents on pupillary function and parameters of cholinergic activity were investigated both in vitro and in vivo following topical administration. The study describes changes in three different aspects of cholinergic function: (1) uptake of choline, (2) release of acetylcholine and (3) AChE activity and pupil size. Our results are consistent with the concept of existence of a presynaptic muscarinic autoreceptor which is affected (DFP directly or through acetylcholine). DFP exerts multiple effects on various cholinergic parameters.


IDENTIFIERS: (U) Cholinergic effects, PE81102F, WUAFOSR2312A3
Iteration of Expansions - Unambiguous Semigroups.

ABSTRACT: (U) New expansions for global semigroup theory are developed. Many expansions have a left and a right version, each with specific (dual) properties; e.g., the Rhodes expansion have unambiguous order. In applications one sometimes needs expansions having both properties simultaneously; these can be constructed by alternately applying the left and the right expansion (possibly infinitely often) while keeping the same set of generators. Thus one obtains an expansion which is invariant under application of the old two expansions and thus has the properties of both. It is proved that, in the case of the Rhodes expansion, the new expansion is close to the original semigroup.

DESCRIPTORS: (U) Matrices(Mathematics), Random variables, Covariance, Expansion, Reprints

IDENTIFIERS: (U) PE81102F, WJAFO5R2304A4
fraction on the tensile modulus, fracture strength and
fracture strain under impact loading has been determined.
A preliminary study of the failure processes using
optical and scanning electron microscopy has been
undertaken.

DESCTIPTORS: (U) Fiber reinforced composites, Tension,
&Stress strain relations, Projectiles, Tensile properties,
Epoxy compounds, Fracture(Mechanics), Mats, Electron
microscopy, Gas guns, Strain rate, Stress waves, Impact
tests

IDENTIFIERS: (U) Hybrid fraction. PE81102F.
WUAFOSR230781

UNCLASSIFIED REPORT

ABSTRACT: (U) This British report describes a small gun
projectile bar, capable of accelerating a projectile length by 25
mm dia. to about 50m/s, and an extended split Hopkinson
pressure bar apparatus which have been designed and
constructed for the tensile impact testing of fibre-
reinforced composite specimens at strain rates of the
order of 1000/s. Commissioning tests have shown
equilibrium in the specimen to be obtained at an early
stage in the test and the effects of stress wave
reflections in the specimen grip regions on the
calculated stress-strain response to be negligibly small.
A technique has been developed for the preparation of low
volume fraction 'model' hybrid specimens,
unidirectionally reinforced with a single layer of fibre
yarns, alternately of glass and of carbon fibres.
Specimens are also prepared from commercially
supplied carbon/glass and carbon/kevlar epoxy plates with
different stacking sequences for the carbon and glass or
carbon and kevlar reinforcing mats to allow specimens
with a range of hybrid fractions. In initial impact tests
on the 'model' specimen tensile failures were obtained
but with a trend for fracture close to the specimen/
loading bar interface rather than in the centre of the
parallel gauge section. Even so, a marked increase in
fracture strength with strain rate was observed. Initial
tests have also been performed on the woven reinforced
carbon/glass hybrid specimens and the effect of hybrid

UNCLASSIFIED
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 622  20/14  20/8
NEW MEXICO UNIV ALBUQUERQUE
(U) Nonrelativistic Kapitza-Dirac Scattering.
84     58P
PERSONAL AUTHORS:  Coutsius, E. A.; McIver, J. K.;
CONTRACT NO.  AFOSR-82-0277
MONITOR:  AFOSR
TR-85-0088

UNCLASSIFIED REPORT

ABSTRACT: (U) We use techniques of Singular Perturbation
theory to investigate the scattering of nonrelativistic
charged particles by a standing light wave (Kapitza-Dirac
scattering). Unlike previous treatments, we give explicit
results for the effects of the time dependent part of the
field. For low field intensity/low particle energy we
show that the leading order effects can be found from an
averaged equation and we compute corrections. For the
strong fields that can be produced by modern lasers and / or
high particle energies we show that the time
dependence of the potential leads to focusing. Our
methods can be applied to other problems with time-
periodic potentials.

DESCRIPTORS: (U) *Light scattering, *Standing waves,
Charged particles, Energy, Lasers, Time dependence
IDENTIFIERS: (U) *Kapitza Dirac scattering

SEARCH CONTROL NO. EVLOSA

AD-A150 621  12/1

ILLINOIS UNIV AT CHICAGO CIRCLE
(U) Optimal Designs for Comparisons between Two Sets of
Treatments.
DESCRIPTIVE NOTE:  Technical rept.,
OCT 84     27P
PERSONAL AUTHORS:  Majumdar, D.;
REPORT NO.  TR-84-7
CONTRACT NO.  AFOSR-80-0170
PROJECT NO.  2304
TASK NO.  A5
MONITOR:  AFOSR
TR-85-0008

UNCLASSIFIED REPORT

ABSTRACT: (U) Suppose $v$ treatments are to be compared in
$b$ blocks of size $k$ each. Also suppose that the treatments
are divided into 2 sets of $u$ and $w = v - u$ treatments. A-
optimal designs are obtained for estimating all the
differences of two treatments, one from each set. Optimal
row-column designs are also obtained. Some new optimal
designs for comparing several treatments with a single
control are obtained as special cases. Key words include:
A-optimal designs, block designs, row-column designs,
comparisons between two sets of treatments, control-
treatment comparisons, several controls. (Author)

DESCRIPTORS: (U) *Set theory, Optimization, Control
IDENTIFIERS: (U) PE61102F, WUAF05R2304A5
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 685 12/1

MASSACHUSETTS UNIV AMHERST DEPT OF MATHEMATICS AND STATISTICS

(U) Weak Convergence of a Sequence of Queueing and Storage Processes to a Singular Diffusion.

DESCRIPTIVE NOTE: Technical rept.

NOV 84 18P

PERSONAL AUTHORS: Rosenkrantz, W. A.

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-85-0056

UNCLASSIFIED REPORT

ABSTRACT: (U) It has been known for a long time that heavy traffic limit theorems in queueing theory are but a special case of the so-called diffusion approximation in Physics and Genetics. Take for example Kingman's (1962) heavy traffic approximation for the stationary waiting time distribution for a sequence of GI/GI/1 queues Q(\sigma) depending on a parameter \sigma. Denote the waiting time, excluding service, or the nth customer by W(n, \sigma) and let U(n, \sigma) = S(n, \sigma) - T(n, \sigma), where S(n, \sigma) = service time of the nth customer and T(n, \sigma) = interval arrival time between the nth and (n + 1)st customer and assume E(U(n, \sigma)) = variance of U(n, \sigma) = \sigma squared, \sigma > 0.

DESCRIPTORS: (U) *SEQUENCES (MATHEMATICS), *QUEUEING THEORY, TIME INTERVALS, GENETICS, PARAMETERS, DIFFUSION, STORAGE, WEAK CONVERGENCE, TRAFFIC, PHYSICS, DISTRIBUTION, TIME

IDENTIFIERS: (U) Heavy traffic limit theorems, Waiting time, Customers, PE81102F, WUAFOSR2304A5

SEARCH CONTROL NO. EVLOSA

AD-A150 649 20/8 20/5

NEW MEXICO UNIV ALBUQUERQUE DEPT OF MATHEMATICS AND STATISTICS

(U) Nonrelativistic Kapitza-Dirac Scattering.

DESCRIPTIVE NOTE: Technical rept.

NOV 84 57P

PERSONAL AUTHORS: Coutsi, E. A.; McIver, J. K.

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR TR-85-0068

UNCLASSIFIED REPORT

ABSTRACT: (U) The authors use techniques of Singular Perturbation theory to investigate the scattering of nonrelativistic charged particles by a standing light wave (Kapitza-Dirac scattering). Unlike previous treatments, they give explicit results for the effects of the time dependent part of the field. For low field intensity/low particle energy they show that the leading order effects can be found from an averaged equation and they compute corrections. For the strong fields that can be produced by modern lasers and/or high particle energies they show that the time dependence of the potential leads to focusing. Their methods can be applied to other problems with time-periodic potentials. (Author).

DESCRIPTORS: (U) *CHARGED PARTICLES, PERTURBATION THEORY, TIME DEPENDENCE, LASERS, HIGH ENERGY

IDENTIFIERS: (U) Kapitza-Dirac scattering, WUAFOSR2304A4, PE81102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 681  5/1  12/1

OKLAHOMA STATE UNIV  STILLWATER OFFICE OF BUSINESS AND ECONOMIC RESEARCH

(U) Some Recent Developments in Systems Reliability.

DESCRIPTIVE NOTE: Final rept. 1 Jul 83-30 Sep 84.

JAN 85  45P

PERSONAL AUTHORS: Locks, M. O.

REPORT NO. 0SU-0BER-85-1

PROJECT NO. AFOSR-82-0251

TASK NO. A5

MONITOR:  AFOSR

TR-85-0094

UNCLASSIFIED REPORT

ABSTRACT: (U) System reliability analysis calculates the probability of success for a system, based on the component reliabilities and the configuration. First, a logic function is obtained in the form of either a tree, chart, graph, diagram or list of paths. From this logic function a probability formula is derived. The classical or conventional method of generating a formula is inclusion-exclusion (IE). With the past decade there have been some significant new developments that resulted in ways to estimate the system reliability that are more efficient than IE. Two of these techniques are discussed in this paper: sum of disjoint products (SDP), and the topological reliability (TR) of Satyanarayana and Prabhakar (SAP). This paper covers the theory and procedures of both techniques, shows their interrelationships with IE, and discusses complexity considerations and computer time needed for preparation of a system formula. The discussion on TR also includes advanced applications such as overall reliability and k-terminal reliability, classes of problems that can conveniently be solved by TR with minor modification of the logic. Originator key words include: System reliability; inclusion-exclusion; sum of disjoint products; topological reliability; m-out-of-n; source-to-multiple terminal reliability. (Author)
the loss of ionization energy (carried by the ions) to the emitter. Therefore these emitter sheath phenomena increase arc drop. Within the limitations of the current thermionic converter formulation, all three of these phenomena (which become significant at low currents) steepen the current-voltage characteristic.

DECRIPTORS: (U) *EMITTERS, *PLASMAS(PHYSICS), *PLASMA SHEATHS, *THERMIonic EMISSION, ELECTRON ENERGY, IONS, DENSITY, REFLECTION, DISTRIBUTION, THeses, STRUCTURAL PROPERTIES

IDENTIFIERS: (U) *Emitter sheath phenomena, Plasma density, Surface emission ions, PE81102F, WUAFOSR2301K2
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 687 20/4

MISSISSIPPI STATE UNIV MISSISSIPPI STATE DEPT OF AEROPHYSICS AND AEROSPACE ENGINEERING

(U) Transonic Merging Separated Flows.

DESCRIPTIVE NOTE: Final rept. 1 May 83-30 Apr 84.

JUL 84 98P

PERSONAL AUTHORS: Koenig.K.

CONTRACT NO. AFOSR-83-0179

PROJECT NO. 2307

TASK NO. D9

MONITOR: AFOSR
TR-85-0098

UNCLASSIFIED REPORT

ABSTRACT: (U) This study considers an arrangement of a plane-nosed circular cylinder with a smaller diameter plane-nosed cylindrical probe coaxially extending ahead in a transonic axial flow. This configuration is a prototype for a low drag forebody replacing more conventional streamlined nose fairings. Apparently only one previous study is available in open literature which clearly shows reductions in transonic forebody drag for such arrangements. In view of the lack of data on transonic flow past probe/cylinder configurations, an attempt is made to construct the flow field based on data for related and component flows. The flow is modeled as the merging of several component, separated flows. Component flows are axisymmetric plane-nosed cylinders and axisymmetric forward-facing steps. Related flows include rearward-facing steps, cavities and bases. Relatively little data are available in the open literature concerning transonic flow past any of these arrangements, especially for axisymmetric geometries. The data which is available is discussed for insights which might be gained regarding probe/cylinder flows; emphasis is given to a plane-nosed cylinder flows and the opening phenomenon associated with cavity flows. A simple, semi-empirical free streamline model is developed for the postulated flow field of a low-drag probe/cylinder configuration. Partial agreement with inferences from related experimental data is obtained.

