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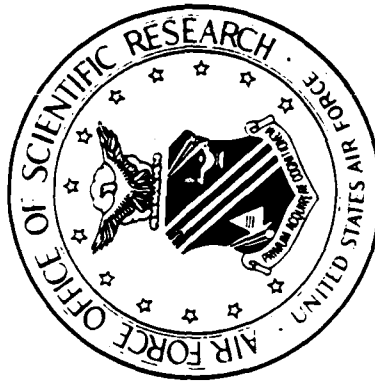
**AIR FORCE OFFICE OF SCIENTIFIC RESEARCH**

(2)

**Air Force Systems Command**

**AFOSR**

**TECHNICAL REPORT SUMMARIES**



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**AFOSR**  
**TECHNICAL REPORT SUMMARIES**  
**THIRD QUARTER 1985**

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**TECHNICAL DOCUMENTS SECTION**  
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INTRODUCTION

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

1) SUBJECT INDEX

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

2) PERSONAL AUTHOR INDEX

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PURPOSE

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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.

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

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

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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.

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Date - Date of the technical report.

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

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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.



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

**Descriptors** - Key words describing the research.

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- \*ZIZAK, G. \* \* \*  
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AD-8092 920L 7/4 20/9

CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

(U) New Plasma Heating Ideas. Part 7. Experimental Facts on Plasma Ion Heating in a Biased Q-Machine by a Current-Driven Collisionless Drift Instability.

(U) International Conference on Phenomena in Ionized Gases (14th) Held at Grenoble, France on 9-13 July 1979.

DESCRIPTIVE NOTE: Scientific rept. Oct 77-Nov 78.

DESCRIPTIVE NOTE: Rept. for 9-13 Jul 79.

JAN 79 48P

AUG 79 16P

PERSONAL AUTHORS: Hatakeyama, R. ;

PERSONAL AUTHORS: Cap, F. ;

REPORT NO. SR-158

REPORT NO. SCIENTIFIC-168

CONTRACT NO. F44620-75-C-0008

CONTRACT NO. F44620-75-C-0008

PROJECT NO. 9751

PROJECT NO. 9751

TASK NO. 03

TASK NO. 03

MONITOR: AFOSR  
TR-85-0305

MONITOR: AFOSR  
TR-85-0311

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DESCRIPTORS: (U) \*PLASMA WAVES, \*ELECTRON BEAMS, \*ENERGY TRANSFER, Q FACTORS, ION ION INTERACTIONS, CONVECTION, DRIFT, HEATING, IONS, LINEARITY, THEORY, MAGNETIC FIELDS, COMPUTATIONS, NUMERICAL ANALYSIS, DISPERSION RELATIONS, AMPLITUDE, ESTIMATES, LOW FREQUENCY, PLASMAS(PHYSICS), STEADY STATE, ELECTRONS, VELOCITY, STOCHASTIC PROCESSES, TURBULENCE, AUSTRIA

DESCRIPTORS: (U) \*AFTERGLOWS, \*PLASMAS(PHYSICS), Q FACTORS, MOLECULAR VIBRATION, IONS, SYMPOSIA, EXCITATION, KRYPTON, ARGON, PURITY, GRIDS, ION ION INTERACTIONS, MOLECULES, LINEARITY, STABILITY, AUSTRIA

IDENTIFIERS: (U) Collisionless plasmas, Plasma instabilities, PEG1102F, WUAFOSR975103

IDENTIFIERS: (U) Trivel piece-Gould modes, Plasma instabilities, PEG1102F, WUAFOSR975103

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AD-8092 888L 20/9

CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

(U) Numerical Calculation of Trivelpiece-Gould Modes in a Circular Torus.

DESCRIPTIVE NOTE: Rept. for Mar 78-Mar 79.

APR 79 26P

PERSONAL AUTHORS: Keil, R. :

REPORT NO. SCIENTIFIC-162

CONTRACT NO F44620-75 C-0006

PROJECT NO. 9751

TASK NO. 03

MONITOR: AFOSR  
TR-85-0310

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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) \*PLASMAS(PHYSICS), EIGENVECTORS, PARTIAL DIFFERENTIAL EQUATIONS, NUMERICAL METHODS AND PROCEDURES, RESONATORS, TOROIDS, ELECTROSTATICS, AUSTRIA

IDENTIFIERS: (U) Ritz-Galerkin method, \*Trivelpiece-Gould modes, PE61102F, WUAFOSR975103

AD-8092 888L

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AD-8092 081L 20/9

CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

(U) Ion Acoustic Instability Driven by an Electron Flux Towards the Hot Plate in a Single-Ended Q-Machine.

DESCRIPTIVE NOTE: Rept. for Jun-Sep 79.

OCT 79 12P

PERSONAL AUTHORS: Popa, G. ;Schrittwieser, R. :

REPORT NO. SCIENTIFIC-188

CONTRACT NO. F49620-80-C-0016

PROJECT NO. 9751

TASK NO. 03

MONITOR: AFOSR  
TR-85-0304

UNCLASSIFIED REPORT

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DESCRIPTORS: (U) \*PLASMA CONTROL, AXES, ELECTRIC CURRENT, ELECTRONS, ACOUSTICS, IONS, STABILITY, ELECTRON FLUX, PLASMAS(PHYSICS)

IDENTIFIERS: (U) Ion acoustic instability, PE61102F, WUAFOSR975103

AD-8092 081L

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AD-8091 874L 20 9

CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

(U) Toroidal Resonators for Electromagnetic Waves. II.

DESCRIPTIVE NOTE: Scientific rept. Jun-Nov 79.

DEC 79 16P

PERSONAL AUTHORS: Cap.F :Deutsch.R. :

REPORT NO. SR-171

CONTRACT NO. F49620-80-C-0018

PROJECT NO. 9751

TASK NO. 03

MONITOR: AFOSR  
TR-85-0318

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SUPPLEMENTARY NOTE: See also AD-A067 488.

DESCRIPTORS: (U) \*RESONATORS, \*TOROIDS, \*PLASMAS(PHYSICS), APPROXIMATION/MATHEMATICS, BOXES, COORDINATES, DIFFERENTIAL EQUATIONS, DISPERSION RELATIONS, ECHOES, EIGENVECTORS, ELECTROMAGNETIC FIELDS, ELECTROMAGNETIC RADIATION, ENGINEERING, GEOMETRY, HOMOGENEITY, ISOTROPISM, LIGHTWEIGHT, LOW FREQUENCY, MAXWELLS EQUATIONS, MICROWAVES, PIPES, SWITCHING, SCALAR FUNCTIONS, SERIES(MATHEMATICS), SOLUTIONS(GENERAL)

IDENTIFIERS: (U) WUAFOSR975103, PE61102F

AD-8091 874L

UNCLASSIFIED

AD-8091 820L 20/9

CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

(U) Trip Report Padova, Italy, July 1979. Reversed Field Pinch.

SEP 79 55P

PERSONAL AUTHORS: Cap.F. F. :

REPORT NO. SCIENTIFIC-167

CONTRACT NO. F44620-75-C-0006

PROJECT NO. 9751

TASK NO. 03

MONITOR: AFOSR  
TR-85-0328

UNCLASSIFIED REPORT

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DESCRIPTORS: (U) \*PLASMAS(PHYSICS), ITALY, PINCH EFFECT, REVERSIBLE

IDENTIFIERS: (U) WUAFOSR975103, PE61102F

AD-8091 820L

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVN39M

AD-B091 786L 18/5

CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

(U) Fusion-Fission Hybrid Systems.

DESCRIPTIVE NOTE: Scientific rept...

MAR 79 21P

PERSONAL AUTHORS: Schoepf, K. ;

REPORT NO. SR-180

CONTRACT NO. F44620-75-C-0008

PROJECT NO. 9751

TASK NO. 03

MONITOR: AFOSR  
TR-85-0308

UNCLASSIFIED REPORT

Distribution: Further dissemination only as directed by AFOSR, Bolling AFB, Bldg. 410, Washington, DC 20222. 8 Mar 85, or higher DoD authority.

DESCRIPTORS: (U) \*NUCLEAR POWER PLANTS, OUTPUT, POWER, DEUTERIUM

IDENTIFIERS: (U) Fusion - fission hybrid systems, Fusion-fission synergetics, PE61102F, WUAFOSR975103

AD-B091 786L

UNCLASSIFIED

AD-B091 741L 10/2

CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

(U) The Mandelstam-Papalex1-Bethenod-Generator. a Parametric Dynamo.

DESCRIPTIVE NOTE: Rept. for Mar-May 79.

JUN 79 18P

PERSONAL AUTHORS: Cap.F. ;

REPORT NO. SCIENTIFIC-164

CONTRACT NO. F44620-75-C-0008

PROJECT NO. 9751

TASK NO. 03

MONITOR: AFOSR  
TR-85-0308

UNCLASSIFIED REPORT

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

DESCRIPTORS: (U) \*ELECTRIC POWER, \*GENERATORS, ELECTROMAGNETISM, ENERGY, MECHANICAL ENERGY, PARAMETRIC ANALYSIS

IDENTIFIERS: (U) PE61102F, WUAFOSR975103

AD-B091 741L

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EYN39M

AD-B091 740L 20/9

CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

(U) Toroidal Electromagnetic Modes in a Torus Containing Plasma and in Coaxial Toroidal Systems.

DESCRIPTIVE NOTE: Rept. for Dec 78-Apr 79.

MAY 79 32P

PERSONAL AUTHORS: Deutsch, R. ;

REPORT NO. SCIENTIFIC-163

CONTRACT NO. F4620-75-C-0006

PROJECT NO. 9751

TASK NO. 03

MONITOR: AFOSR  
TR-85-0309

UNCLASSIFIED REPORT

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

DESCRIPTORS: (U) \*TOROIDS, FREQUENCY, DISPERSION RELATIONS, ELECTROMAGNETISM, POWER, MAGNETIC FIELDS, INTERFACES, PLASMA PHYSICS, VACUUM, ELECTROMAGNETIC RADIATION, TOROIDS, SHIPS, DENSITY, PROFILES, LOW FREQUENCIES, MAXWELLS EQUATIONS, STATIONARY WAVES, GEOMETRY, PLASMA WAVES

IDENTIFIERS: (U) FE61102F, WJAFOSR975103

AD-B091 740L

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AD-B091 875L 20/8 20/7

CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

(U) An Integral Approach of Successive Collisions to Linear Charged-Particle Transport through a Finite Slab.

DESCRIPTIVE NOTE: Scientific rept. Sep 78-Sep 79.

MAR 80 32P

PERSONAL AUTHORS: Kuhn, S. ;

REPORT NO. SR-177

CONTRACT NO. F49620-80-C-0018

PROJECT NO. 9751

TASK NO. 03

MONITOR: AFOSR  
TR-85-0327

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) \*CHARGED PARTICLES, \*PARTICLE COLLISIONS, STEADY STATE, LINEAR ACCELERATORS, BACKGROUND, CONSTANTS, DIFFERENTIAL EQUATIONS, DISTRIBUTION FUNCTIONS, ELECTRIC FIELDS, INTERACTIONS, PARTICLES, RATES, SCATTERING, TRANSPORT

IDENTIFIERS: (U) PE61102F, WJAFOSR975103

AD-B091 875L

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVN39M

AD-8091 666L 20/9

CAP (FERDINAND F) INNSBRUCK (AUSTRIA)

(U) Amplitude Dispersion of Standing Electron Plasma Waves.

DESCRIPTIVE NOTE: Rept. for Mar 78-Jan 79.

FEB 79 10P

PERSONAL AUTHORS: Auer, G. ;

REPORT NO. SR-159

CONTRACT NO. F44620-75-C-0006

PROJECT NO. 9751

TASK NO. 03

MONITOR: AFOSR  
TR-85-0307

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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. 8 Mar 85 or higher DoD authority.

DESCRIPTORS: (U) \*PLASMA WAVES. FREQUENCY SHIFT, NONLINEAR SYSTEMS

IDENTIFIERS: (U) WUAFOSR975103. PE81102F

AD-A157 445 20/8 20/9 20/5

MICHIGAN UNIV ANN ARBOR COLL OF ENGINEERING

(U) Neutral Beam Interactions with Materials.

DESCRIPTIVE NOTE: Annual progress rept. 1 Jun 84-31 May 85.

JUN 85 61P

PERSONAL AUTHORS: Gilgenbach, R. M. ; Duderstadt, J. J. ;

CONTRACT NO. AFOSR-84-0130

MONITOR: AFOSR  
TR-85-0655

UNCLASSIFIED REPORT

ABSTRACT: (U) This annual report describes experimental and theoretical research which concerns the interaction of neutral or ion beams with surface ablation plasmas. This problem is of interest in the case of particle penetration to outgassing or ablating objects in a high vacuum environment. We have constructed a neutral beam-ablation plasma experiment which employs a Q-switched ruby laser to independently generate a dense ablation plasma. Keywords include: Neutral-beams, radiation signatures, and beam-material interactions.

DESCRIPTORS: (U) \*PLASMAS(PHYSICS), \*ION BEAMS, \*RUBY LASERS, OUTGASSING, LASER BEAMS, ABLATIVE MATERIALS, ABLATION, HIGH VACUUM, INTERACTIONS, NEUTRAL, PARTICLES, PENETRATION, RADIATION, SIGNATURES, DENSE GASES, Q SWITCHING, PLASMAS(PHYSICS), SURFACES

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AD-A157 083 12/1

STANFORD UNIV CA EDWARD L GINZTON LAB OF PHYSICS

FLORIDA UNIV GAINESVILLE CENTER FOR MATHEMATICAL SYSTEM THEORY

(U) Metastability in the XUV. Lasers and Spectroscopy.

(U) System-Theoretic and Algebraic Aspects of the Rings of Stable and Proper Stable Rational Functions.

83 21P

PERSONAL AUTHORS: Harris, S. E. ; Caro, R. G. ; Falcone, R. W. ; Holmgren, D. E. ; Rothenberg, J. E. ;

85 47P

PERSONAL AUTHORS: Khargonekar, P. P. ; Ozguler, A. B. ;

CONTRACT NO. F49620-83-C-0016. MIPR-ARO-122-84

CONTRACT NO. DAAG29-81-K-0136, AFOSR-81-0238

MONITOR: ARO, AFOSR  
21323.7-PH, TR 85-0651

MONITOR: ARO, AFOSR  
18343.4-MA, TR 85-0834

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Atomic Physics, v9 p462-478 1983.

SUPPLEMENTARY NOTE: Pub. in Linear Algebra and Its Applications, v66 n123 p123-167 1985.

ABSTRACT: (U) The spectroscopy, methods for excitation, and application of core-excited metastable atomic levels are described. Emphasis is on systems in alkali atoms and alkali-like ions which are metastable against autoionization and in some cases against the radiation, and which allow lasting to a level in the valence structure of the atom.

DESCRIPTORS: (U) \*ATOMIC SPECTROSCOPY, \*VACUUM ULTRAVIOLET RADIATION, \*ULTRAVIOLET LASERS, \*ULTRAVIOLET SPECTRA, ALKALI METALS, ATOMS, IONIZATION, VALENCE, REPRINTS

DESCRIPTORS: (U) \*RATIONAL FUNCTIONS, FRACTIONATION, LINEAR ALGEBRAIC EQUATIONS, MATRICES (MATHEMATICS), MODELS, POLYNOMIALS, REPRINTS, SET THEORY, STABILITY, THEORY, TRANSFER FUNCTIONS, PROBLEM SOLVING, RINGS (MATHEMATICS)

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AD-A157 083

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AD-A155 911 7/4 20/5

JOINT INST FOR LAB ASTROPHYSICS BOULDER CO

(U) Laser Probing of Chemical Reaction Dynamics.

FEB 85 10P

PERSONAL AUTHORS: Leone, S. R. ;

CONTRACT NO. DAAG29-82-K-0031, F49620-83-C-0013

MONITOR: ARO, AFOSR  
18660 6 PH, TR-85-0508

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Science, v227 p889-895 1985.

ABSTRACT: (U) Lasers are used in increasingly sophisticated ways to carry out reactions between molecules in selected vibrational rotational, and electronic states and to probe the product states of chemical reactions. Such investigations are providing unprecedented insights into chemical reaction dynamics, the study of the detailed motions that molecules undergo in simple chemical reactions. In many cases it is possible to describe the influence that specific types of molecular excitation have on reactive events. Experiments are also being carried out to learn about chemical reactivity as function of the alignment of reagents. There is increasing excitement concerning the potential of laser methods to interrogate the transition states of molecular reactions.

DESCRIPTORS: (U) \*CHEMICAL REACTIONS, \*MOLECULAR STATES, \*LASER APPLICATIONS, MOLECULAR PROPERTIES, CHEMICAL REACTIONS, LASERS, EXCITATION, MOLECULES, ELECTRONIC STATES, METHODOLOGY, TRANSITIONS, MOLECULAR ROTATION, MOLECULAR VIBRATION, REPRINTS

AD-A155 879 7/5 20/3

WISCONSIN UNIV-MILWAUKEE DEPT OF PHYSICS

(U) Optogalvanic Measurements of Gas Temperature in the Cathode Fall.