AD-A150 687

AD-A150 687

UNCLASSIFIED

SEARCH CONTROL NO. EVLOSA

AD-A150 687 CONTINUED

DESCRIPTORS: (U) *TRANSONIC FLOW, *FLOW SEPARATION, COAXIAL CONFIGURATIONS, MATHEMATICAL MODELS, NOSES, AXISYMMETRIC, FLOW FIELDS, CAVITIES, CYLINDRICAL BODIES, LOW DRAG, PROBES, STREAMLINE SHAPE, AXIAL FLOW

IDENTIFIERS: (U) Low drag forebodies, Merging flow, Forward facing steps, Rearward facing steps, Plane nosed cylinder flow, Cavity flow. PEB1102F, WUAFDR2307D9
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

ROCKWELL INTERNATIONAL THOUSAND OAKS CA
MICROELECTRONICS RESEARCH AND DEVELOPMENT CENTER

(U) AIN Insulator for III-V MIS Applications

DESCRIPTIVE NOTE: Final rept. 1 Jul 82-30 Jun 84.
NOV 84 58P

PERSONAL AUTHORS: Elliott, K. R.; Grant, R. W.;

CONTRACT NO. F49620-82-C-0034
PROJECT NO. 2306
TASK NO. B1
MONITOR: AFOSR
TR-85-0091

UNCLASSIFIED REPORT

ABSTRACT: (U) The use of AIN as an insulator for GaAs
MIS structures was investigated. The AIN films were
prepared by reactive evaporation in an ultra-high vacuum
system. Aluminum from a MBE source was reacted with NH3
from an effusion cell on a heated GaAs substrate. Several
material preparation variables were investigated which
included choice of substrate, substrate surface
preparation, growth temperature, A1/NH3 flux ratio, and
deposition rate. The optimum AIN film growth parameters
in terms of morphology and adhesion were found to involve
use of thermally cleaned GaAs substrates, a 500-550 C
substrate growth temperature, an effective NH3 partial
pressure of 0.00005 to 0.00001 Torr at the GaAs surface,
and a growth rate of about 100 Å/min. The AIN prepared in
this manner was stoichiometric, polycrystalline, had the
hexagonal wurtzite structure, and had no detectable
oxygen or carbon contamination as determined by x-ray
diffraction, TEM far infrared transmission, and in situ
Auger electron spectroscopy. The insulating properties of
the AIN/GaAs MIS structures appeared to depend
on preparation conditions. It was concluded from several
studies that small amounts of undetectable residual
oxygen contamination were most likely responsible for the
observed variation in AIN conductivity. Complex C-V
results were obtained for most AIN/GaAs MIS structures
which most likely were influenced by large interface
density, leakage, and charge storage effects. No
definitive correlation between AIN/GaAs preparation
parameters and interface state charge densities was
obtained. Processes were developed to fabricate both
gated diodes and MISFET's from AIN/GaAs samples.

DESCRIPTORS: (U) INSULATION, SEMICONDUCTORS, ALUMINUM
COMPOUNDS, ADHESION, AUGER ELECTRON
SPECTROSCOPY, FILMS, GROWTH (GENERAL), PARAMETERS,
ALUMINUM, CARBON, CONTAMINATION, DEPOSITION, RATES,
ELECTRICAL PROPERTIES, GALLIUM ARSENIDES, DENSITY,
INTERFACES, OXYGEN, PREPARATION, RESIDUALS, MORPHOLOGY, X
RAY DIFFRACTION, SUBSTRATES, ULTRAHIGH VACUUM

IDENTIFIERS: (U) WUAFOSR2306B1, PE81102F

UNCLASSIFIED
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 875  20/4  14/2

STANFORD UNIV  CA HIGH TEMPERATURE GASDYNAMICS LAB

(U) Advanced Diagnostics for Reacting Flows.

DESCRIPTIVE NOTE: Annual scientific rept. 1 Oct 83-30 Sep 84.

DEC 84  89P

PERSONAL AUTHORS: Hanson, R. K.

CONTRACT NO. F49620-83-K-0004

PROJECT NO. 2308

TASK NO.  A3

MONITOR: AFOSR

TR-85-0086

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates; All DTIC and NTIS reproductions will be in black and white.

ABSTRACT: (U) Progress is reported for the fourth year of an interdisciplinary program to innovate modern diagnostic techniques applicable to reacting and plasma flows. Research topics include: 1) fiber optic absorption/fluorescence sensors employing tunable ultraviolet, visible and infrared laser sources for species measurements; 2) wavelength-modulation spectroscopy, using rapid-scanning ultraviolet, visible and infrared laser sources, for absorption and fluorescence measurements of species, temperature and absorption lineshapes; 3) quantitative flow visualization, including temporally and spatially resolved species and temperature measurements in a plane, using laser-induced fluorescence; 4) quantitative particle visualization in spray flames using Mie scattering; 5) multiple-point velocity visualization; 6) advanced solid-state cameras/computer systems for high speed and high-resolution recording, processing and display of flow visualization data; 7) plasma diagnostics utilizing planar laser-induced fluorescence and wavelength modulation techniques; 8) optical processing and phase conjugation studies; and 9) investigation of other diagnostic concepts. Originator-supplied keywords include: Combustion; Flame; Diagnostics; Temperature; Infrared; Visible; Spectroscopy.
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 689  20/5  20/8

OPTICAL SOCIETY OF AMERICA WASHINGTON D C

(U) Second Topical Meeting on Laser Techniques in the Extreme Ultraviolet.

DESCRIPTIVE NOTE: Final rept. 1 Oct 83-10 Jan 85.

JAN 85  140P

PERSONAL AUTHORS: Quinn, J. W.;

CONTRACT NO. AFOSR-84-0012

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR

TR-85-0080

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Presented at the Topical Meeting on Laser Techniques in the Extreme Ultraviolet, Boulder, CO 5-7 Mar 84.

ABSTRACT: (U) The topical meeting on Laser Techniques in the Extreme Ultraviolet dealt with the development of sources of high energy photons produced by direct lasing action, nonlinear mixing, and laser produced plasmas; basic research relevant to molecular physics; and selected novel applications such as holography and x-ray lithography. The conference also addressed novel spectroscopic techniques applicable in the extreme ultraviolet. Topics covered include: laser produced xuv radiation sources; high resolution and excited state spectroscopy; harmonic generation and frequency conversion; multiphoton excitation and ionization studies; laser-synchrotron experiments; soft x-ray lasers; anti-stokes Raman techniques; and xuv reflectors and optics. (Author).

DESCRIPTORS: (U) *LASER APPLICATIONS, *FAR ULTRAVIOLET RADIATION, RAMAN SPECTRA, HARMONIC GENERATORS, IONIZATION, LASERS, EXCITATION, PHOTONS, OPTICS, SPECTROSCOPY, FREQUENCY CONVERSION, HIGH ENERGY, HOLOGRAPHY, MOLECULAR PROPERTIES, SYNCHROTRONS, REFLECTORS, LITHOGRAPHY, X RAYS

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A1

AD-A150 689

UNCLASSIFIED

SEARCH CONTROL NO. EVLOSA

AD-A150 689  11/9

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) Polysilastyrine: Phenylmethylsilane-Dimethylsilane Copolymers as Precursors to Silicon Carbide. 83 TP


CONTRACT NO. AFOSR-78-3570

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR

TR-85-0043

UNCLASSIFIED REPORT


ABSTRACT: (U) Cocondensation of phenylmethyl-SiC12 and dimethyl-SiC12 with sodium metal in toluene leads to copolymers of the formula (Me2Si)x(PhMeSi) n, where x = 0. 6 to 1.4 (polysilastyrine). Synthesis and some physical properties are described for the polymer, which can be molded, cast into films, or drawn into fibers. Exposure of the solid polymer to ultraviolet light leads to crosslinking. The crosslinked polymer can be thermolized to silicon carbide by heating above 800 C in an inert atmosphere. Originator supplied keywords include: polysilanes, photocrosslinking.

DESCRIPTORS: (U) *POLYSILANES, *SILICON CARBIDES, *STYRENES, COPOLYMERS, PRECURSORS, CROSSLINKING CHEMISTRY, CONDENSATION, PHENYL RADICALS, METHYL RADICALS, REPRINTS

IDENTIFIERS: (U) Polysilastyrine, Phenylmethyl silane, Dimethyl silane. WUAFOSR2303B2, PE81102F

AD-A150 689

UNCLASSIFIED

PAGE 188 EVLOSA
(U) Effects of Assuming Independent Component Failure Times, If They Actually Dependent, in a Series System.

DESCRIPTION NOTE: Annual rept. 1 Sep 83-30 Sep 84.

PERSONAL AUTHORS: Moeschberger, M. L.; Klein, J. P.;

CONTRACT NO.: AFOSR-82-0307

PROJECT NO.: 2304

TASK NO.: A5

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall objective of this proposal is to investigate the robustness to departures from independence of methods currently in use in reliability studies when competing failure modes or competing causes of failure associated with a single mode are present in a series system. The first specific aim is to examine the error one makes in modeling a series system by a model which assumes statistically independent component lifetimes when in fact the component lifetimes follow some multivariate distribution. The second specific aim is to assess the effects of the independence assumption error in estimating component parameters from life tests on series systems. In both cases, estimates of such errors will be determined via mathematical analysis and computer simulations for several prominent multivariate distributions. A graphical display of the errors for representative distributions will be made available to researchers who wish to assess the possible erroneous assumption of independent competing risks. A third aim is to tighten the bounds on estimates of component reliability when the risks belong to a general dependence class of distributions (for example, positive quadrant dependence, positive regression dependence, etc.). Major decisions involving reliability studies, based on competing risk methodology, have been made in the past and will continue to be made in the future. This study will provide the user of such techniques with a clearer understanding of the robustness of the analyses to departures from independent risks, an assumption commonly made by the methods currently in use.


IDENTIFIERS: (U) Robustness, LPN-05R-763265/714837, PE81102F, WUAFOSR2304A8
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY
SEARCH CONTROL NO. EVLOSA
AD-A150 577 7/3
CINCINNATI UNIV OH DEPT OF CHEMISTRY
(U) Theoretical Investigations on Some Rigid-Rod Polymers
Used as High-Performance Materials,
FEB 84 10P
PERSONAL AUTHORS: Welsh, W. J.; Bhaumik, D.; Jaffe, H. H.;
Mark, J. E.
CONTRACT NO. AFOSR-78-3883
PROJECT NO. 2303
TASK NO. A3
MONITOR: AFOSR
TR-85-0035

UNCLASSIFIED REPORT
SUPPLEMENTARY NOTE: Pub. in Polymer Engineering and
Science, v24 n3 p216-225 Feb 84.

ABSTRACT: (U) This review focuses on a new type of para-
catenated aromatic polymer being used in the preparation
of high-performance films and fibers of exceptional
strength, thermal stability, and environmental resistance,
including inertness to essentially all common solvents.
Polymers of this type include cis and transpoly(p-
phenylene benzobisoxazole) (PBO), and the cis and trans
forms of the corresponding poly(p-phenylene
benzobisthiazole) (PBT). The purpose of this paper is to
summarize the authors' theoretical work on the
structures, conformational energies, intermolecular
interactions, and electronic properties of PBO and PBT
chains, including the protonated forms known to exist in
strong acids. The emphasis is on how such studies provide
a molecular understanding of the unusual properties and
processing characteristics of this new class of materials.
Originator-supplied key words include: Rigid-rod polymers,
Liquid-crystalline polymers, Conformational analysis, PBT,
PBO, Electrical conductivity.

DESCRIPTORS: (U) *Azoles, *Synthetic fibers, *Films,
*Polymers, Electronics, Preparation, Theory, Solvents,
Electrical conductivity, Interactions, Molecule molecule
interactions, Processing, Thermal stability, Reprints
The decomposition kinetics of ethylsilane under shock tube conditions (P sub T approx. 3100 torr, T = 1080 approx. 1245 K), both in the absence and presence of silylene trapping agents (butadiene and acetylene) are reported. Arrhenius parameters under maximum butadiene inhibition are: log k(C2HSS1D3) = 15.14-164.769 or -1433 cal/2.303 RT; log k(C2HSS1D3) = 15.29-168.208 or -1414/2.303 RT. The uninhibited reaction is subject to silylene induced decomposition (63% lowest T - 24% highest T). Major reaction products are ethylene and hydrogen, consistent with two dominant primary dissociation reactions: C2HSS1D3 yields C2H5S1D + D2, Phi approx. 0.88; C2HSS1D3 yields CH3CH = SI + HD, Phi approx. 0.30. Minor products suggest several other less important primary processes: alkane elimination, Phi approx. 0.02, and free-radical production via simple blood fission, Phi approx. 0.02. An upper limit for the activation energy of the decomposition, C2HSS1H yields C2H4 + SIH2, of E less than or = 30 or - 4 kcal is established, and speculations on the mechanism of this decomposition (concerted or stepwise) with conclusions in favor of the stepwise path are made. Computer modeling studies for the reaction both in the absence and presence of butadiene are shown to be in good agreement with the experimental observations. Originator furnished keywords include: Kinetics, Mechanism, Ethylsilane, Ethylsilylene.
UNCLASSIFIED REPORT

ABSTRACT: (U) The authors develop a unified theory for obtaining stochastic rearrangement inequalities. The authors present sample applications in ranking problems, hypothesis testing, contamination models, optimal assembly of systems, and stochastic versions of well known rearrangement inequalities. Keywords include: hypothesis testing; partial ordering; total positivity; positive set function; arrangement increasing.


IDENTIFIERS: (U) PE81102F. WUAFOSR2304A5

UNCLASSIFIED REPORT


ABSTRACT: (U) The notion of regularity for semigroups is studied, and it is shown that an unambiguous semigroup (i.e., whose L and R orders are respectively unions of disjoint trees) can be embedded in a regular semigroup with the same subgroups and the same ideal structure (except that a zero is added to the regular semigroup). Previously it was shown that any semigroup is the homomorphic image of an unambiguous semigroup with the same groups and a similar ideal structure. Together these prove that an arbitrary semigroup divides a regular semigroup with a similar structure. The resulting regular semigroup is finite (resp. torsion, or bounded torsion) if the given semigroup has that property.