FEB 85 4P

PERSONAL AUTHORS: Doughty, D. K. ; Den Hartog, E. A. ; Lawler, J. E. ;

CONTRACT NO. AFOSR-81-0208, MIPR-ARO-186-84

MONITOR: ARO, AFOSR  
22312 1-PH, TR-85-0490

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Applied Physics Letters, v48 n4 p352-354, 15 Feb 85.

ABSTRACT: (U) Optogalvanic diagnostics are used to determine the electric field and the absolute gas temperature as a function of position in the cathode fall of an abnormal glow discharge. Gas temperature in the cathode fall at modest current densities are as much as a factor of 2 above ambient temperatures. Symmetric charge exchange of energetic positive ions produces fast neutrals which efficiently heat gas in the cathode fall. This hot, rarefied gas has important implications in modeling the cathode fall, sputtering processes at the cathode, the glow-to-arc transition, and other phenomena.

DESCRIPTORS: (U) \*GLOW DISCHARGES, \*LASER PUMPING, ABNORMALITIES, ELECTRIC FIELDS, TRANSITIONS, HOT GASES, RAREFIED GASES, CHARGE TRANSFER, SYMMETRY, TEMPERATURE, CATHODES, CATIONS, ENERGETIC PROPERTIES, GASES, TEMPERATURE, SPUTTERING, ELECTROOPTICS, ELECTRON TRANSITIONS, REPRINTS

AD-A155 911

AD-A155 879

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVN39M

AD-A155 360 CONTINUED

ILLINOIS UNIV AT URBANA COORDINATED SCIENCE LAB

(U) Modulation Doped GaAs/Al(x)Ga<sub>3</sub>(1-x)As Layered Structures with Applications to Field Effect Transistors.

DESCRIPTORS: (U) \*SEMICONDUCTOR DEVICES, \*FIELD EFFECT TRANSISTORS, CONDUCTION BANDS, DISCONTINUITIES, ELECTRIC CURRENT, ENGINEERING, EPITAXIAL GROWTH, LITHOGRAPHY, LOSSES, MODULATION, PARASITES, REGIONS, SUBSTRATES, TRANSPORT PROPERTIES, VALENCE BANDS

DESCRIPTIVE NOTE: Annual rept. 1 Jan-31 Dec 84.

IDENTIFIERS: (U) WUAFOSR2305C1, PE61102F

MAR 85 204P

PERSONAL AUTHORS: Morkoc, H. ;

CONTRACT NO. F49620-83-K-0021

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR  
TR-85-0468

UNCLASSIFIED REPORT

ABSTRACT: (U) Traditionally, there have been two approaches to achieving high switchings speeds in semiconductor devices. One is to improve processing and lithographic techniques thereby reducing device dimensions and reducing parasitic losses. The other is to fabricate devices from material with improved transport properties such as GaAs or InP as opposed to Si. With the advent of epitaxial techniques which can grow thin reproducible heterolayer structures on substrates large enough for LSI and VLSI application, devices which employ 'conduction band engineering' to improve device performance are becoming strong contenders in the race for faster devices. Examples of devices which have been improved by conduction band engineering are heterojunction lasers, heterojunction bipolar transistors junction field effect transistors and metal semiconductor field effect transistor (MESFETS). In the aforementioned structures conduction and valence band discontinuities at the heterojunction are used to confine carriers to the active region of the device and/or reduce parasitic currents. A modulation doped heterostructure (MDH), on the other hand, is employed to actually improve or enhance the transport properties of the majority carriers in the channel of a MESFET. In a modulation doped (Al, Ga) As/GaAs heterostructure only the larger bandgap (Al, Ga) As is doped (n-type).

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ROCKWELL INTERNATIONAL CANOGA PARK CA ROCKETDYNE DIV

(U) Basic Research In Novel Inorganic Reagents and Fluorocarbon Chemistry.

DESCRIPTIVE NOTE: Final rept. 4 Mar 81-30 Sep 84,

FEB 85 130P

PERSONAL AUTHORS: Schack, C. J. ;Christe, K. O. ;

REPORT NO. RI/RD85-121

CONTRACT NO. F49620-81-C-0020

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR  
TR-85-0462

UNCLASSIFIED REPORT

ABSTRACT: (U) A 44-month program was conducted on the preparation of dense, thermally stable fluorocarbon derivatives. The technical approach employed was the interaction of inorganic Ief50- and Sef50- reactants and selected fluorocarbons. Improved or innovative preparative methods were developed for the requisite inorganic reagents. Substitution-type reactions led to the formation of mono-substituted fluorocarbon derivatives, whereas bis-substituted products were obtained via addition of the inorganic groups to unsaturated fluorolefins. Spectroscopic characterization of the synthesized compounds was employed to identify their molecular structures. The new compounds were shown to be thermally stable, and possessing densities only slightly less than the analogous iodo-substituted fluorocarbons. Originator supplied keywords include: Pentafuorotelluriumoxide compounds; Pentafuorotellurium hypofluorite; Pentafuorotelluriumoxide fluorocarbons; Olefin addition reactions; Fluorocarbon iodine oxidations; Xenon (II) Pentafuorotelluriumoxide; Xenon (II) Pentafuoroseelenium oxide; Pentafuoroselementumoxide fluorocarbons; Aromatic fluorocarbon additions; Azidotrifluoromethane reactions; Syntheses; Physical Properties; Spectroscopic Properties.

DESCRIPTORS: (U) \*FLUORINATED HYDROCARBONS, \*SYNTHESIS(CHEMISTRY), ADDITION REACTIONS, AROMATIC COMPOUNDS, CHEMICAL AGENTS, IODINE, OLEFIN POLYMERS, OXIDATION, PHYSICAL PROPERTIES, SPECTROSCOPY, THERMAL STABILITY, XENON, INORGANIC COMPOUNDS, REACTANTS(CHEMISTRY), TELLURIUM COMPOUNDS, SELENIUM COMPOUNDS, FLUOROPOLYMERS

IDENTIFIERS: (U) PE61102F, WJAFOSR2303B2

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVN39M

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HONEYWELL SYSTEMS AND RESEARCH CENTER MINNEAPOLIS MN

(U) Robust Control of Multivariable and Large Space Systems.

DESCRIPTIVE NOTE: Final rept. 7 Jan 82-30 Jun 84.

MAR 85 163P

PERSONAL AUTHORS: Doyle, J. D. ; Cunningham, T. B. ;

CONTRACT NO. F49620-82-C-0090

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR  
TR-85-0473

UNCLASSIFIED REPORT

ABSTRACT: (U) This report, in the form of a set of notes, details Honeywell's research results of the past year in Robust Multivariable Control Theory. These notes are made up of four major parts. Part 0 gives a review of the required notation and mathematical background. Part 1 reviews recent results on the problem of analyzing the performance and robustness properties of systems. Part 2 presents the results on synthesis which are the highlight of this report, and Part 3 outlines how the methods of the previous parts apply to control of large space structures. (Author)

DESCRIPTORS: (U) \*SPACE SYSTEMS, \*CONTROL THEORY, SPACECRAFT, BACKGROUND MATHEMATICS, SYNTHESIS, BINARY NOTATION, MULTIVARIATE ANALYSIS

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1

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AD-A155 110 20/12

ROCKWELL INTERNATIONAL THOUSAND OAKS CA  
MICROELECTRONICS RESEARCH AND DEVELOPMENT CENTER

(U) LSI/VLSI Ion Implanted Planar GaAs IC Processing.

DESCRIPTIVE NOTE: Semi-annual rept. 1 Feb-31 Jul 84.

MAR 85 SOP

PERSONAL AUTHORS: Vahrenkamp, R. ; Holmes, D. ; Elliot, K. ; Griffith, P. ;

REPORT NO. MRDC41129.9SA

CONTRACT NO. F49620-83-C-0042, ARPA Order-338419

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR  
TR-85-0486

UNCLASSIFIED REPORT

ABSTRACT: (U) The scope of this program is to complete and stabilize the development of a planar fabrication process for high speed digital integrated circuits on 3-inch, GaAs wafers. In the six-month period covered by this was made in the areas of materials characterization, uniformity evaluation, and gate array design. Annealing experiments were performed on as-grown GaAs wafers to evaluate methods of damage gettering to reduce the metal concentration in active layers and to improve the reproducibility of the implant process. The results were somewhat inconsistent because of unusually high manganese levels in the ingot. To help determine those factors which influence threshold voltage variation, a simple C-V technique was established. One feature illustrated by the C-V data is that most reported nonuniformities in the LEC material which has been reported is due to systematic rather than random variations in threshold voltages. The statistical variation in threshold are generally much smaller being on the order of 20 mV. Standard deviations due to the larger systematic variations have been typically 50-70 mV. The AR8 mask set is in the second phase of the on-going gate array development program. The masking plates for fabricating the generic underlayers have been received in-house, and Mayo had completed the

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customization layers. The UCSB circuits have been placed on the mask. The customization layers are ready to be sent to the mask shop.