DESCRIPTORS: (U) *Groups(Mathematics). Reprints

IDENTIFIERS: (U) PE81102F. WUAFOSR2304A6

UNCLASSIFIED

SEARCH CONTROL NO. EVLOSA

AD-A150 571 12/1

FLORIDA UNIV GAINESVILLE CENTER FOR MATHEMATICAL SYSTEM THEORY

(U) Arbitrary Versus Regular Semigroups.

84 81P

PERSONAL AUTHORS: Birget, J. C.;

CONTRACT NO. DAA029-81-K-0138, AFOSR-81-0238

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR, ARD

TR-85-0051, 18343.43-MA

UNCLASSIFIED REPORT

AD-A150 573 20/1

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Stochastic Rearrangement Inequalities.

DESCRIPTIVE NOTE: Technical rept.,

SEP 83 41P

PERSONAL AUTHORS: D'Abadiel, C.; Proschick, F.;

REPORT NO. FSU-STATISTICS-M872, TR-83-187-AFOSR

PROJECT NO. 2304

MONITOR: AFOSR
TR-85-0007

UNCLASSIFIED

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DTIC REPORT BIBLIOGRAPHY

GEORGIA INST OF TECH ATLANTA SCHOOL OF AEROSPACE ENGINEERING

(U) Interlaminar Fracture Toughness in Resin Matrix Composites.

DESCRIPTIVE NOTE: Annual scientific rept. 1 Jan 83-14 Feb 84.

APR 84

PERSONAL AUTHORS: Rehfield, L. W.; Armanios, E. A.; Reddy, A. D.

CONTRACT NO. AFOSR-83-0056

PROJECT NO. 2307

TASK NO. B2

MONITOR: AFOSR TR-85-0061

UNCLASSIFIED REPORT

ABSTRACT: (U) This annual report summarizes the objectives, accomplishments and proposed new directions of research on mode II interlaminar fracture in resin matrix composites. A mode II interlaminar fracture specimen, test and analysis method for interpreting results have been successfully developed and demonstrated for the AS4/3502 material system. Experimental data have been obtained under both net tensile and compressive loading. Of considerable importance are the findings that (1) the AS4/3502 material system shows increasing resistance to crack growth in tension, (2) interlaminar fracture under compression is a totally unstable process, and (3) tension and compression behaviors are considerably different. The findings and the conclusions that are drawn from them point to new, promising directions for the work. Two new central directions that are suggested involve failure analysis using fractography, radiography and ultrasonic inspection and the quantitative evaluation of mode I suppression technology utilizing the new testing method. Papers, reports and presentations resulting from this research are listed. Originator furnished keywords include: Delamination; Interlaminar fracture; Composite materials; Composite structures; Fracture testing; Mode II fracture; and...

AD-A150 585

CONTINUED

Fracture.

DESCRIPTORS: (U) *Toughness, *Composite materials, *Fracture(Mechanics), Laminates, Fractography, Tensile properties, Test methods, Radiography, Composite structures, Compressive properties, Quantitative analysis, Matrix materials, Polymers, Crack propagation, Resistance, Ultrasonic tests

IDENTIFIERS: (U) WUAFOSR230782, PE81102F

IAC NO. NT-030802

IAC DOCUMENT TYPE: NTIAC - MICROFICHE --

IAC SUBJECT TERMS: N-(U)DELAMINATION, FRACTURE(MECHANICS), COMPOSITE MATERIALS, LAMINATES, INTERFACES, INTERNAL, RESINS, FAILURE ANALYSIS, FRACTOGRAPHY, RADIOGRAPHY, ULTRASONIC TESTING, TENSION, COMPRESSION, DESIGN;

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DTIC REPORT BIBLIOGRAPHY

CALIFORNIA UNIV LOS ANGELES SCHOOL OF ENGINEERING AND APPLIED SCIENCE

(U) Sequential Decision Models in Reliability.

DESCRIPTIVE NOTE: Progress rept. 1 Oct 83-30 Sep 84.

DEC 84 5P

PERSONAL AUTHORS: Miller, B. L.; Jacobson, S. E.; Mortensen, R. E.

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-85-0010

UNCLASSIFIED REPORT

ABSTRACT: (U) Research during this period was carried out in the areas of quality control, reliability in logistics support, and queueing theory applications to inventory. In addition, work from the previous year was completed in optimal inspection and optimal stockage policies for parts which replace failed components. The research was more varied than anticipated because Assistant Professor Subelman resigned unexpectedly to accept a position in industry and was replaced by Professor Jacobsen and Associate Professor Mortensen. This is a progress report on AFOSR Grant 82-0305.


IDENTIFIERS: (U) WUAFOSR2304A5, PE81102F

CINCINNATI UNIV OH DEPT OF CHEMISTRY

(U) Particle Sizes of Reinforcing Silica Precipitated into Elastomeric Networks.

84 5P

PERSONAL AUTHORS: Ning, Y. P.; Tang, M. Y.; Jiang, C. Y.; Mark, J. E.

PROJECT NO. AFOSR-83-0027

UNCLASSIFIED REPORT

ABSTRACT: (U) It has recently been demonstrated that it is possible to prepare very tough elastomers by swelling (Poly(dimethyl)siloxane)PDMS networks with tetraethyl orthosilicate (TEOS) (C2H5SiO1.45), which is then hydrolyzed in situ. It was proposed that the hydrolysis of the TEOs gives silica particles which provide the desired reinforcement. The present investigation tests these ideas by means of transmission electron micrographs obtained on thin slices of PDMS elastomers thus prepared. The main goals are to find evidence for such filler particles and, if present, to estimate their sizes and size distribution. Since any such particles would be formed within a polymer matrix which should impede their coalescence into undesired aggregates, the degree of dispersion of the filler particles is also of considerable interest. Originator furnished keywords include: Silica particles, Elastomer reinforcement, In-situ precipitation, Electron microscopy, and Filled networks.

(U) Treatment of Filler-Reinforced Silicone Elastomers to Maximize Increases in Ultimate Strength.

ABSTRACT: (U) Model elastomers prepared by end linking poly(dimethylsiloxane) chains were filled in-situ by the ethylamine-catalyzed hydrolysis of tetraethylorthosilicate. The increases in modulus and ultimate strength obtained from the presence of filler were enhanced by a swelling-extraction treatment of the elastomers with tetrahydrofuran. The effect may be due to hydrolytic formation of additional particle surface silanol groups or removal or adsorbed small molecules, thereby increasing the number of sites for particle-polymer bonding. Originator furnished keywords include: Filled elastomers, Reinforced elastomers, In-situ precipitation, Silica particles, Model networks, and Particle surface treatment.

DESCRIPTORS: (U) Chemical precipitation, Elastomers, Hydrolysis, Silicon dioxide, Fillers, Surface finishing, Modulus of elasticity, Strength(Mechanics), Reprints, Reinforcing materials, Furans, Hydroxy radicals

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A3
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 549  12/1

NORTH CAROLINA  UNIV AT CHAPEL HILL DEPT OF STATISTICS

(U) Skewed Stable Variables and Processes.

DESCRIPTIVE NOTE: Technical rept.,

SEP 84  28P

PERSONAL AUTHORS: Hardin, C. D., Jr.

REPORT NO.  TR-79

CONTRACT NO.  F49620-82-C-0009

PROJECT NO.  2304

TASK NO.  A5

MONITOR:  AFOSR

TR-84-1273

UNCLASSIFIED REPORT

ABSTRACT: (U) We consider here general (i.e. possibly skewed or asymmetric) stable distribution and processes. A decomposition result and a moment equality are given for these distributions. More importantly, we determine the form of all stable independent increments processes, construct a Wiener-type stochastic integral with respect to these processes, and prove a representation theorem for general stable processes analogous to (and in some sense including) the spectral representation theorem for symmetric stable processes. (Author)

DESCRIPTORS: (U) *Statistical distributions, Random variables, Theorems, Skewness, Stability

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5

AD-A150 549

UNCLASSIFIED SEARCH CONTROL NO. EVL05A

AD-A150 535  7/4  20/9

FLORIDA UNIV  GAINESVILLE DEPT OF CHEMISTRY


84  7P

PERSONAL AUTHORS: Long, G. L., Winefordner, J. D.

CONTRACT NO.  F49620-80-C-0005

PROJECT NO.  2303

TASK NO.  A1

MONITOR:  AFOSR

TR-85-0037

UNCLASSIFIED REPORT


ABSTRACT: (U) The use of an inductively coupled plasma ICP, as an excitation source for atomic fluorescence spectrometric, AFS, in a second ICP is re-examined. Improvements in the ICP-ICP-IFS setup have allowed the lowering of the limits of detection by one to two orders of magnitude below that of previous work. Also discussed is a new mode of operation for the atomization cell ICP. Through simple torch-position and flow-rate adjustments, a thin plasma, which extends 20 to 30 cm above the torch can be produced. This plasma is referred to as the pencil plasma. With the use of these operating conditions, propane can be added to the Ar nebulizing gas to aid in refractory-element determination. The pencil plasma and the conventional plasma will be compared for use as an atom reservoir for AFS measurements.

DESCRIPTORS: (U) *Atomic spectroscopy, *Plasmas(Physics), Fluorescence, Refractory materials, Refractory materials, Reprints, Atoms, Pencil beams, Atomization, Cells, Coupling(Interaction), Excitation

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A1

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DTIC REPORT BIBLIOGRAPHY

AD-A150 534 7/2
FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY
(U) Use of Active Nitrogen in Analytical Chemiluminescence Spectrometry.
84 7P
PERSONAL AUTHORS: Jurgensen, H.; Winefordner, J. D.
CONTRACT NO. F49620-80-C-0005
PROJECT NO. 2303
TASK NO. A1
MONITOR: AFOSR
TR-0038

UNCLASSIFIED REPORT


ABSTRACT: (U) Methods of obtaining active nitrogen plasmas at both reduced and atmospheric pressures are described. The mechanism of energy transfer from the excited states of nitrogen to metal atoms and to organic molecules and the subsequent emission of characteristic radiation is outlined. The application of these processes to the detection and determination of traces of metals and organic compounds is discussed and recent work on gas chromatographic detectors, based on these systems, is reviewed.

DESCRIPTORS: (U) Nitrogen, Chemiluminescence, Spectrometry, Reprints, Atoms, Organic compounds, Plasmas (Physics), Energy transfer, Molecules

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A1

AD-A150 533

SEARCH CONTROL NO. EVLOSA

AD-A150 533 21/5 20/4
MASSACHUSETTS INST OF TECH CAMBRIDGE GAS TURBINE LAB
(U) Current Problems in Turbomachinery Fluid Dynamics.

DESCRIPTIVE NOTE: Final rept. 1 Oct 81-30 Sep 84.

DEC 84 55P
PERSONAL AUTHORS: Greitzer, E. M.; Kerrebrock, J. L.; Thompkins, W. T.; McCune, J. E.; Epstein, A. H.
CONTRACT NO. F49620-82-K-0002
PROJECT NO. 2301
TASK NO. A4
MONITOR: AFOSR
TR-85-0016

UNCLASSIFIED REPORT

ABSTRACT: (U) A multi-investigator program on problems of current interest in turbomachinery fluid dynamics is being conducted at the MIT Gas Turbine Laboratory. Within the scope of this effort, four different tasks, encompassing both design and off design programs, have been identified. These are (1) Investigation of fan and compressor design point fluid dynamics including formation of design procedures using current 3-D transonic codes and development of advanced measurement techniques for use in transonic fans; (2) Studies of basic mechanisms of compressor stability enhancement using compressor casing/hub treatment; (3) Fluid mechanisms of inlet vortex flow distortions in the gas turbine engines; (4) Investigations of 3-D analytical and numerical computations of flows in highly loaded turbomachinery blading.

DESCRIPTORS: (U) Engines, Gas turbines, Turbomachinery, Measurement, Methodology, Augmentation, Compressors, Stability, Distortion, Inlets, Vortices, Fluid dynamics, Blades

IDENTIFIERS: (U) PE81102F, WUAFOSR2301A4

AD-A150 534

UNCLASSIFIED
UNCLASSIFIED

ABSTRACT: (U) The numerical solution of many problems in continuum dynamics is seriously limited by the computation rates attainable on computers with serial architecture. Parallel processing machines can achieve much higher rates. However, applying additional processors to a calculation is only part of the solution. In this report, parallel algorithms are developed for explicit and implicit, Lagrangian and Eulerian finite difference schemes for computational continuum dynamics in one spatial dimension. First, the explicit conservation equations in the Lagrangian reference frame are readily reformulated for concurrent processing. Second, and implicit solution is derived for these equations. This is important because it yields unconditional stability. The parallelism is achieved via a block implicit numerical scheme. Third, a rezone algorithm is employed with each Lagrangian integration step to transform the mesh back to the Eulerian reference frame. Along the algorithmic development path, a zone-by-zone parallelization gives way to a block-by-block technique both of which are self-scheduling. Then the latter is compared to an approach that keeps the parallel processes alive for many time steps. At each step of this research exploiting the architectural advantages of the HEP H1000 (Heterogeneous Element Processor) computer.

(Author)
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DTIC REPORT BIBLIOGRAPHY

AD-A150 512 6/4 9/2

STANFORD UNIV CA DEPT OF AERONAUTICS AND ASTRONAUTICS

(U) Robust Feedforward/Feedback Control Logic for a Target- Tracking Mechanical Arm.

DESCRIPTIVE NOTE: Semi-annual rept. 30 Sep 83-30 Mar 84.

MAR 84 74P

PERSONAL AUTHORS: Cannon, R. H., Jr.; Gardner, B. E.;

REPORT NO. SUDAAR-537

CONTRACT NO. F49620-82-C-0092

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR

TR-84-1277

UNCLASSIFIED REPORT

ABSTRACT: (U) An analytic design study is conducted to demonstrate circumstances under which the inclusion of feedforward compensation in a target-tracking control scheme can be expected to offer significant performance gain. In particular, a target-tracking controller design problem for a mechanical arm is developed to assess quantitatively the capacity of feedforward to provide a quicker, more accurate tracking response over wide ranges of uncertainty or variability in the dynamic parameters of both plant and target. The Stanford Aeronautics and Astronautics Department Robotics Lab two-link, two- actuator mechanical arm, inherently a system with variable kinematic and dynamic parameters, provides an appropriate framework for this study. Using recent developments in the theory of quadratic synthesis of robust, low-order optimal controllers, control logic is developed - both with and without feedforward - that enables the arm end point to track a physical target characterized in part by periodic motion of variables or uncertain frequency and phase. It is shown that, using relatively noise-free measurements of target position coordinates only, feedforward compensation can be expected to provide substantial reductions in tracking errors for given constraints on control effort, particularly when the range of variation in target

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ABSTRACT: (U) This paper presents a relatively complete and comprehensive description of a general class of Monte Carlo sampling plans for estimating $g = g(s,T)$, the probability that $s$ is connected to all nodes in $T$. The paper also provides procedures for implementing these plans. Each plan uses known lower and upper bounds $B,A$ on $g$ to produce an estimator of $g$ that has a smaller variance $(A-g)(g-B)/K$ than one obtains for crude Monte Carlo sampling $(B=0, A=1)$ on $K$ independent replications. The paper describes worst case bounds on sample sizes $K$, in terms of $B$ and $A$, for meeting absolute and relative error criteria. It also gives the worst case bound on the amount of variance reduction that can be expected when compared with crude Monte Carlo sampling. An example illustrates the variance reductions achievable with these plans. The paper next shows how to assess the credibility that a specified error criterion for $g$ is met as the Monte Carlo experiment progresses and then shows how confidence intervals can be computed for $g$. Originator-supplied keywords include: Monte Carlo methods, Network reliability, Variance reduction.

DESCRIPTORS: (U) *Electrical networks, *Sampling, Monte Carlo method, Planning
UNCLASSIFIED
UNCLASSIFIED REPORT

ABSTRACT: (U) This paper is concerned with the geometrical properties that are induced by the local information contents and structures of the parameter space of probability distributions. Of particular interest in this investigation is the Rao distance which is the geodesic distance induced by the differential metric associated with the Fisher information matrix of the parameter space. Moreover, following Efron, David and Amari, some affine connections are introduced into the informative geometry of parameter space and thereby elucidating the role of the curvature in statistical studies. In addition, closed form expressions of the Rao distances for certain families of probability distributions are given and discussed. (Author).

DESCRIPTORS: (U) Geometry, Geodesics, Probability distribution functions

IDENTIFIERS: (U) Probability space, PE61102F, WUA05R2304A5

UNCLASSIFIED REPORT

ABSTRACT: (U) The bootstrap is proposed as a method for estimating the precision of forecasts and estimates of parameters of the Kalman Filter model. It is shown that when the system and the filter is in steady state the bootstrap applied to the Gaussian innovations yields asymptotically consistent standard errors. That the bootstrap works well with moderate sample sizes and supplies robustness against departures from normality is substantiated by empirical evidence. Keywords: Bootstrap; Kalman filter; Forecasting; and Robustness.

DESCRIPTORS: (U) Kalman filtering, Statistical samples, Forecasting, Normality

IDENTIFIERS: (U) Bootstrapping, Robustness, PEB1102F, WUA05R2304A5

IAC NO. GC-850189
IAC DOCUMENT TYPE: GACIAC - MICROFICHE
IAC SUBJECT TERMS: G--(U)Kalman filters, Forecasting, Robustness, Smoothing, Parameters, Gaussian filters, Gaussian noise, Models, Filters, Estimates, Statistical analysis,;
ABSTRACT: During this past year we have concerned ourselves with the synthesis of tree structures. These structures offer, in our opinion, the best hope of achieving sub-polynomial running times for typical problems without a degree of interconnection that makes physical implementation difficult. One would like to be able to synthesize trees using divide & conquer. Divide & conquer is an appealing technique for tree synthesis because of the isomorphism between the shape of the desired synthesized system and the recursive descent implicit in divide & conquer. Additionally, the technique makes good use of theorem proving techniques which are rapidly being developed for other purposes. Certain problems arise, however, when one tries to use divide & conquer to synthesize a tree-structured computing system. The basic difficulty is that nodes that are high in the tree are required to either compute or communicate large amounts of data. Our primary solution to this problem is to replace the original specification, which in general declares the existence of an output array that depends on various elements of the input array, into an equivalent specification, which declares the existence of a certain closure or specialized functional object, together with a declaration that it be applied. Additional keyword:
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 497 12/1 9/2
MARYLAND UNIV COLLEGE PARK CENTER FOR AUTOMATION RESEARCH

(U) Parallel Update of Minimum Spanning Trees in Logarithmic Time.

DESCRIPTIVE NOTE: Technical rept.,
NOV 84 19P

PERSONAL AUTHORS: Ramakrishnan, I. V.; Pawagi, S.

REPORT NO. CAR-TR-97, CS-TR-1452

CONTRACT NO. F49620-83-C-0082, N00014-84-K-0530

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR
TR-85-0089

UNCLASSIFIED REPORT

ABSTRACT: (U) Parallel algorithms are presented for updating a minimum spanning tree when the cost of an edge changes or when a new node is inserted in the underlying graph. The machine model used is a parallel random access machine which allows simultaneous reads but prohibits simultaneous writes into the same memory location. The algorithms described in this paper for updating a minimum spanning tree require \( O(\log n) \) time and \( O(n \text{ square}) \) processors. These algorithms are efficient when compared to previously known algorithms for initial construction of a minimum spanning tree that require \( O(\log n \text{ to the base } 2) \) time and use \( O(n \text{ square}) \) processors.

DESCRIPTORS: (U) Algorithms, Random access computer storage, Logarithm functions, Memory devices, Parallel processing

IDENTIFIERS: (U) WUAFOSR2304A7, PE81102F

UNCLASSIFIED REPORT

AD-A150 491 20/12
GEORGE WASHINGTON UNIV WASHINGTON D C DEPT OF CIVIL MECHANICAL AND ENVIRONMENTAL ENGINEERING

(U) Evaluation and Development of Constitutive Relations for Inelastic Behavior.

DESCRIPTIVE NOTE: Final technical rept. 1 Jun 80-31 Jan 83,
DEC 83 338P

PERSONAL AUTHORS: Eftis, J.; Jones, D. L.;

REPORT NO. GWU/CME/TRA-83/1

CONTRACT NO. AFOSR-81-0241, AFOSR-80-0098

PROJECT NO. 2307

TASK NO. B2

MONITOR: AFOSR
TR-85-0018

UNCLASSIFIED REPORT

ABSTRACT: (U) A review and critical assessment of the major theoretical developments in plastic and viscoplastic constitutive theory, as well as a brief survey of recent related experimental and computational advances is given. The very large number of thermoplastic and thermoviscoplastic theories that are currently being proposed stems largely from the presently unsettled state of the underlying theory of nonequilibrium thermodynamics, and also from the ambiguousness that surrounds the added use of the internal state variable formalism as a theoretical tool in constitutive theory formulation. The use of the generalized continua, that is, continua with different formally defined internal structure as background for constitutive theory development does not, after approximately thirty years of activity, appear to have been fruitful, and seems to hold little promise for future useful applications. The advances that have occurred in experimental equipment and techniques, including the development of computer-controlled servohydraulic testing systems and various new areas of experimentation, are also reviewed. These areas include the measurement of initial and subsequent yield surfaces, time and temperature effects, strain rate effects, cyclic

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loading and finite strain considerations. The dramatic advances in computational capabilities and in techniques necessary to use computers in solving practical problems are also reviewed. Originator furnished key words include: Constitutive Equations, Plasticity, Viscoplasticity.


IDENTIFIERS: (U) Constitutive equations, WUAFOSR230782, PEB1102F

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UNCLASSIFIED
SEARCH CONTROL NO. EVLOSA

CALIFORNIA UNIV LOS ANGELES DEPT OF ELECTRICAL ENGINEERING

(U) Visible-Millimeter Solid State Research.

DESCRIPTIVE NOTE: Interim rept. Jan 83-Jun 84, SEP 84 10p

PERSONAL AUTHORS: Fetterman, H. R.

CONTRACT NO. F49620-83-K-0018

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-84-1280

UNCLASSIFIED REPORT

ABSTRACT: (U) A Visible - Millimeter Wave mixing system has been set up with all components operating satisfactory and locked to stabilized cavities. Using this system, mixing has been obtained in semiconductor devices with frequency separations ranging up to 100 GHz., in a number of GaAs and GaAs/AlGaAs devices. These devices include commercial FETs, state of the art industrial FETs, HEMT structures fabricated as part of this program and Heterojunction bi-polar transistors supplied by local industry on a collaborative basis. Many of the initial goals of the first and second stages of this program have been achieved or are well underway. For example, mixing in short gate length FETs has been used to injection lock oscillators at frequencies up to 20 GHz. The mixing in HEMTs structure has proved to be extremely interesting when studied as a function of temperature. Improvements in transconductance as a result of increased carrier mobility are reflected in the mixing efficiencies. Finally these experiments have been extended to heterojunction bi-polartrans showing that these devices have extremely fast response times limited by circuit parasitics. In the current phase of this program, devices specifically tailored to these experiments are being designed and tested. The goal is to obtain wideband width control of HEMT, and other novel three terminal layered, oscillators using fiber optics for efficient injection locking at millimeter wave frequencies. (Author)
ILLINOIS UNIV AT URBANA DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Non-Linear Optical Techniques for Visible and UV Lasers and Thin Film Deposition.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 83-30 Sep 84.

NOV 84 15P

PERSONAL AUTHORS: Eden, J. G.;

CONTRACT NO. F48620-83-C-0003

MONITOR: AFOSR
TR-84-1263

UNCLASSIFIED REPORT

ABSTRACT: (U) Experiments are described in which lasers are used to generate specific CuIIa metal ions. The first studies involved ion pair production in the metal-halide molecules (such as thallium iodide) by illuminating the vapor with 193 nm radiation. More recent experiments have succeeded in producing Al(+) ions by the multiphoton ionization (MPI) of metal alkyls (such as trimethylaluminum) in the visible. Another aspect of the current work is focusing on the use of ultraviolet radiation to enhance the growth rate of semiconductor films grown near pyrolytic threshold. The use of gaseous sensitizers (such as ammonia) to improve film growth rates and quality is also being explored. Finally, a simple photochemical means for improving the efficiency of a commercial XeCl laser by more than 50% has also been discovered. Originator furnished keywords include: Laser; Ultraviolet; Visible; Semiconductor films; Metal films; Excimer laser; Multiphoton ionization.


IDENTIFIERS: (U) Multiphoton ionization
(U) Automatic Symbolic Solution of Markov Chains.

ABSTRACT: (U) Continuous time Markov chains are commonly used in system performance modeling. Increasing system complexity and non-Markovian behavior can drastically increase the size of a Markov model's state space. Accordingly, approximation techniques have been introduced to reduce the resources needed to solve Markov chain models. In this paper the authors discuss a method for automatically deriving symbolic solutions of Markov chains. Symbolic solutions should provide insight when attempting to evaluate the validity of both Markov models and approximation techniques for their solution. (Author).

UNCLASSIFIED REPORT

SEARCH CONTROL NO. EVLOSA

AD-A150 475 7/2

NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) Structure, Bonding, and Internal Rotation in H3PO, H2POH, and HFPOH.

84 9P

PERSONAL AUTHORS: Schmidt, M. W.; Yabushita, S.; Gordon, M. S.;

CONTRACT NO. AFOSR-82-0190

PROJECT NO. 2303

TASK NO. B2

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AD-A150 475 12/1

DUKE UNIV DURHAM NC DEPT OF COMPUTER SCIENCE

(U) Search Control No. EVLOSA

AD-A150 475 7/2

NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) Structure, Bonding, and Internal Rotation in H3PO, H2POH, and HFPOH.

84 9P

PERSONAL AUTHORS: Schmidt, M. W.; Yabushita, S.; Gordon, M. S.;

CONTRACT NO. AFOSR-82-0190

PROJECT NO. 2303

TASK NO. B2

UNCLASSIFIED REPORT

AD-A150 475 12/1

DUKE UNIV DURHAM NC DEPT OF COMPUTER SCIENCE

(U) Search Control No. EVLOSA

AD-A150 475 7/2

NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) Structure, Bonding, and Internal Rotation in H3PO, H2POH, and HFPOH.