DESCRIPTORS: (U) \*GALLIUM ARSENIDES, \*ION IMPLANTATION, \*PLANAR STRUCTURES, ARRAYS, CONCENTRATION(COMPOSITION), DAMAGE, EXPERIMENTAL DATA, FABRICATION, GATES(CIRCUITS), GETTERING, IMPLANTATION, LAYERS, MANGANESE, MATERIALS, METALS, REPRODUCIBILITY, THRESHOLD EFFECTS, VOLTAGE, WAFERS

IDENTIFIERS: (U) PB1102F, WUAFOSR2305C1

AD-A155 078 7/3 7/4

IOWA UNIV IOWA CITY DEPT OF CHEMISTRY

(U) Fluoride Ion Catalyzed Isomerization of 2-Aryl-F-Butenes,

81 35P

PERSONAL AUTHORS: Burton, D. J.; Headley, J. A.;

CONTRACT NO. AFOSR-80-0259

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR  
TR-85-0427

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Fluorine Chemistry, v18 p323-356 1981.

ABSTRACT: (U) A kinetic study of the fluoride ion catalyzed isomerization of a series of 2-aryl-F-1-butenes shows the reactions to be pseudo first order in olefin at constant fluoride ion concentration. The resultant Hammett plot is non-linear with a concave downward break near  $\sigma = 0$ . A two step mechanism involving formation of a carbanionic intermediate is proposed. A change in the rate limiting step causes the break in the Hammett plot. Carbanion trapping experiments are also reported.

DESCRIPTORS: (U) \*ISOMERIZATION, \*BUTENES, \*ARYL RADICALS, \*FLUOROPOLYMERS, \*OLEFIN POLYMERS, FLUORIDES, IONS, CATALYSIS, REACTION KINETICS, TRAPPING(CHARGED PARTICLES), REPRINTS

IDENTIFIERS: (U) Carbanions, WUAFOSR2303B2, PE61102F

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. EVN39M

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AD-A154 796

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DELAWARE UNIV NEWARK DEPT OF MATHEMATICAL SCIENCES

HANNEMANN MEDICAL COLL AND HOSPITAL PHILADELPHIA PA DEPT OF ANATOMY

(U) The Shorter Queue Problem: A Numerical Study Using the Matrix-Geometric Solution.

(U) Analysis of Long Bone and Vertebral Failure Patterns.

JUN 82

9P

DESCRIPTIVE NOTE: Final scientific rept..

PERSONAL AUTHORS: Gertsbakh, I. ;

FEB 85

223P

CONTRACT NO. AFOSR-77-3236

PERSONAL AUTHORS: Eurrell, J. A. C. ;

PROJECT NO. 2304

CONTRACT NO. AFOSR-84-0044

TASK NO. A5

PROJECT NO. 2312

MONITOR: AFOSR TR-85-0405

TASK NO. A1

MONITOR: AFOSR TR-85-0454

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in European Jnl. of Operational Research, v15 p374-381 1984.

UNCLASSIFIED REPORT

ABSTRACT: (U) The author considers a service system with two similar servers in which a customer, on arrival, joins the shorter queue. The state of the system is described by a part  $(i, j)$ ,  $j > 0$  or  $= 1$ , where  $i$  and  $j$  are the number of customers in the shorter and the longer queue, respectively. The stationary probability vector and several performance characteristics are obtained using the matrix-geometric solution technique.

DESCRIPTORS: (U) \*QUEUEING THEORY, \*NUMERICAL ANALYSIS, PROBABILITY, STATIONARY, VECTOR ANALYSIS, PROBLEM SOLVING, MATRICES(MATHEMATICS), GEOMETRY, REPRINTS

IDENTIFIERS: (U) Customers, PE61102F, WUAFOSR2304A5

ABSTRACT: (U) This report documents five years of work on the normal anatomy of the rhesus monkey vertebral column, the vertebral column response to compressive loading, and the response of bone to hypokinesia. The surface of fractures of long bones were also examined. The rhesus monkey vertebral column was similar to the human spine anatomically. With the exception of the cartilaginous end plates which had unique islands of calcification. The primate vertebral column responded to compressive loading by bending or fracture of bone within individual vertebral bodies, burst injuries in spinal units, and stimulation of osteophyte formation in vivo impacted spines. Bone formation appeared to be inhibited by hypokinesia in the femur, rib, and vertebral body of exposed rhesus monkeys. Torsional and straight fractures of long bones had varied surface texture due to different angles of fracture planes across the bone matrix. Originator supplied keywords include: Spinal column; Impaction; Electron microscopy; light microscopy; intervertebral discs; bone histomorphometry; fracture.

DESCRIPTORS: (U) \*BONE FRACTURES, \*BONES, \*SPINAL COLUMN, BENDING, BODIES, CALCIFICATION, COMPRESSIVE PROPERTIES, DISKS, ELECTRON MICROSCOPY, IN VIVO ANALYSIS, MICROSCOPY, MOTOR REACTIONS, MUSCLES, REDUCTION, RESPONSE, RHEBUS MONKEYS

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IDENTIFIERS: (U) Hypokinesia. WJAFOSR2312A1. PEB1102F

MISSION RESEARCH CORP SANTA BARBARA CA

(U) Experimental and Analytic Characterization of  
Nonlinear Seismic Attenuation.

DESCRIPTIVE NOTE: Final rept. 21 Mar 84-20 Mar 85.

MAR 85 85P

PERSONAL AUTHORS: McCartor, G. D. ; Wortman, W. R. ;

REPORT NO. MRC-R-900

CONTRACT NO. F49620-84-C-0049. ARPA Order-4397

MONITOR: AFOSR  
TR-85-0565

UNCLASSIFIED REPORT

ABSTRACT: (U) In order to assess the existence and impact of mild nonlinear contributions to attenuation of seismic signals from underground explosions, data from the test SALMON have been studied. It's found that the moderate strain regime (epsilon approx. 10 to the third power) data are internally consistent with an attenuation function, Q, which is independent of amplitude over more than an order magnitude. However the attenuation is much greater than that found from small strain measurements in different experiments. Nonlinear constitutive relations are considered which allow an analytic solution for the expected transition to linear small strain behavior. Keywords include: Seismic Propagation; Nonlinear Attenuation; Nonlinear constitutive relation; SALMON Data.

DESCRIPTORS: (U) \*SEISMIC WAVES, \*ATTENUATION, AMPLITUDE, BEHAVIOR, FUNCTIONS, MATHEMATICAL ANALYSIS, MEASUREMENT, NONLINEAR SYSTEMS, PROPAGATION, SIGNALS, STRAIN(MECHANICS), UNDERGROUND EXPLOSIONS, Q FACTORS

IDENTIFIERS: (U) Salmon shot

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BATTELLE COLUMBUS LABS OH

INVESTMENT CASTING, LASERS, PHOTOSENSITIVITY, PORPHYRINS,  
FABRICATION, MACHINING, POLYMERIZATION, LASER PUMPING

(U) Three-Dimensional Photochemical Machining with Lasers.

IDENTIFIERS: (U) WUAFOSR230682, PE61102F

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

DEC 84 254P

PERSONAL AUTHORS: Schuerzel, R. E.; Ivancic, W. A.; Johnson,  
D. R.; McGinniss, V. D.; Wood, V. E.;

CONTRACT NO. F49620-82-C-0077

PROJECT NO. 2306

TASK NO. B2

MONITOR: AFOSR  
TR-85-0456

UNCLASSIFIED REPORT

ABSTRACT: (U) The primary objective of this research has been to evaluate the technical feasibility of three-dimensional photochemical machining with lasers, or PCM. PCM is a concept for the rapid fabrication of high-precision three-dimensional solid objects by spatially selective photopolymerization (or, alternatively, depolymerization) at the intersection point of two intersecting laser beams. To obtain true spatially selective photochemistry, it is necessary to develop systems in which the first laser beam (Beam 1) will pump a photoinitiator or photosensitizer to an unreactive, and spontaneously reversible, metastable intermediate with an energy content less than that required to initiate the desired reaction. The second laser beam (Beam 2) then selectively pumps the intermediate species to an energy level above that required to fragment the photoinitiator and trigger the reaction. In this way, the photochemical reaction can be confined to the intersection point, with no reaction occurring in either beam above. Keywords include: photochemical machining; lasers; polymers; photoinitiators; photosensitizers; porphyrins; prototypes; investment casting.

DESCRIPTORS: (U) MACHINING, \*PHOTOCHEMICAL REACTIONS,  
\*LASER APPLICATIONS, SOLIDS, THREE DIMENSIONAL, LASER  
BEAMS, PHOTOSENSITIVITY, POLYMERS, LASER BEAMS.