84 9P

PERSONAL AUTHORS: Schmidt, M. W.; Yabushita, S.; Gordon, M. S.;

CONTRACT NO. AFOSR-82-0190

PROJECT NO. 2303

TASK NO. B2

UNCLASSIFIED REPORT


ABSTRACT: (U) The fundamental nature of the P-O bond is reexamined by using ab initio (3-21G* and 6-31G*) wave functions and energy-localized orbitals. The bond is best described as a dative single bond augmented by PI backdonation from the oxygen lone pairs. The isomerization pathway from H3PO to H2POH is followed by using the intrinsic reaction coordinate and localized orbitals. The latter, more stable, isomer has two forms, cis and trans, which are nearly equal in energy. The internal rotation barriers in this molecule and in HFPOH are examined with a Fourier analysis and compared with their nitrogen analogues. The major differences between the potential curves in phosphorus and nitrogen species are attributed to different dipole-dipole (DD) interactions between the HYX and OH moieties. Originator furnished keywords include: ab initio; PO bond; Energy-localized orbitals; Internal rotation barriers.


IDENTIFIERS: (U) WUAOSR2303B2, PEI1102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 473 7/5

WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) On the Thermal Interconversion of Matrix-Isolated
Dimethylsilylene and 2-Silapropene. Their Reactions
with Oxygen Atom Donors.

83 3P

PERSONAL AUTHORS: Arrington, C. A.; West, R.; Michl, J.

CONTRACT NO. AFOSR-82-0067, NSF-CHE78-27094

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-85-0042

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical
Society, v105 p6176-6177 1983. Sponsored in part by Grant
NSF-CHE80-00256.

ABSTRACT: (U) Generation of dimethylsilylene by
photolysis of (Me2Si)8 in argon matrix at 15K in the
presence of N2O produces a new species believed to be
dimethylsilanone, Me2SiO double bond. The same species
is produced from Me2SiH-CH2 double bond in the presence
of N2O. Originator furnished keywords include:
organosilanes; silanones; photo rearrangement; silicon-
oxide double bond.

DESCRIPTORS: (U) *Photolysis, *Organic compounds,
*Silanes, Nitrous oxide, Chemical bonds, Reprints, Atoms, Oxygen

IDENTIFIERS: (U) Dimethylsilylene, Silapropenes,
Silanones, WUAFOSR2303B2, PE81102F

AD-A150 470 8/13

CALIFORNIA UNIV DAVIS DEPT OF CIVIL ENGINEERING

(U) In Situ Characterization of Soils for Prediction of
Stress-Strain Relationship.

DESCRIPTIVE NOTE: Final rept. Nov 82-Nov 83,

NOV 83 121P

PERSONAL AUTHORS: Arulanandan, K.; Dafalias, Y.; Herrmann, L.
R.; Anandarajah, A.; Meegoda, N.

CONTRACT NO. AFOSR-81-0216

PROJECT NO. 2307

TASK NO. C1

MONITOR: AFOSR
TR-85-0017

UNCLASSIFIED REPORT

ABSTRACT: (U) A non-destructive method of characterizing
particular systems using electrical properties is
presented. The application of this methodology for the
demarcation of cohesive and granular soils is
demonstrated. The significance of this approach is that
electrical properties of soils such as conductivity,
sigma, and dielectric constant, epsilon, as a function of
frequency, can be measured in situ. These properties,
when suitably interpreted, can be used to quantify the
structure of particulate systems including the inter and
intra cluster void ratios. These structural properties
can then be correlated with mechanical properties such as
k sub o, lambda, k and M. Incorporating these mechanical
properties into a bounding surface plasticity model, the
in situ stress state and in situ stress strain behavior
could be predicted. Application of this method to mixed
soils is demonstrated in this report. This approach
therefore provides a non-destructive method of
characterization soils for the prediction of mechanical
behavior.

DESCRIPTORS: (U) *Soils, *Nondestructive testing,
Constants, Dielectric properties, Electrical properties,
Mechanical properties, Predictions, Stress strain
relations, Mixtures, Models, Plastic properties
Molecular orbital calculations have been carried out on a sequence of HXYPOH molecules with X and Y = H, CH, NH2, OH, OCH3, and F. The molecular structures are predicted with the STO-2G* basis set. For the prediction of energies of isomerization to XYPHOH species single-point 3-21G* and 6-31G* calculations were used. The molecular dissociation energies of HXYPOH to HOP + XY and to XPO + HY were calculated by augmenting the latter two basis sets with MP2 and MP3 perturbation corrections. Originator furnished keywords include: Molecular orbital calculations, HXYPOH, STO-2G*.

IDENTIFIERS: (U) WUAFOSR2307C1, PE81102F

UNCLASSIFIED REPORT
UNCLASSIFIED

UNCLASSIFIED REPORT

Availability: Document partially illegible.

ABSTRACT: (U) This report documents an investigation of the stability and control of cascaded doubly fed machines (CDFM). These machines are brushless variable speed constant frequency electric power generators with potential for application in aircraft. A previous analytical study indicated the CDFM system would be controllable in the subsynchronous operating mode with a passive RL load. The present study contains two steps.

First is an investigation of the machine operation in the supersynchronous mode. The second step is an investigation of machine operation with output capacitors providing excitation VARs for the machine and load. Step 1 results show that the machines exhibit stability characteristics in the supersynchronous mode similar to those observed in the subsynchronous mode. Step 2 results show that output capacitors degrade the system performance, particularly at light loads. The results show that output current feedback can be employed to improve the system performance.

DESCRIPTORS: (U) *Electric generators, Synchronization(Electronics), Brushless electric equipment, Aircraft equipment, Stability, Capacitors, Output
The Effect of Relative Humidity on the Hydrolytic Precipitation of Silica into an Elastomeric Network.

ABSTRACT: (U) Results are presented showing the effect of relative humidity on the amount of reinforcing silica precipitated into an elastomeric network. Mechanical properties are used to show the extent of the reinforcement obtained. Originator furnished keywords: Elastomers, Silica filler, Insitu reinforcement and Poly(dimethylsiloxane).

DESCRIPTORS: (U) Chemical precipitation, Elastomers, Hydrolysis, Silicon dioxide, Reprints, Reinforcing materials, Fillers, Mechanical properties, Humidity

IDENTIFIERS: (U) Siloxane
(U) Classical Trajectory Study of Adsorption and Surface Diffusion of Si on Si(100).

OCT 84 8P

PERSONAL AUTHORS: Noorbacha, I.; Raff, L. M.; Thompson, D. L.

CONTRACT NO. AFOSR-82-0311

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR TR-B5-0030

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. In Jnl. of Chemical Physics, 81, n8 p3715-3721, 15 Oct 84.

ABSTRACT: (U) Adsorption and surface diffusion of silicon on the Si(100) plane have been investigated by classical trajectory methods using a realistic potential-energy surface. The calculated sticking probability for adsorption is 0.985 at 1500 K and is independent of temperature. The diffusion coefficient for Si on Si(100) is evaluated by modeling the diffusion process as the jumping of the atom from one adsorption site to another. The diffusion coefficient calculated by this approach is given by D = (6.35 + or - 1.44) x 0.0001 exp(-3.63 + or - 0.47 kcal/mol/RT) sq cm/s. This value is found to be in good agreement with the diffusion coefficients calculated from the long-time behavior of the mean square displacement and from the integrated velocity autocorrelation function. The activation energy for diffusion is found to be less than the reported experimental value of 4.8 kcal/mol for the diffusion of Si on Si(111). The diffusion of Si on Si(100) is found to be directional, occurring only along channels described by the intersection of the (022) planes and the (100) plane. Transverse diffusion in directions described by the intersection of the (022) planes with the (100) plane is a much higher-energy process. Originator furnished keywords include: Silicon chemical vapor deposition, Thin films, and Surface diffusion.
UNCLASSIFIED

ROCHESTER UNIV NY DEPT OF CHEMISTRY

(U) Theory of Laser-Simulated Surface Processes.

DEC 84 135P

PERSONAL AUTHORS: George, T. F.; Lin, J.; Berl, A. C.; Murphy, W. C.

REPORT NO. 55

CONTRACT NO. AFOSR-82-0048

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR

TR-85-0019

UNCLASSIFIED REPORT


ABSTRACT: (U) Theoretical techniques for describing laser-stimulated processes in a vacuum and at a gas-surface interface are presented. For adspecies-surface systems, the laser excitation of vibrational degrees of freedom is considered, and quantum-mechanical and classical models and also an almost first-principles treatment of the competition between multiphoton absorption and multiphonon relaxation are discussed. The laser excitation of electronic degrees of freedom is considered with respect to surface states of semiconductors and metals, for the predissociation of diatomic species on metal substrates, for ionization, and for resonance fluorescence of a gasous atom near a metal. In connection with gas-surface interactions, the influence of laser radiation on diffraction patterns and energy transfer in atom-surface scattering is explored. Collisional ionization and ion neutralization in the presence of laser radiation are discussed. The roles of partial pressures and surface coverage in laser-stimulated surface processes are analyzed. Finally, some ideas on surface waves and annealing are presented.

Originator furnished keywords include: Review article, Adspecies-surface systems, Desorption and migration, Resonance fluorescence, Surface states and charge transfer, Thermonic and phototectric ionization, Gas-surface interaction, Diffraction, Collisional ionization and Neutralization, Partial pressure and surface coverage.

DESCRIPTORS: (U) +Gas surface interactions, +Lasers, Electronic states, Vibrational spectra, Partial pressure, Surface waves, Annealing, Charge transfer, Laser induced fluorescence, Reprints, Ionization, Degrees of freedom, Neutralization

AD-A150 405 CONTINUED
A Rule for the Total Number of Topologically Distinct Feynman Diagrams.

ABSTRACT: (U) A rule for the total number of topologically distinct Feynman diagrams is presented for the ground state of a system of many identical particles interacting via a two-body potential. Keywords include: Feynman diagrams; Topologically distinct; Total number; Ground-state system; Identical particles; Two-body potential.

ABSTRACT: (U) Classes of 'ribbonlike' planar shapes can be defined by specifying an arc, called the spine or axis, and a geometric figure such as a disk or line segment, called the generator, that 'sweeps out' the shape by moving along the spine, changing size as it moves. Shape descriptions of this type have been considered by Blum, Brooks, Brady, and others. This paper considers such descriptions from the standpoints of both generation and recovery (i.e., given a shape generated in this way, to determine the axis and generation rule that gave rise to it), and discusses their relative advantages and disadvantages. Keywords include: Shape; Generalized Ribbons.

IDENTIFIERS: (U) Feynman diagrams, Topologically distinct, Identical particles, Two body potential

IDENTIFIERS: (U) Blum ribbons, WUAFOSR2304A7, PE61102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

CALEIFORNIA UNIV SANTA BARBARA DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Development of a Planar Heterojunction Bipolar Transistor for Very High Speed Logic.

DESCRIPTION NOTE: Annual technical rept. no. 2, 1 Oct 83-30 Sep 84, Nov 84 51P

PERSONAL AUTHORS: Long, S. I.

CONTACT NO. AFOSR-82-0344

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR

TR-84-1236

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this research project is to develop heterostructure bipolar transistors for very-high-speed logic. During the second year of effort, significant progress was made on (Al,Ga)As/GaAs HBTs of both emitter-down and emitter-up configurations, with current gains of 10 or greater being observed in both cases for base dopings which exceed emitter dopings. Structural modifications were evaluated which led to increased injection and reduced recombination currents. Annealing systems were constructed and characterized for activation of Be ion-implantations. Promising initial studies of (In,Ga)P/GaAs HBTs has led to their inclusion in this research project for the third year of effort.

DESCRIPTORS: (U) *Bipolar transistors, Logic circuits, High rate, Gallium arsenides, Doping, Emitters, Planar structures

IDENTIFIERS: (U) *Very high speed logic, PE61102F, WUAFOSR2305C1

UNCLASSIFIED REPORT

SEARCH CONTROL NO. EVLOSA

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) NMR Study of Polyethylene Crystallization Kinetics under High Pressure.

DESCRIPTION NOTE: Rept. for 30 Sep 83-29 Sep 84, 84 14P

PERSONAL AUTHORS: Brown, D. R., Jonas, J.

CONTACT NO. AFOSR-81-0010

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR

TR-84-1250

UNCLASSIFIED REPORT


ABSTRACT: (U) Crystallization of polyethylene under hydrostatic pressures of 1 - 4.5 kbar is directly observed using pulsed proton NMR. The rate of growth of extended-chain polyethylene crystals is measured over this pressure range and to a maximum temperature of 227 C. The observed crystallization isotherms are superimposible on a log time scale, this implies a consistent mechanism for extended-chain growth over this pressure range. Avrami coefficients for high-pressure extended-chain crystallization are determined to be 1.3 - 1.7. A decrease of crystal nucleus surface free energies with increasing pressure is indicated. Findings are consistent with Wunderlich's model of initial folded-chain crystallization followed immediately by chain extension. Future applications of this NMR technique are briefly considered. Originator-supplied key words include: Crystallization, Polyethylene, High pressure, Nuclear magnetic response.