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AD-A154 710 17/10

AD-A154 710 CONTINUED

KLD ASSOCIATES INC HUNTINGTON N Y

(U) Robust Detection and Classification of Regional  
Seismic Signals Using a Two Mode/Two Stage Cascaded  
Adaptive Arma (CAARMA) Model.

MONITORING, GAIN, PROCESSING, RECEIVERS, HYBRID SYSTEMS,  
ELIMINATION, NOISE, DETECTION, SEISMIC WAVES, SIGNALS,  
ACOUSTIC EQUIPMENT

IDENTIFIERS: (U) TRAPS(Transient Acoustic Processing  
System), ARMA(Autoregression Moving Average), Maximum  
Likelihood estimation, WUAFOSR478701, PE62714E

DESCRIPTIVE NOTE: Final rept. 15 Jul 83-14 Jul 84.

MAR 85 169P

PERSONAL AUTHORS: Schnitta-Israeli, B. ;

REPORT NO. KLD-TR-159

CONTRACT NO. F49620-83-C-0137, ARPA Order-4787

PROJECT NO. 4787

TASK NO. 01

MONITOR: AFOSR  
TR-85-0395

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this contract was to tailor TRAPS (Transient Acoustic Processing System) to the seismic event monitoring application thus providing a powerful tool for the nuclear monitoring problem. TRAPS is a three stage process. Stage One is a hybrid adaptive filter designed to perform noise elimination on each receiver component. This is beamformed and input into Stage Two which performs signal enhancement. Information resulting from Stage One/Two is used in Stage Three to calculate the location and classification of the detected event. While the original TRAPS succeeded in doubling the range of detection, study it did so with a standard beamformer. Task 1 was to ascertain if an adaptive beamformer (AB) incorporated into TRAPS would produce any gains. It was determined that TRAPS' Stage One followed by a standard beamformer was superior to an AB, yet an AB strategically placed between TRAPS' Stage One and Stage Two provided some processing gain. Keywords: Adaptive Autoregressive Moving Average (ARMA); Linear predictive residual; Pole migration; Slayed adaptive AR model; Time delay estimation maximum likelihood.

DESCRIPTORS: (U) \*SEISMIC DETECTION, \*NUCLEAR EXPLOSION  
DETECTION, ADAPTIVE SYSTEMS, BEAM FORMING, DETECTION,

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SEARCH CONTROL NO. EVN39M

AD-A154 682 4.2

AD-A154 680 17/9

MISSOURI UNIV-ROLLA GRADUATE CENTER FOR CLOUD PHYSICS RESEARCH

ENVIRONMENTAL RESEARCH INST OF MICHIGAN ANN ARBOR RADAR DIV

(U) Construction of University of Missouri-Rolla's Full Scale Cloud Simulation Chamber and Applied Research.

(U) Applications of Adaptive Learning Controller to Synthetic Aperture Radar.

DESCRIPTIVE NOTE: Final rept..

DESCRIPTIVE NOTE: Final technical rept..

MAR 85 62P

FEB 85 137P

PERSONAL AUTHORS: White, D. R. :

PERSONAL AUTHORS: Politis, D. T. ; Licata, W. H. ;

CONTRACT NO. F49620-80-C-0090, MIPR-138-84

REPORT NO. ERIM-183800-4-F

PROJECT NO. 2310

CONTRACT NO. F49620-82-C-0097

TASK NO. A1

PROJECT NO. 2312

MONITOR: AFOSR,ARO  
TR-85-0409, 1663.5-GS

TASK NO. A1

MONITOR: AFOSR  
TR-85-0455

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this work is to construct two cooled wall cloud simulation chambers. The smaller 48-inch tall chamber capable of being cooled at 10 C/min and the larger 112-inch tall chamber capable of 15 C/min. Construction will include such support peripherals as secondary cooling, computer control, data acquisition, and other systems required for the operation of the chambers. The chambers will be incorporated into the existing Univ. of Mo., Rolla, cloud simulation facility. The construction and testing of these two cloud simulation chamber facilities, with precise wall temperature control, is described and discussed. Keywords: Condensation.

DESCRIPTORS: (U) \*CLOUDS \*SIMULATORS, FACILITIES, SIMULATION, CONDENSATION, CHAMBERS, OPERATION, COOLING, SECONDARY, COMPUTERS, CONTROL, DATA ACQUISITION, PRECISION, TEMPERATURE CONTROL, WALLS

IDENTIFIERS: (U) PE51102F, WUAFOSR2310A1

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UNCLASSIFIED REPORT

ABSTRACT: (U) In this study the application of Artificial Intelligence methods to Synthetic Aperture Radars (SARs) is investigated. It was shown that the neuron-like Adaptive Learning Controller (ALC), operating in the extremizing mode suggested by Klopf, can be used successfully in the motion compensation system of a SAR. Keywords include: Adaptive control; Artificial Intelligence; Synthetic aperture radar; Autofocus; and Learning networks.

DESCRIPTORS: (U) \*ADAPTIVE CONTROL SYSTEMS, \*SYNTHETIC APERTURE RADAR, ADAPTIVE TRAINING, ARTIFICIAL INTELLIGENCE, COMPENSATION, LEARNING, MOTION, NETWORKS

IDENTIFIERS: (U) PE81102F, WUAFOSR2312A1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVN39M

AD-A154 647 11/9 20 12

AD-A154 629 10/2

CALIFORNIA UNIV DAVIS DIV OF MATERIALS SCIENCE AND ENGINEERING

TEXAS TECH UNIV LUBBOCK DEPT OF ELECTRICAL ENGINEERING

(U) Fundamental Investigations of Failure during Superplastic Forming Process.

(U) Coordinated Research Program in Pulsed Power Physics.

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

DESCRIPTIVE NOTE: Annual rept. 1 Oct 83-31 Oct 84.

MAR 85 18P

DEC 84 213P

PERSONAL AUTHORS: Hidalgo-Prada,B. ;Mukherjee,A. K. ;

PERSONAL AUTHORS: Kristiansen,M. ;Hatfield,L. ;Schaefer,G.

CONTRACT NO. AFOSR-82-CQ81

CONTRACT NO. AFOSR-84-0032

PROJECT NO. 2306

PROJECT NO. 2301

TASK NO. A1

TASK NO. A7

MONITOR: AFOSR

MONITOR: AFOSR

TR-85-0392

TR-85-0457

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The effects of strain rate on the stress-strain behavior of Ni-modified Ti-6Al-4V (Ti-6Al-4V-2Ni) at superplastic forming temperature (815 C), were investigated. The microstructural evolution during superplastic deformation (SPD), produced strain hardening at low strain-rates and strain softening at high strain rates. Maximum attainable superplastic ductility, observed at intermediate strain softening. Metallographic evidence is presented to show that the observed strain hardening is due to deformation-enhanced grain growth in the alpha and beta phases, while the strain softening can be attributed, primarily, to grain size refinement, due to dynamic recrystallization. Additional keywords: Titanium alloys.

DESCRIPTORS: (U) \*STRAIN RATE, \*PLASTICS, DYNAMICS, EVOLUTION(GENERAL), FAILURE, GRAIN SIZE, HIGH RATE, METALLOGRAPHY, MICROSTRUCTURE, PLASTIC DEFORMATION, RECRYSTALLIZATION, STRAIN HARDENING, STRAIN(MECHANICS), STRESS STRAIN RELATIONS, TEMPERATURE, TITANIUM ALLOYS, LOW RATE, DUCTILITY, SOFTENING

IDENTIFIERS: (U) \*Superplastic forming, \*Superplasticity, PE61102F, WUAFOSR2308A1

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVN39M

AD-A154 818 6/13 6/1 6/3 CONTINUED

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Development of an In Vivo Assay for Mistranslation-Inducing Activity of Pollutants and Characterization of Amino Acid Substitutions. IDENTIFIERS: (U) Addition to protein, Plasmid PAR324, O.3 protein, Phage SPP1-0.3, O.3 gene, Plasmids. PE91102F, WUAFOSR2312A5

DESCRIPTIVE NOTE: Interim rept. 1 Aug 83-31 Jul 84.

NOV 84 45P

PERSONAL AUTHORS: Reeve, J. N.; Rice, J. B. ;

CONTRACT NO. AFOSR-81-0087

PROJECT NO. 6110

TASK NO. A5

MONITOR: AFOSR  
TR-85-0453

UNCLASSIFIED REPORT

ABSTRACT: (U) In experiments directed toward developing a simple, in vivo assay for mistranslation, we have attempted to purify monoclonal antibody to O.3 protein from large volumes of spent hybridoma. Purification was attempted by several means but no method resulted in high yields of pure antibody. In radioimmune precipitation (RIP) -SDS-PAGE experiments for O.3 protein. It was found that proteins in addition to O.3 protein were precipitated with monoclonal antibody from ascites as well as with rabbit antibody. No contaminating, additional proteins were precipitated with monoclonal antibody from culture fluid but we have not been able to purify and concentrate it sufficiently to be practicable in RIP assays. In experiments directed toward determining the influence of cellular environment on mistranslation we have shown that a protein synthesized in E. coli containing the plasmid PAR324 (which contains the 4.3 gene) is of the same M. W. as O.3 protein and is precipitated by rabbit antibody to O.3 protein produced in this and other PAR324 - containing bacterial strains, and in B. subtilis infected with phage SPP1-0.3

DESCRIPTORS: (U) \*ANTIBODIES, \*PROTEINS, \*GENETICS, \*CYSTEINE, \*BACTERIA, STRAINS(BIOLOGY), ASCITES, IN VIVO ANALYSIS, PROTEINS, RABBITS, ANTIBODIES, POLLUTANTS, ESCHERICHIA COLI, BACILLUS SUBTILIS, PRECIPITATION

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVN39M

AD-A154 615 6 15

CALIFORNIA UNIV SAN FRANCISCO CARDIOVASCULAR RESEARCH  
INST

(U) Inhibition of Carcinogen-Induced Cellular  
Transformation of Human Fibroblasts by Drugs that  
Interact with the Poly(ADP-Ribose) Polymerase System.

JAN 85 6P

PERSONAL AUTHORS: Mito, G. E. ; Kurian, P. ; Kirsten, E. ; Kun,  
E. ;

CONTRACT NO. F49620-81-C-0007

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR  
TR-85-0450

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Initial Evidence for the  
Development of Transformation Resistance. v179 n2 p332-  
336 Jan 85.

ABSTRACT: (U) Two types of interactions of 13 drugs with  
human fibroblasts were determined: (a) 1 sub 50 of the  
nuclear poly(ADP-ribose) polymerase, as assayed with  
isolated nuclei in vitro, and (b) the nontoxic  
concentration of drugs that prevented carcinogen-induced  
cell transformation of intact fibroblasts RCF sub 1). In  
general, RCF sub 1 was much lower than 1 sub 50, and one  
antitransformer did not inhibit the enzyme in vitro,  
indicating that low-affinity enzyme inhibitory sites  
appear to play no role in the mechanism of prevention of  
cell transformation. Two enzyme inhibitors, caffeine and  
1-methylxanthinamide, exhibited no antitransforming  
activity. Benzamide when applied in population doubling 1  
induced resistance to cell transformation in population  
doubling 6 by carcinogens added at this stage.

DESCRIPTORS: (U) \*DRUGS, \*FIBROBLASTS, \*CARCINOGENS,  
\*RESISTANCE(BIOLOGY), \*CAFFEINE, ENZYME INHIBITORS,  
ENZYMES, HUMANS, IN VITRO ANALYSIS, ISOLATION, NUCLEI,  
TRANSFORMATIONS, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5

AD-A154 615

AD-A154 614 7/3

IOWA UNIV IOWA CITY DEPT OF CHEMISTRY

(U) Preparation, Stability and Acidity of  
Difluoromethylene Bis Phosphonic Acid,

82 11P

PERSONAL AUTHORS: Burton, D. J. ; Pietrzyk, D. J. ; Ishihara,  
T. ; Fonong, T. ; Flynn, R. M. ;

CONTRACT NO. AFOSR-80-0259

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR  
TR-85-0430

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Fluorine Chemistry,  
v20 p617-626 1982.

ABSTRACT: (U) Hydrolysis of difluoromethylene  
phosphonate esters quantitatively yields  
difluoromethylene bis phosphonic acid as a dihydrate. In  
vacuo drying leads to either the monohydrate or the  
anhydrous acid. Titration of either the free acid or its  
sodium salt and computer fit of the data gives all  
four pKas. The disodium salt and the free acid are  
thermally stable, and the disodium salt is extremely  
stable even to strong base. Originator supplied keywords  
include: Fluoro acids; Acidity; Ionization constants;  
Phosphonic acids; Phosphonates (fluoro).

DESCRIPTORS: (U) \*PHOSPHONIC ACIDS, \*SYNTHESIS(CHEMISTRY)  
\*, \*ANALYTICAL CHEMISTRY, ESTERS, TITRATION, SALTS, ACIDS,  
FLUORINE COMPOUNDS, HYDROLYSIS, HYDRATES, CONSTANTS,  
IONIZATION, PHOSPHONATES, REPRINTS

IDENTIFIERS: (U) WUAFOSR230382, PE61102F

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IOWA UNIV IOWA CITY DEPT OF CHEMISTRY

MIXTURES, RESPONSE, ALKENES, CARBENES, CHLORINATION,  
DEHYDRATION

(U) Ylide-Carbene Chemistry. Synthesis of 1,1-Difluoro-1-alkenes.

IDENTIFIERS: (U) Ylides, Phosphoranes, Zwitterions,  
PEB1102F, WUAFOSR2303B2

83 12P

PERSONAL AUTHORS: Wheaton, G. A.; Burton, D. J. ;

CONTRACT NO. AFOSR-80-0259

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR  
TR-85-0424

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organic Chemistry,  
v48 n7 p917-927 1983.

**ABSTRACT:** (U) The reaction between nonstabilized alkylidenetriphenylphosphoranes and chlorodifluoromethane has been found to be a useful alternative to the Wittig reaction for the synthesis of many difluoromethylene olefins. Both primary and secondary ylides which do not contain strongly electron-withdrawing substituents within the alkylidene portion of the ylide react with chlorodifluoromethane to give the corresponding difluoromethylene olefins in yields which are significantly better than those obtained by the Wittig reaction. The formation of triphenyl-phosphene oxide is avoided, and all phosphorus-containing moieties can be recovered and recycled. The reaction proceeds by initial dehydrochlorination of chlorodifluoromethane by the ylide to generate difluorocarbene. The intermediate difluorocarbene is then trapped by a second equivalent of the nucleophilic ylide. Mechanistic evidence indicates that either a zwitterionic intermediate or a three-membered cyclic phosphorane can account for the 1,1-difluoro-1-alkene products such as FCH=CHPh, FHC-CPh<sub>2</sub>, and FHC=CHC(CH<sub>3</sub>)<sub>2</sub>Ph after steam distillation of the reaction mixtures, however can only be accounted via a three-membered cyclic phosphorane.

**DESCRIPTORS:** (U) \*METHYLENES, \*OLEFIN POLYMERS,  
\*SYNTHESIS(CHEMISTRY), \*FLUORINATED HYDROCARBONS.

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IOWA UNIV IOWA CITY DEPT OF CHEMISTRY

IOWA UNIV IOWA CITY DEPT OF CHEMISTRY

(U) Preparation and Synthetic Utility of Fluorinated Phosphonium Salts, Bis-Phosphonium Salts and Phosphoranium Salts.

(U) The Facile Preparation of HF Free Polyfluorinated Acyl Fluorides.

83 21P

83 7P

PERSONAL AUTHORS: Burton, D. J. ;

PERSONAL AUTHORS: Cox, D. G. ; Sprague, L. G. ; Burton, D. J. ;

CONTRACT NO. AFOSR-80-0259

CONTRACT NO. AFOSR-80-0259

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. B2

TASK NO. B2

MONITOR: AFOSR  
TR-85-0421

MONITOR: AFOSR  
TR-85-0420

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Fluorine Chemistry, v23 p339-357 1983.

SUPPLEMENTARY NOTE: Pub. in Jnl. of Fluorine Chemistry, v23 p383-388 1983.

ABSTRACT: (U) The reaction of tertiary phosphines with fluoroalcohols provides a rapid and high yield synthesis of various types of fluorinated phosphonium salts, bis-phosphonium salts and phosphoranium salts. These salts are useful precursors to fluorine-containing ylides, carbenes and methide ions. Examples of the preparation, mechanism of formation and synthetic utility of these novel reagents is described. Originator supplied keywords include: Fluorinated ylides, fluorinated phosphonium salts, synthetic methods (fluorine), Mechanism (Fluorine chemistry).

ABSTRACT: (U) The reaction of polyfluorinated acids with the Ishikawa Reagent (FAR) in the presence of NaF gives 59-91% isolated yields of HF free polyfluorinated acyl fluorides. The reaction is rapid, safe, easily scaled up, and amenable to a one-pot procedure. Originator supplied keywords include: Acyl fluorides; Wittig reaction; fluorinating agents; fluorinated acids; hydrogen fluoride.