DESCRIPTORS: (U) *Crystallization, *Polyethylene, Hydrostatic pressure, Reprints, High pressure, Kinetics, Isotherms

IDENTIFIERS: (U) WUAFOSR2303A3, PE61102F

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DTIC REPORT BIBLIOGRAPHY

AD-A150 283  20/10  7/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Aspects of Organotin Chemistry,
84  7P

PERSONAL AUTHORS: Dewar, M. J. S.; Grady, G. L.; Kuhn, D. R.
; Merz, K. M., Jr.

PROJECT NO. 2303

MONITOR: AFOSR
TR-85-0024

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of American Chemical

ABSTRACT: (U) MNDO (Modified neglect of differential
eral overlap) has been applied with success to four topics of
current interest in organotin chemistry, leading to
satisfactory interpretations of the mechanism for
hydrostannylation, the structures of sandwich and half-
sandwich cyclopentadienyltin compounds, the possibility
of multiple bonding by tin in distannene or
dimethylmethylenestannane, and the geometry of the
trimethylstannyl radical. Originator furnished keywords
include: Organotin chemistry.

DESCRIPTORS: (U) *Quantum theory, *Organometallic
compounds, *Tin compounds, Cyclic compounds, Dienes,
Methyl radicals, Chemical bonds, Reprints, Sandwich
construction

IDENTIFIERS: (U) Hydrostannylation, Tin/cyclopentadieny1,
MNDO (Modified Neglect of Differential Overlap). PE81102F,
WUAFOSR230382

AD-A150 282  20/10  7/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) MNDO Calculations for Compounds Containing Tin.
84  5P

PERSONAL AUTHORS: Dewar, M. J. S.; Grady, G. L.; Stewart, J.
J. P.

PROJECT NO. 2303

MONITOR: AFOSR
TR-85-0023

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of American Chemical

ABSTRACT: (U) The MNDO (Modified Neglect of Differential
Overlap) parametric SCF-MO treatment has been
parametrized for tin. Calculations are reported for a
number of compounds of tin. The results are comparable
with those for the third-period elements. We decided to
start with tin, for three reasons: first, because
organotin chemistry is not only interesting and varied
but is also playing an increasing role in organic
synthesis; second, because tin is a metal and MNDO
parameters are as yet available for only two metals; and
third, as a test of the applicability of the MNDO
formalism to elements of later periods. While the results
for bromine 14 and iodine 15 were satisfactory, univalent
elements cannot exhibit the variety of geometries and
types of bonding that polyatomic ones can. Originator
furnished keywords include: Compounds containing tin.

DESCRIPTORS: (U) *Organometallic compounds, *Quantum
theory, *Tin compounds, Computations, Parametric analysis,
Reprints

IDENTIFIERS: (U) Organotin, MNDO (Modified Neglect of
Differential Overlap). PE81102F, WUAFOSR230382
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

IDENTIFIERS: (U) Dication, WINDD(Modified Intermediate Neglect of Differential Overlap), PE81102F, WUAFOSR230382

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J DEPT OF MATHEMATICS

(U) A Concept of Local Observability.

OCT 84 9P

PERSONAL AUTHORS: Sontag, E. D.

CONTRACT NO. AFOSR-80-0198

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR
TR-85-0050

UNCLASSIFIED REPORT


ABSTRACT: (U) A notion of local observability, which is natural in the context of nonlinear input/output regulation, is introduced. A simple characterization is provided, a comparison is made with other local nonlinear observability definitions, and its behavior under constant-rate sampling is analyzed. Keywords: Observability; Sampling; Stabilization. (Author)

DESCRIPTORS: (U) *Statistical samples, Input output processing, Sampling, Reprints

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A6
How Lasers May Open the Last Frontier of Reaction Dynamics.

PERSONAL AUTHORS: George, T. F.

REPORT NO. 51

PROJECT NO. 2303

MONITOR: AFOSR TR-84-1253

UNCLASSIFIED REPORT


ABSTRACT: (U) A review of experimental results for laser control of chemical reactions is presented, with mention of corresponding theoretical progress. Two general classes of reactions are discussed: gas-phase reactions and reactions occurring at a gas-solid interface. For the first class the following topics are reviewed: state-selected reactions, new reaction pathways and transition-state spectroscopy. For the second class the following topics are reviewed: desorption, chemical vapor deposition, heterogeneous catalysis and microelectronics. Originator furnished keywords include: Review article; State-selected gas-phase reactions; New reaction/Pathways; Transition-state spectroscopy; Reactions at gas-solid interface; Desorption; Chemical vapor deposition; Heterogeneous catalysis; Microelectronics.

DESCRIPTORS: (U) Chemical reactions, Laser applications, Reaction kinetics, Desorption, Gases, Interfaces, Solids, Microelectronics, Vapor deposition, Catalysis, Spectroscopy, Reprints

IDENTIFIERS: (U) WU831303, PE61102F, WUA03R2303A2

UNCLASSIFIED
ABSTRACT: (U) Signals of M dimensions (M-1) can be reduced to one-dimensional data by integration over M-1 dimensions. This operation is known as the Radon transform. Many useful two-dimensional signal processing operations can be performed rapidly by first producing the one-dimensional projection data and operating on the projections with efficient one-dimensional processors, such as surface acoustic wave devices. Such operations as spectrum analysis, complex Fourier transformation, production of the Wigner distribution function, and convolution can be performed in this manner, and may be done more rapidly or more accurately than by more conventional methods. Keywords include: Optical data processing; Radon transform; Surface acoustic wave filters.

DESCRIPTORS: (U) *Radon, *Optical processing, Integration, Fourier transformation, Signal processing, Two dimensional, One dimensional, Optical data, Spectrum analysis, Acoustic filters, Surface acoustic waves, Distribution functions

IDENTIFIERS: (U) *Optical data processing, Radon transform


ABSTRACT: (U) MNDO (Modified Neglect of Differential Overlap) calculations are reported for the Claisen rearrangement of 3-oxa-1-hexene, for its various methoxy and cyano derivatives, and for the 2-methoxy-5-cyano derivative. The reactions are found to take place by a two-stage mechanism, analogous to that of the Cope rearrangement of 2,5-hexadiene but where the intermediate biradicaloid is not a stable species, undergoing conversion to the product without activation. The results agree with the available evidence concerning substituent effects and lead to verifiable predictions. Originator furnished keywords include: Claisen rearrangement.


IDENTIFIERS: (U) Claisen rearrangement, MNDO (Modified Neglect of Differential Overlap), PE81102F, WUAOSR230382
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

UNCLASSIFIED REPORT

ABSTRACT: (U) This report pertains to: (a) Stimulated Emission Pumping Studies of Formaldehyde. The Stimulated Emission Pumping (SEP) technique was applied for the first time to a polyatomic molecule, H2CO. SEP spectroscopy has provided an unprecedentedly complete picture of the structure of H2CO at high levels of excitation. (b) The H2CO S sub 0 yields H2+CO Barrier. Stark Quantum and Anticrossing Spectroscopy were used to measure the homogeneous width of two S sub 0 rotation-vibration levels near the top of the S sub 0 barrier. (c) Collisional Studies of H2CO A 1A sub 1 Level. Two pulsed-cw variants of SEP, Transient Gain and Transient Gain and Transient Polarization Spectroscopy enable measurement of single-J level collisional depopulation and depolarization rates and state-of-state transfer rates free of the multiple-collision effects and limited resolution of resolved fluorescence studies. (d) Spectroscopic Studies of Na2. Two new techniques were demonstrated. Modulated gain spectroscopy has allowed observation of the levels of Na2 states near the Na (2S level)+Na (2P level) dissociation limit. Perturbation facilitated Optical-Optical Double Resonance has made the Na2 triplet valence and Rydberg states accessible to sub-Doppler spectroscopy. Originator furnished keywords include: Spectroscopy, Vibrational structure, Optical-optical double resonance, Molecular dynamics, Anharmonic vibrational constants, Electric dipole moment, Coriolis perturbations, Quantum chaos, Anticrossing and Quantum Beat spectroscopy, Barrier to Dissociation, Rotational energy transfer, and Formaldehyde.

IDENTIFIERS: (U) SEP (Stimulated Emission Pumping), Anticrossing spectroscopy, Quantum beat spectroscopy, WUAFOSR2303B1, PE61102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

UNCLASSIFIED

AD-A150 308  20/8  20/10  7/3
TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) The C4H7(+) Potential Surface, 84  6P

PERSONAL AUTHORS: Dewar, M. J. S.; Reynolds, C. H.

PROJECT NO.  F49620-83-C-0024

PROJECT NO.  2303

MONITOR: AFOSR  TR-85-0021


ABSTRACT:  (U) WINDD(Modified Intermediate Neglect of Differential Overlap)/3 calculations are reported for the C4H7(+) systems. Contrary to conclusions from ab initio calculations but in agreement with experiment, the cyclopropylcarbinyl cation and cyclobutyl cation are both predicted to correspond to minima on the potential surface, the latter being indeed the lower in energy and having a nonclassical structure with a relatively strong transannular bond, corresponding to 1-protonated bicyclobutane. The cyclopropylcarbinyl cation is best formulated as a 1 complex. Interconversion of the two isomers was studied and also their conversions to the alpha-methylic yl cation. The formation of 1-substituted 3-butenes does not take place via 3-buten-1-yl cation. Originator furnished keywords include: C4H7(+) potential surface.


IDENTIFIERS:  (U) Carbonyl radicals, WINDD(Modified Intermediate Neglect of Differential Overlap), WUAFOSR20303B1, PE81102F

SEARCH CONTROL NO. EVLOSA

AD-A150 307  20/8  7/3
CHICAGO UNIV IL JAMES FRANCK INST

(U) Relaxation of Large Molecules Following Ultrafast Excitation.

NOV 84  5P

PERSONAL AUTHORS: Lorincz, A.; Novak, F. A.; Rice, S. A.

PROJECT NO.  F49620-83-C-0003

PROJECT NO.  2303

MONITOR: AFOSR  TR-85-0020


ABSTRACT:  (U)  We demonstrate that the ultrafast relaxation observed in the excited states of large organic molecules in solution may be understood as the coherent evolution of the initially prepared non-stationary state. It is shown that under femto-second excitation conditions the relaxation is determined by the characteristics of the light pulse. The analysis of a simple pump-probe experiment suggests a way of measuring the characteristics of ultrashort pulses. The case of fluorescence excited by ultrafast pulses is also analyzed. Originator furnished keywords include: Vibrational relaxation; Coherent processes; Characterization of ultrashort pulses.

DESCRIPTORS:  (U) *Molecular vibration, *Molecular states, Coherence, Fluorescence, Light pulses, Relaxation, Molecules, Organic compounds, Short pulses, Excitation, Reprints

IDENTIFIERS:  (U) WUAFOSR20303B1, PE81102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 310 CONTINUED

DESCRIPTORS: (U) *Ketones, *Photochemical reactions, Isotropism, Photolysis, Solid phases, Absorption, Liquid crystals, Isomers, Cyclic compounds, Butanols, Stearates, Chemical radicals, Reprints

IDENTIFIERS: (U) Smectic phase, Alkyl pherones, Biradicals, WUAFOSR230382, PE81102F

SEARCH CONTROL NO. EVLOSA

AD-A150 309 7/4

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DAVEY LAB

(U) Solids Analysis Using Energetic Ion Bombardment and Multiphoton Resonance Ionization with Time-of-Flight Detection

DESCRIPTIVE NOTE: Technical rept.,

DEC 84 13P

PERSONAL AUTHORS: Kimock, F. M.; Baxter, J. P.; Pappas, D. L.; Kobrin, P. H.; Winograd, N.;

REPORT NO. TR-7

CONTRACT NO. N00014-83-K-0052, AFOSR-82-0057

MONITOR: AFOSR

TR-85-0224

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Analytical Chemistry, v56 n14 p2782-2791 Dec 84.

ABSTRACT: (U) Recently multiphoton resonance ionization (MPRI) has been coupled with energetic ion bombardment to yield a highly efficient and selective tool for solids analysis. Although this method promises to yield sub-part-per-billion determinations for many elements without chemical alteration of the matrix, there are a number of experimental factors which may ultimately limit the sensitivity of the technique. Among these factors are (a) duty cycle, (b) primary ion current, (c) sputter yield, (d) useful fraction of ejected particles, and (e) detection efficiency. In this paper we discuss the origin of these factors and their influence on the use of MPRI of sputtered neutrals as a tool for the elemental analysis of solids. Originator furnished key words include: Sputtering, Multiphoton resonance ionization.


IDENTIFIERS: (U) Multiphoton resonance ionization
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 310 CONTINUED

ray astronomy.

DESCRIPTIONS: (U) *Detectors, *Gamma rays, Avionics, Astronomy, Germanium, Bismuth compounds, Germanates, Scintillation, Alpha particles, Beta particles, Radiation shielding, Space missions, Signal to noise ratio. Space shuttles

IDENTIFIERS: (U) GRAD(Gamma Ray Advanced Detectors), Bismuth germanates, *Gamma ray detectors, Scintillators, Gamma ray astro. PE81102F. WUAFOSR2309A1

AD-A150 310 7/5

COLUMBIA UNIV  NEW YORK DEPT OF CHEMISTRY

(U) Type II Photochemistry of Ketones in Liquid Crystalline Solvents. The Influence of Ordered Media on Biradical Dynamics.


84 8P

PERSONAL AUTHORS: Hrovat, D. A.; Liu, J. H.; Turro, N. J.; Weiss, R. G.

CONTRACT NO. AFOSR-81-0013, NSF-CHE81-20730

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-84-1249

UNCLASSIFIED REPORT


ABSTRACT: (U) The Norrish type II photochemistry of five alkylphenones, PhCO(CH2)nH (1a, n=4; 1b, n=10; 1c, n=17; 1d, n=19; 1e, n=21), 10-nonadecanone (2), and 2-undecanone (3) was studied in the isotropic, smectic, and solid phases of n-butyl stearate. The ratio of elimination-to-cyclization products for ketones 1c-e and 2 exhibits a strong phase dependence with a 7-8-fold increase in the smectic phase relative to the isotropic phase. The ratio of isomeric cyclobutanols from 2 shows a similar change. Further increases in the elimination-to-cyclization ratio are observed for 1d in the solid phase. The product ratios for ketones 1a, 1b, and 3 are the same in all the phases studied. Transient absorption studies on the intermediate 1,4-biradical produced from laser flash photolysis of 1d yield lifetimes of 64 or - 5 and 70 + or - 5 ns in the isotropic and smectic phases, respectively. These results are explained in terms of the structures of the various phases of n-butyl stearate and the accepted behavior of Norrish type II biradicals. Originator furnished keywords include: Alkylphenones, Norrish type II biradicals, Isotropic phase, Smectic phase.
FLORIDA UNIV GAINESVILLE SPACE ASTRONOMY LAB

(U) Shuttle Flight Test of an Advanced Gamma-Ray Detection System.

DESCRIPTION NOTE: Semi-annual technical rept. 1 Jul-31 Dec 83.

FEB 84 21P

PERSONAL AUTHORS: Rester, A. C., Jr;

CONTRACT NO. F48620-83-C-0131, ARPA Order-4585

PROJECT NO. 2309

TASK NO. A1

MONITOR: AFOSR

TR-84-1258

ABSTRACT: (U) In August of 1983 the Gamma-Ray Advanced Detector (GRAD) Project was assigned to the AFPRP-675 Program for flight on a future Space Shuttle mission. In order to adapt the experiment to the requirements of AFPRP-675 we are making a number of changes, both in hardware and software. However, the necessity for such changes is more than affected by an expansion in scope of the experiment made possible by the introduction of a Payload Specialist into the operation. The principal changes to be made are in the avionics, as GRAD was originally designed for operation through ground-based telemetry. This complete redesigning of our avionics to accommodate operation by a Payload Specialist from the aft flight deck of the Orbiter allows us to take advantage of very recent findings on radiation-induced microprocessor failure in other space shuttle experiments in order to make the GRAD avionics less vulnerable to such latch-ups. Advances in bismuth germanate (BGO) scintillator technology during the year since construction of the prototype GRAD now make it possible for us to construct a BGO shield with a closed-ended geometry. This improvement will enhance the signal-to-noise ratio. In addition we are experimenting with a new type of decay-vetoed calibration probe using an alpha-rather than a beta-emitting radioactive source. Keywords include: Gamma-ray detectors, Bismuth germanate, Germanium detectors, Gamma-
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 324 12/1
PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS
(U) Multivariate Analysis and Its Applications.

DESCRIPITIVE NOTE: Final rept. 15 Dec 81-30 Sep 84.
NDV 84 34P

PERSONAL AUTHORS: Krishnaiah, P. R.; Rao, C. R.

PROJECT NO. 2304

MONITOR: AFOSR
TR-85-0008

UNCLASSIFIED REPORT

ABSTRACT: (U) A summary of the work done under the contract is reported here. The work involved a broad spectrum of topics in the area of multivariate analysis. These topics include contingency tables, distribution theory, selection of variables, classification and pattern recognition and statistical inference. Keywords include: Multivariate analysis; Reliability; Contingency tables; Multivariate distributions; Selection of variables; Classification & Pattern recognition; and Statistical inference.

DESCRIPTORS: (U) *Multivariate analysis, Classification, Distribution theory, Reliability, Statistical inference, Pattern recognition, Selection, Variables

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5

AD-A150 324

SEARCH CONTROL NO. EVLOSA

AD-A150 323 12/1 22/2
CALIFORNIA UNIV LOS ANGELES
(U) Approximation in Optimal Control and Identification of Large Space Structures.

DESCRIPITIVE NOTE: Final scientific rept. 15 Aug 83-14 Aug 84.
JAN 85 18P

PERSONAL AUTHORS: Gibson, J. S.

PROJECT NO. AFOSR-83-0317

TASK NO. 2304

MONITOR: AFOSR
TR-85-0049

UNCLASSIFIED REPORT

ABSTRACT: (U) This project dealt with the application of distributed system theory to control and identification of large flexible space structures. The main analytical tools were control theory for infinite dimensional systems and approximation theory for distributed systems. Both theoretical results and practical numerical approximation schemes were developed. The research dealt with both continuous-time and discrete-time control and identification. In each case, an ideal infinite dimensional compensator was used to guide the design of implementable finite dimensional compensators. Most of the research dealt with optimal linear-quadratic control theory, but significant preliminary results were obtained on infinite dimensional autoregressive-moving-average models of distributed systems. These models will be used in adaptive control and identification of flexible space structures. Subject terms: Control of space structures; distributed system theory; infinite dimensional control theory; approximation theory.


IDENTIFIERS: (U) ARMA(Autoregressive moving average),

AD-A150 323
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 326 12/1

DESCRIPTIVE NOTE: Technical rept., 84 24P
PERSONAL AUTHORS: Trivedi, K. S.; Ciardo, G.; Bobbio, A.; Dugan, J. B.

CONTRACT NO.: AFOSR-84-0132
PROJECT NO.: 2304
TASK NO.: A5
MONITOR: AFOSR TR-85-0013

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper describes the philosophical differences between three current Stochastic Petri Net models in an attempt to merge the most important (and non-contradictory) aspects into one. It previews the design of a package for the solution of this unified model.

DESCRIPTORS: (U) *Stochastic processes, Mathematical models

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5

SEARCH CONTROL NO. EVLOSA

AD-A150 325 12/1
PITTSBURGH UNIV PA CENTER FOR MULTIVARIATE ANALYSIS (U) A Note about the Strong Convergence of the Nonparametric Estimation of a Regression Function.

DESCRIPTIVE NOTE: Technical rept., SEP 84 10P
PERSONAL AUTHORS: Fang, Z.

REPORT NO.: TR-84-45
CONTRACT NO.: F48620-82-K-0001
PROJECT NO.: 2304
TASK NO.: A5
MONITOR: AFOSR TR-85-0005

UNCLASSIFIED REPORT

ABSTRACT: (U) Consider the regression model that are unordered design variables, g unknown function defined with mean 0 and finite moment of order p 1. The asymptotic behavior of estimator g sub n are studied. Keywords include: Nonparametric regression; kernel estimation; large sample property.

DESCRIPTORS: (U) *Linear regression analysis, Functions(Mathematics); Convergence, Nonparametric statistics, Estimates

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5

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DTIC REPORT BIBLIOGRAPHY

AD-A150 328            20/3
RANDOM APPLICATIONS INC MONTROSE CO

(UN) On Filter Binary Processes.

DESCRIPTIVE NOTE: Technical rept.,

NOV 84            40P

PERSONAL AUTHOR(S): Pawula, R. F.; Rice, S. O.

CONTRACT NO. F49620-83-C-0085

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR
TR-85-0055

UNCLASSIFIED REPORT

ABSTRACT: (UN) The problem of calculating the probability density function of the output of an RC filter driven by a binary random process with intervals generated by an equilibrium renewal process is studied. New integral equations, closely related to McFadden's original integral equations, are derived, and solved by a matrix approximation method and by iteration. Transformations of the integral equations into differential equations are being investigated. Some numerical results which compare the matrix and iteration solutions with both exact solutions and approximate solutions based upon the Fokker-Planck equation are presented. (Author).

DESCRIPTORS: (UN) *Electric filters, Electrical resistance, Output, Fokker-Planck equations, Iterations, Solutions(General), Probability density functions, Integral equations

IDENTIFIERS: (UN) Binary random processes, RC filters, Equilibrium renewal, PE81102F, WUAFOSR2304A8

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SEARCH CONTROL NO. EVLOSA

NORTHEASTERN UNIV EVANSTON IL DEPT OF CIVIL ENGINEERING

(UN) Dynamic Effects on Fracture.

DESCRIPTIVE NOTE: Final rept. 1 Jul 78-30 Sep 83.

OCT 83            19P

PERSONAL AUTHOR(S): Achenbach, J. D.

CONTRACT NO. AFOSR-78-3589

PROJECT NO. 2307

TASK NO. B2

MONITOR: AFOSR
TR-85-0062

UNCLASSIFIED REPORT

ABSTRACT: (UN) A summary and a bibliography are presented of the investigations on dynamic effects on fracture in elastic and elastic-plastic materials which were carried out at Northwestern University under the sponsorship of the Air Force Office of Scientific Research during the period July 1, 1978 - September 30, 1983. Two main areas are investigated: high rate loads on bodies containing cracks, and fast fracture and crack arrest. Inertial and crack tip plasticity effects are investigated for a stationary crack under rapid loading. Dynamic analysis of fast fracture and crack arrest using a Dugdale model is formulated and numerically solved. Elastodynamic stress intensity factors are investigated for various subsurface crack geometries, including Mode III analytical solutions and approximate mixed Mode I-II solutions. Elastic-viscoelastic fast fracture and crack arrest are studied using Bodner-Partom constitutive modeling. Crack kinking under stress wave loading is analyzed rigorously for Mode III, and mixed Mode I-II is approximated. Originator furnished key words include: Crack propagation, Near tip fields, Elastic plastic behavior, Crack arrest, Crack kinking.


IDENTIFIERS: (UN) PE81102F, WUAFOSR230782

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exist between the photochemical reactions of metal-tetrazadiene complexes and their fragmentation pathways in a mass spectrometer. Originator furnished keywords include: Cyclopentadienylcobalt 1,4-Diaryl tetrazadienes; Photolysis; Metal dinitrene; Metal-tetrazadiene complexes.


Identifiers: (U) Dinitrenes, WUAF0SR2303B2, PE81102F
Lattice Filter Parametrization and Modeling of Nonstationary Processes,

JAN 84 17P

PERSONAL AUTHORS: Lev-Ari, H.; Kailath, T.

CONTRACT NO.: DAAG29-81-K-0057, AFOSR-83-0228

PROJECT NO.: 2304

TASK NO.: A6

MONITOR: AFOSR, ARO

TR-84-1286, 16946.65-MA

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Information Theory, vIT-30 no p2-18 Jan 84. Also available as ARO-18193.32-EL.

ABSTRACT: (U) A general theory of constant-parameter modular lattice models for discrete-time nonstationary second-order processes in terms of Schur and congruence coefficients is derived by developing a natural connection between the displacement structure of a covariance matrix and Schur's test for positive-definiteness of matrices. Schur coefficients provide a simple solution to problems of covariance extension and rational spectral approximation for nonstationary covariances, and they coincide with the well-known reflection (or PARCOR) coefficients when the covariance is stationary. The congruence coefficients provide the time-varying gains of a tapped-delay-line realization of the whitening filter for the process. A constant-parameter realization of the same filter is derived by combining a lattice filter structure with a tapped delay line, both with time-invariant gains. This configuration also provides a recursive relation for the congruence coefficients (namely, a generalized Levinson-Szego recursion). The tapped-delay-line part of the realization can be eliminated by introducing the concept of admissibility. Admissibility also reduces the parametrization of a nonstationary process to Schur coefficients alone, in analogy to stationary processes, which are completely characterized by their PARCOR coefficients. Keywords include: Lattice filters; parameterization; nonstationary processes; second-order processes; tapped delay.

DESCRIPTORS: (U) Mathematical filters, Matrices (Mathematics), Reprints, Parametric analysis, Stationary, Covariance

IDENTIFIERS: (U) Lattice filters, WUAFOSR2304A8, PE81102F
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 198  8/11

SAINT LOUIS UNIV   MO   DEPT OF EARTH AND ATMOSPHERIC
SCIENCES

(U) Attenuation of Seismic Waves at Regional Distances.

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 82-30 Sep
84.