DESCRIPTORS: (U) \*FLUORINE, \*PHOSPHONIUM COMPOUNDS, \*SALTS, \*SYNTHESIS(CHEMISTRY), CARBENES, SYNTHESIS, IONS, REPRINTS

DESCRIPTORS: (U) \*SYNTHESIS(CHEMISTRY), \*ACYLATION, \*FLUORIDES, ACIDS, CHEMICAL AGENTS, FLUORINATION, HYDROGEN FLUORIDE, REPRINTS

IDENTIFIERS: (U) Ylides. PE61102F. WJAFOSR2303B2

IDENTIFIERS: (U) Wittig reaction, Acyl Fluorides, PE61102F, WJAFOSR2303B2

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SEARCH CONTROL NO. EVN39M

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IOWA UNIV IOWA CITY DEPT OF CHEMISTRY

(U) Current and Future Developments of Synthetic Methods  
in Organofluorine Chemistry.

84

6P

PERSONAL AUTHORS: Burton, D. J. ;

CONTRACT NO. AFOSR-80-0259

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR  
TR-85-0417

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in *Jnl. of Fluorine Chemistry*,  
v25 p21-25 1984.

ABSTRACT: (U) Although fluorine chemistry is rapidly  
approaching its 100th anniversary, organofluorine  
chemistry, as most of us know it, is only 40-50 years old.  
Interest and enthusiasm in this area of chemistry  
essentially traces its origins to the discovery and  
industrial applications of the Freons and  
polytetrafluoroethylene (Teflon). The unique properties  
of these materials attracted attention to this neglected  
area of organic chemistry-particularly industrially - and  
stimulated work on methods for the introduction of  
fluorine into organic molecules.

DESCRIPTORS: (U) \*SYNTHESIS(CHEMISTRY), \*FLUORINATED  
HYDROCARBONS, POLYETHYLENE, FLUOROPOLYMERS, FLUORINE,  
MOLECULES, CHEMISTRY, INDUSTRIES, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR230382

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IOWA UNIV IOWA CITY DEPT OF CHEMISTRY

(U) Wittig Olefination via Reaction of Fluorine-Containing  
Phosphonium Salts and F-Acyl Fluorides. A New  
Approach to Fluoroolefin Synthesis.

83

3P

PERSONAL AUTHORS: Burton, D. J. ; Cox, D. G. ;

CONTRACT NO. AFOSR-80-0259

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR  
TR-85-0423

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in *Jnl. of American Chemical  
Society*, v105 p650-651 1983.

ABSTRACT: (U) Fluorine-containing phosphonium salts  
such as  $\text{Bu}_3\text{P}(+)\text{-CFP}(+)\text{Bu}_3\text{X}(-)$  and  $\text{Ph}_3\text{P}(+)\text{Ph}_3\text{Br}(-)$  were  
readily prepared from tertiary phosphines and  $\text{CFCl}_3$  and  
 $\text{CFBr}_3$ . In contrast to the normal acylation of phosphonium  
ylides by acyl halides,  $\text{Bu}_3\text{P}(+)\text{-CFP}(+)\text{Bu}_3\text{X}(-)$  undergoes a  
Wittig reaction with F-acyl fluorides to give  
stereospecifically the trans-vinyl phosphonium salts,  
 $\text{Bu}_3\text{P}(+)\text{CF-CFR sub Fx}(-)$  double bond. Alkaline hydrolysis  
of the phosphonium salt gives the trans-1-hydro-F-olefin.  
The overall one-pot process provides a novel  
stereospecific conversion of F-acyl halides to olefins  
with chain-extension of one carbon. Mechanistically, the  
process demonstrates that with proper control, the  
reaction of phosphonium ylides with acyl halides can be  
diverted to olefination rather than the previously  
observed acylation sequence.

DESCRIPTORS: (U) \*SYNTHESIS(CHEMISTRY), \*OLEFIN POLYMERS,  
ACYLATION, FLUORIDES, HYDROLYSIS, PHOSPHONIUM COMPOUNDS,  
RESPONSE, SALTS, SEQUENCES, SYNTHESIS, REPRINTS

IDENTIFIERS: (U) Ylides, Wittig reactions, PE61102F,  
WUAFOSR230382

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CONNECTICUT UNIV STORRS DEPT OF ELECTRICAL ENGINEERING  
AND COMPUTER SCIENCE

(U) Dual Control Guidance for Simultaneous Identification  
and Interception.

84 15P

PERSONAL AUTHORS: Birmival.K. ;Bar-Shalom.Y. ;

CONTRACT NO. AFOSR-80-0098

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR  
TR-85-0439

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Automatica, v20 n6 p737-749  
1984.

ABSTRACT: (U) An adaptive dual-control guidance algorithm is presented for intercepting a moving target in the presence of an interfering target (decoy) in a stochastic environment. Two sequences of measurements are obtained at discrete points in time; however, it is not certain which sequence came from the target of interest and which from the decoy. Associated with each track, the interceptor also receives noisy, state-dependent feature measurements. The optimum control for the interceptor which is given by the solution of the stochastic dynamic programming equation is not numerically feasible to obtain. An approximate solution of this equation is obtained by evaluating the value of the future information gathering. This is done through the use of preposterior analysis --- approximate prior probability densities are obtained and used to describe the future learning and control. In this way, the interceptor control is used for information gathering in order to reduce the future target and decoy inertial measurement errors and enhance the observable target/decoy feature differences for subsequent discrimination between the true target and the decoy. Simulation studies have shown the effectiveness of the scheme. Keywords include: Guidance systems; dual control; Kalman filters; identification; and dynamic programming.

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DESCRIPTORS: (U) \*CONTROL, \*KALMAN FILTERING, \*GUIDANCE, DECOYS, DISCRETE DISTRIBUTION, DYNAMIC PROGRAMMING, ENVIRONMENTS, EQUATIONS, ERRORS, IDENTIFICATION, INERTIAL SYSTEMS, INTERCEPTION, INTERCEPTORS, LEARNING, MATHEMATICAL PROGRAMMING, MEASUREMENT, MOVING TARGETS, OPTIMIZATION, PROBABILITY DENSITY FUNCTIONS, SEQUENCES, SIMULATION, STOCHASTIC PROCESSES, SYNCHRONISM, TARGETS, REPRINTS

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVN39M

AD-A154 606 7/3 7:2

IOWA UNIV IOWA CITY DEPT OF CHEMISTRY

(U) A Practical Synthesis of Fluoromethyltriphenylphosphonium Salts.

84 6P

PERSONAL AUTHORS: Burton, D. J.; Niemers, D. M.;

CONTRACT NO. AFOSR-80-0259

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR  
TR-85-0437

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Fluorine Chemistry, v27 p85-89 184.

ABSTRACT: (U) A practical synthesis of  $(\text{Ph}_3\text{P}(+)\text{CH}_2\text{F})\text{BR}_4(-)$  is reported via two routes, via fluorination of  $(\text{Ph}_3\text{Pr}+)\text{CH}_2\text{OH})\text{BF}_4(-)$  with DAST or via hydrolysis of the phosphoranium salt,  $(\text{Ph}_3\text{P}(+)\text{CFP}(+)\text{Ph}_3\text{BR})(-)$ . Originator supplied keywords include: Phosphonium salts; Wittig reaction; Fluoroolefin; Fluorinating agents; Ylides.

DESCRIPTORS: (U) \*PHOSPHONIUM COMPOUNDS, \*SALTS, \*SYNTHESIS(CHEMISTRY), FLUORINATION, HYDROLYSIS, FLUOROPOLYMERS, OLEFIN POLYMERS, SYNTHESIS, REPRINTS

IDENTIFIERS: (U) Wittig reactions, Ylides, PE61102F, WUAFOSR230382

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IOWA UNIV IOWA CITY DEPT OF CHEMISTRY

(U) The Hydrolysis of Bromodifluoromethyltriphenylphosphonium Bromide.

81 7P

PERSONAL AUTHORS: Flynn, R. M.; Manning, R. G.; Kessler, R. M.;

CONTRACT NO. AFOSR-80-0259

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR  
TR-85-0435

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Fluorine Chemistry, v18 p525-531 1981.

ABSTRACT: (U) Hydrolysis of  $\text{Ph}_3\text{P}(+)\text{CFBr}_2\text{Br}(-)$  afforded a high yield of dibromofluoromethane and triphenylphosphine oxide. Hydrolysis in the presence of a radioactive isotope of bromine gave evidence that the mechanism of this reaction proceeds via the dibromofluoromethide ion and not via a bromofluorocarbene intermediate. Originator supplied keywords include: Phosphonium salts (fluoro), Hydrolysis(Phosphorus), Mechanism(Phosphorus), and Carbanions.

DESCRIPTORS: (U) \*PHOSPHONIUM COMPOUNDS, \*HYDROLYSIS, \*BROMIDES, BROMINE, HIGH RATE, OXIDES, PHENYL RADICALS, PHOSPHINE, PHOSPHORUS, RADIOACTIVE ISOTOPES, SALTS, METHYL RADICALS, FLUORINE, METHANE, CARBENES, REPRINTS

IDENTIFIERS: (U) Carbanions, WUAFOSR230382, PE61102F

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AD-A154 574 12/1

MARYLAND UNIV COLLEGE PARK DEPT OF COMPUTER SCIENCE

(U) Comparison of Structural Test Coverage Metrics.