NOV 84  132P

PERSONAL AUTHORS: Nultin, O. W.; Mitchell, B. J.;

CONTRACT NO. F49620-83-C-0015, ARPA Order-4397

MONITOR: AFOSR
TR-84-1272

UNCLASSIFIED REPORT

ABSTRACT: (U) The coda-Q method was applied to determine
the anelastic attenuation of 1-sec period Lg waves at
NTS(Nevada Test Site), East Kazakhstan, the Indian
subcontinent, and the South American continent. M(Q) m
sub b (Lg) versus explosion yield calibration curves are
given for NTS explosions in hard rock and in alluvium.
The NTS hard-rock calibration curve, when applied to
explosions in other regions of the United States and in
the French Sahara, gives realistic yield estimates. The
technique also is applied to selected Soviet explosions
in East Kazakhstan. M sub b (Lg) and M sub b (P) values were
used to estimate the M sub b (P) bias between NTS and
eastern North America. Assuming that explosions and
earthquakes of the same M sub b (P) value excite Lg waves
of equal amplitude, the P-wave magnitude bias between NTS
and eastern North America. Assuming that explosions and
earthquakes of the same M sub b (P) value excite Lg waves
of equal amplitude, the P-wave magnitude bias between NTS
and eastern North America is 0.31 magnitude units. A
tentative value for the bias between NTS and Shagan River
is 0.41 magnitude units, but this value may be changed.
Frequency-dependence of crustal Q seems significant in
regions of high Q, but are small or non-existent in
regions of low Q values. Keywords include: Lg waves,
Magnitude, Surface waves, Spectra, Nuclear explosions,
and Seismic yield.

DESCRIPTORS: (U) *Seismic data, *Rock, *Seismic waves,
South America, Range(Distance), Bias, Excitation, Primary
waves(Seismic waves), Statistical analysis, Alluvium,

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Earthquakes, Saharan Africa, Calibration, Curved profiles,
Hardness, Nuclear explosions, Attenuation, Elastic
properties, North America, Regions, USSR, Yield, Surface
waves, Estimates.

IDENTIFIERS: (U) Anelastic attenuation, Coda Q method,
Nevada test site, Kazakh(USSR), Seismic magnitude, Lg
waves, PEB2714E
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 196 20/8

ARIZONA UNIV TUCSON OPTICAL SCIENCES CENTER

(U) Research in the Optical Sciences.

DESCRIPTIVE NOTE: Final rept. 1 Oct 78-30 Sep 84.

OCT 84 87P

PERSONAL AUTHORS: Shannon, R. R.;

 CONTRACT NO. F49620-80-C-0022, MIPR-ARO-103-83

MONITOR: ARO, AFOSR 15412.20-PH, TR-85-0132

UNCLASSIFIED REPORT

ABSTRACT: (U) Research during the fifth year of contract F49620-80-C-0022 is described. Discussed are: optical bistability in thin evaporated films; long-range surface-plasmon polaritons; nonlinear guided wave interactions; theory of two-photon Doppler-free spectroscopy; x-ray image intensifiers with electronic readout; optical bistability; optical bistability experiments to improve solid-state devices and basic understanding; modulated emittance spectroscopy; high-resolution wavefront sensing through the atmosphere; aberrated Gaussian beams; ion beam processing of optical coatings on plastics; optical coatings for the x-ray to ultraviolet wavelength range. The degrees awarded to students receiving USOP support are listed. Also included are the papers published under USOP support from 1978 to 1983. Originator-supplied keywords include: Optics, and Optical sciences.

DESCRIPTORS: (U) Optics, Optical properties, Stability, Thin films, Plasmons, Ultraviolet spectra, Research management, Detection, High resolution, Wavefronts, Spectroscopy, Optical coatings, Ion beams, Processing, Solid state electronics, Image intensifiers(Electronics)

IDENTIFIERS: (U) Polaritons

SEARCH CONTROL NO. EVLOSA

AD-A150 193 12/1

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) Schur-Ostrowski Theorems for Functionals on L1(0,1).

DESCRIPTIVE NOTE: Technical rept.,

AUG 84 28P

PERSONAL AUTHORS: Chan, W.; Proschan, F.; Sethuraman, J.;

 REPORT NO. FSU-STATISTICS-MB84, TR-D-89-ARO

 CONTRACT NO. F49920-82-K-0007, DAAG29-82-K-0188

 PROJECT NO. 2304

TASK NO. A5

 MONITOR: AFOSR, ARO TR-84-1245, 19367.21-MA

SUPPLEMENTARY NOTE: Also available as Rept. no. TR-84-171-AFOSR.

ABSTRACT: (U) Hardy, Littlewood and Polya (1934) introduced the partial ordering of majorization among n-dimensional real vectors. Many well known inequalities can be recast as the statement that certain functions are increasing with respect to this ordering. Such functions are said to be Schur-convex. An important result in the theory of majorization is the Schur-Ostrowski Theorem, which characterizes Schur-convex functions. The concept of majorization has been extended to elements of L sub 1(0,1) by Ryff (1983). A functional on L sub 1(0,1) that is increasing with respect to the ordering of majorization is said to be Schur-convex. In this paper, the authors prove an analogue of the Schur-Ostrowski condition which characterizes Schur-convex functionals in terms of their Gateaux differentials. They also introduce another partial ordering in L sub 1(0,1) called unrestricted majorization. This partial ordering is similar to majorization but does not involve the use of decreasing rearrangements. The authors establish a characterization of non-decreasing functionals on L(0,1) with respect to the partial ordering of unrestricted majorization through another analogue of the Schur-Ostrowski condition. Keywords include: Inequalities;
**UNCLASSIFIED**

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<td>majorization; Muirhead's theorem; peakedness in symmetric distribution; rearrangement; Schur functions; Schur-Ostrowski's theorem.</td>
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<td><strong>DESCRIPTORS:</strong> (U) <em>Functional analysis, Theorems</em></td>
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<td><strong>IDENTIFIERS:</strong> (U) Schur functions, Schur-Ostrowski theorems, WUAFOSR2304A85, PE60112F</td>
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<td>FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS</td>
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<tr>
<td>(U) Optimal Allocation of Components in Parallel-Series and Series-Parallel Systems.</td>
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<td><strong>DESCRIPTIVE NOTE:</strong> Technical rept..</td>
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<td>NOV 84 32P</td>
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<tr>
<td><strong>PERSONAL AUTHORS:</strong> El-Neweihi,E. ;Proschan,F. ;Sethuraman, J. ;</td>
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<td><strong>REPORT NO.</strong> FSU-TR-M690, TR-D-73-ARO</td>
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<td><strong>CONTRACT NO.</strong> DAAG29-82-K-0168, AFOSR-80-0170</td>
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**UNCLASSIFIED REPORT**

**SUPPLEMENTARY NOTE:** Prepared in cooperation with Illinois Univ. Chicago, IL. Dept. of Mathematics. Sponsored in part by Grant AFOSR-82-K-0007.

**ABSTRACT:** (U) This paper considers the problem of optimal allocation of components to parallel-series and series-parallel systems to maximize the reliability of the system or the expected number of working subsystems. For parallel-series systems the optimal allocation is completely described and it depends only on the ordering of component reliabilities. For series-parallel systems, we describe a partial ordering among allocations that can lead to the optimal allocation. The powerful techniques of Schur functions are used to obtain these results. Finally, we describe how these problems can be cast as integer linear programming problems and therefore can also be attacked by other methods. Keywords include: Reliability; Optimal allocation; Schur functions; Integer programming.


**IDENTIFIERS:** (U) Schur Functions
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

AD-A150 167 11/2 20/3 20/13 7/2

BATTLE PACIFIC NORTHWEST LAB RICHLAND WA

(U) Electrical and Thermal Transport Property Studies of
High-Temperature Thermoelectric Materials.

DESCRIPTIVE NOTE: Interim rept. 15 Aug 83-15 May 84.

JUL 84 105P

PERSONAL AUTHORS: Bates, J. L.; Garnier, J. E.; Olsen, L. C.
; Griffin, C. W.;

CONTRACT NO. F49620-83-C-0109

MONITOR: AFOSR
TR-84-1210

UNCLASSIFIED REPORT

ABSTRACT: (U) The first year of this research emphasized
the study of electronically conducting oxides with varied
transport characteristics, an evaluation of theoretical
models, and the determination of a high-temperature
transport property database. Oxide systems based on SnO2-
In2O3, (La, Y) (Mg,Ca,Sr) CrO3, Ho2-xDy-In3O3 and La(Sr)
MnO3 were selected for initial studies and represent
different crystallographic/defect structures and
transport characteristics. The electrical conductivity,
Seebeck coefficient and thermal conductivity for these
oxides are being measured and have provided a preliminary
data base for evaluating transport properties and the
figure of merit. The purpose of this report is to
describe the technical results obtained during the first
year's study of high-temperature thermoelectric materials.
The scope of the research is (a) to develop theoretical
models for electrical, thermal, and thermoelectric
behavior of refractory oxide materials, (b) to determine
electrical transport properties necessary to develop and
test these models, (c) to determine methods for
increasing the figure of merit in refractory oxide
systems by varying composition, defect structure,
microstructure, etc., and (d) to use these models to
establish theoretical and empirical limits of the figure
of merit for these oxides and other refractory materials.

DESCRIPTORS: (U) @Electrical properties, @Refractory
materials, @Transport properties, @Oxides, @Thermal
properties, Crystal defects, Electrical conductivity,
High temperature, Thermoelectricity, Data bases.

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Electrical properties, Microstructure, Thermal
conductivity

IDENTIFIERS: (U) High temperature thermoelectric
materials
UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY

COLORADO UNIV AT BOULDER

(U) Ion Transport in Beam-Plasma Interactions.

DESCRIPTIVE NOTE: Annual rept. 30 Sep 83-30 Sep 84.
SEP 84 8P

PERSONAL AUTHOR(S): Stern, R. A.;

REPORT NO. 153-3223

CONTRACT NO. AFOSR-83-0325

PROJECT NO. 2310

TASK NO. A7

MONITOR: AFOSR
TR-84-1257

UNCLASSIFIED REPORT

ABSTRACT: (U) This interim report covers work performed on the topic of laser-fluorescence measurements of ion beam scattering and transport of background ions during beam-plasma interactions. Achievements to date include: (1) construction and operation of the plasma device, (2) assembly of a diagnostic pulsed laser, and (3) assembly and emplacement of the detection system. Future work plans, personnel changes and general scientific activities are described. Originator furnished keywords include: Ion beams, Beam-plasma interactions, Plasmas, Diagnostics, Laser diagnostics, Ion transport, and Beam scattering in plasmas.


IDENTIFIERS: (U) *Beam plasma interactions, Laser diagnostics, Beam scattering, WUAFOSR2310A7, PEB1102F

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this research was to obtain increased understanding of turbulent combustion in flows related to propulsion systems. Measurement and data analysis techniques, and the boundary conditions of various flames were designed to provide improved concepts and fundamental experimental data, to aid the development of modelling techniques for practical combustion systems. The specific approach of the study was to quantify the roles of large eddies (coherent structures) in reacting flows. The experiments and measurement techniques which have been developed to attain this aim were described in previous Interim Scientific Reports. Measurements during the past year have been made in the initial region of gaseous jet flames with separate variation in Reynolds number and equivalence ratio. These measurements have produced detailed data on the structure of the initial regions of jet diffusion flames, as a function of systematic variation of initial burner nozzle conditions. This data is already recognized to be of considerable use for combustion modelling. Two associated experiments, investigating the structures of turbulent liquid fuel sprays and impinging flames have been carried out during the period of the contract.


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SHEFFIELD UNIV (ENGLAND) DEPT OF CHEMICAL ENGINEERING AND FUEL TECHNOLOGY

(U) Coherent Structures in Turbulent Flames.

DESCRIPTIVE NOTE: Final rept., OCT 83 32P

PERSONAL AUTHOR(S): Chigier, N. A.;

CONTRACT NO. AFOSR-77-3414

MONITOR: AFOSR
TR-84-1275

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SAINT LOUIS UNIV MO DEPT OF EARTH AND ATMOSPHERIC SCIENCES

(U) Lg Wave Excitation and Propagation with Application to Nuclear Yield Determination.

DESCRIPTIVE NOTE: Semi-annual rep't. no. 3, 1 Apr-31 Oct '84.

NOV 84 99P

PERSONAL AUTHORS: Herrmann, R. B.; Wang, C. Y.;

CONTRACT NO. F49620-83-C-0087, ARPA Order-4751

MONITOR: AFOSR

TR-84-1271

UNCLASSIFIED REPORT

ABSTRACT: (U) Studies of seismic wave propagation in heterogeneous media are continued. A detailed study of the Cerveny-Psenick ray tracing program SEIS81 is made by comparing results to those obtained by full wavenumber integration and Cagniard-de Hoop techniques. Programming errors were detected in the subroutines AMPL and COEF8 which led to incorrect amplitudes of free surface reflections of shear waves. These errors are present in SEIS83 and in other programs which use these routines. The other result obtained consists of initial formulation and testing of algorithms for deterministic scattering of surface waves by point scatterers. Initial results are promising, yielding qualitative agreement with observed data. First order scattering theory can be made to fit onto small minicomputers. Initial results point out the importance of the source-scatterer-receiver distance, mode conversion and wavetype conversion. Keywords include: Lg coda; Coda Q; Seismic wave scattering; Synthetic seismograms.

DESCRIPTORS: (U) *Seismic waves, Amplitude, Seismic reflection, Secondary waves, Algorithms, Theory, Heterogeneity, Determination, Yield(Nuclear explosions), Computer programming, Errors, Wave propagation, Determinants(Mathematics), Conversion, Scattering, Shear properties, Subroutines, Seismic data, Synthesis, Minicomputers, Surface waves

IDENTIFIERS: (U) Lg Coda, SEIS81 computer program, Point

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