MAR 85 7P

PERSONAL AUTHORS: Gannon, J. D. ; Weiser, M. D. ; McMullin, P. R. ;

CONTRACT NO. F49620-83-K-0018

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR  
TR-85-0442

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Software, p80-85 Mar 85.

ABSTRACT: (U) Program testing is the controlled execution of a program over a finite set of test data and the analysis of the results. Testing seeks either to expose flaws in a program or to increase confidence that a program performs correctly. Strategies for selecting test cases generally fall into two categories: functional (that is, black-box techniques based on the computational structure of the program itself). This article compares several structural test case selection strategies by examining test coverage metrics, which judge the adequacy with which the selected data exercises the program's structure. Additional keywords: Statistical tests; and reprints.

DESCRIPTORS: (U) STATISTICAL TESTS, COMPUTATIONS, CONTROL, DEFECTS(MATERIALS), EXPERIMENTAL DATA, REPRINTS, SET THEORY, STRUCTURAL PROPERTIES, TEST METHODS

IDENTIFIERS: (U) WUAFOSR2304A2. PE61102F

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IOWA UNIV IOWA CITY DEPT OF CHEMISTRY

(U) Tributylarsonium-2,2,3,3,4,4-Hexafluorocyclobutane Ylide. Preparation and Cleavage.

MAR 81 5P

PERSONAL AUTHORS: Burton, D. J. ; Valk, P. D. Vander ;

CONTRACT NO. AFOSR-80-0259

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR  
TR-85-0436

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Fluorine Chemistry, v18 p413-416 1981.

ABSTRACT: (U) F-cyclobutene forms a stable ylide with n-tributylarsine. In contrast to the halogen cleavage of the analogous phosphonium ylide, which gives 1, 1-dihaloalkanes, the arsonium ylide reacts with bromine and iodine to give the 1-halo-F-cyclobutenes. Originator supplied keywords include: Ylides (arsenic), fluoroolefins, cyclobutanes, carbanions (arsonium).

DESCRIPTORS: (U) \*ARSINES, \*SYNTHESIS(CHEMISTRY), \*CYCLOBUTANES, ARSENIC, BROMINE, CLEAVAGE, CYCLOBUTANES, HALOGENS, IODINE, BUTYL RADICALS, FLUORINE, OLEFIN POLYMERS, REPRINTS

IDENTIFIERS: (U) \*Ylides, Carbanions, WUAFOSR2303B2, PE61102F

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IOWA UNIV IOWA CITY DEPT OF CHEMISTRY

SRI INTERNATIONAL MENLO PARK CA

(U) Preparation of Halo-F-Methanes via Potassium Fluoride-Halogen Cleavage of Halo-F-Methylphosphonium Salts.

(U) Dynamic Fracture behavior of Structural Materials.

DESCRIPTIVE NOTE: Annual rept. no. 4, Feb 84-Feb 85,

82 11P

PERSONAL AUTHORS: Burton, D. J. ; Shin-Ya, S. ; Kesling, H. S.

MAR 85 17P

PERSONAL AUTHORS: Giovanola, J. H. ; Shockey, D. A. ;

CONTRACT NO. AFOSR-80-0259

PROJECT NO. 2308

PROJECT NO. 2303

TASK NO. A1

TASK NO. B2

MONITOR: AFOSR  
TR-85-0460

MONITOR: AFOSR  
TR-85-0433

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Fluorine Chemistry, v20 p89-97 1982.

ABSTRACT: (U) Treatment of halo-F-methylphosphonium salts with potassium fluoride and halogen (I2, Br2, ICl, IBr) gives modest yields of halo-F-methanes. This method of preparation augments the classical Hunsdiecker approach to these materials. Originator supplied keywords include: Fluoroalkanes, phosphonium salts (fluoro), carbanions (fluoro) alkyl halides, fluoride ion.

DESCRIPTORS: (U) \*METHANES, \*HALOGENATED HYDROCARBONS, \*SYNTHESIS(CHEMISTRY), ALKYL RADICALS, FLUORIDES, HALIDES, IONS, PHOSPHONIUM COMPOUNDS, POTASSIUM, SALTS, CLEAVAGE, REPRINTS

IDENTIFIERS: (U) Carbanions, WUAFOSR230382, PE61102F

ABSTRACT: (U) To ensure safe design of Air Force structures, it is necessary to understand the mechanics of high-rate fracture and to have a knowledge of the dynamic fracture properties of component materials. In accord with this need, a research program is being conducted at SRI with the goals of developing a test procedure for obtaining reliable dynamic initiation toughness values and establishing the relationship between dynamic initiation and dynamic propagation toughness. This annual report summarizes the progress and results of the fourth research year. The capabilities of the one-point-bend impact test (1PBt) conceived by Kalthoff et al. and further developed during previous years of this program were extended in two ways during this fourth research year. By adding ballast plates to the ends of a specimen plate we showed that the 1PBt could be applied to lower density materials and smaller specimens than heretofore possible. Second, we developed a model of the post-instability behavior of the impacted specimen that allows the test to be used to assess crack propagation as well as crack initiation behavior. To compare dynamic initiation and propagation toughness, we performed a series of one-point-bend experiments in which K1d and K1d were measured on the same specimen. The propagation toughness values were dependent on crack velocity and propagation distance, and were much larger than the initiation toughness. Keywords: Dynamic fracture, Incubation time.

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DESCRIPTORS: (U) \*FRACTURE(MECHANICS), AIR FORCE,  
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MATERIALS, CRACK PROPAGATION, DYNAMICS, DYNAMIC LOADS, BALLAST, PLATES, CRACKING(FRACTURING), VELOCITY, FRACTURE(MECHANICS), PROPAGATION, TOUGHNESS, INCUBATION, TIME, HIGH RATE, MECHANICS, TOUGHNESS, VALUE, CONSTRUCTION MATERIALS, LOW DENSITY, BEHAVIOR, SAFETY, TEST METHODS

IDENTIFIERS: (U) LPN-SRI-PYU-2777. WUAFOSR2308A1, PES1102F

AD-A154 563 7/3

IOWA UNIV IOWA CITY DEPT OF CHEMISTRY

(U) Determination of Formation Constants of Calcium Complexes of Difluoromethylenediphosphonic Acid and Related Diphosphonates.

JUN 83 7P

PERSONAL AUTHORS: Fonong, T. ; Burton, D. J. ; Pietrzyk, D. J.

CONTRACT NO. AFOSR-80-0259

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR  
TR-85-0419

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Analytical Chemistry, v55 n7 p1089-1094 Jun 83.

ABSTRACT: (U) Formation constants for the 1:1 and 2:1 complexes formed between Ca(2+) and difluoromethylenediphosphonate (F2MDP), dichloromethylenediphosphonate (Cl2MDP), and 1-hydroxyethane-1, 1-diphosphonate (EHDP) were determined by a potentiometric titration procedure where the indicator electrode is a Ca ion selective electrode and the titrant is a CaCl2 solution. Logarithm formation constants, although similar for the 1:1 complex, change in the order EHDP>Cl2MDP>F2MDP which is opposite to the acid strength exhibited by the ligands. For the 2:1 Ca(2+) : ligand complex the EHDP complex formation constant is similar to the 1:1 complex and the complex is significantly more stable than either of the 2:1 Ca(2+): Cl2MDP or Ca (2+):F2MDP complexes. This is probably the result of coordination involving the hydroxyl group in EHDP. Weak 1:1 Na(+):ligand complexes were also detected. Originator supplied keywords include: Diphosphonates, chelating agents, calcium ion, fluorinated acids, calcium complexes, ylides (fluoro).

DESCRIPTORS: (U) \*CALCIUM, \*PHOSPHONIC ACIDS, \*PHOSPHONATES, \*ANALYTICAL CHEMISTRY, CHELATING AGENTS, CONSTANTS, ELECTRODES, FLUORINATION, HYDROXYL RADICALS,

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IONS, LIGANDS, LOGARITHM FUNCTIONS, METHYLENES, FLUORINE,  
TITRATION, POTENTIOMETRIC ANALYSIS, REPRINTS

IOWA UNIV IOWA CITY DEPT OF CHEMISTRY

(U) Remarkable, Contrasteric, Electrocyclic Ring Opening  
of a Cyclobutene.

IDENTIFIERS: (U) Yides

84 3P

PERSONAL AUTHORS: Dolbier, W. R. ; Jr.; Koroniak, H. ; Burton,  
D. J. ; Bailey, A. R. ; Shaw, G. S. ;

CONTRACT NO. AFOSR-80-0259

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR  
TR-85-0416

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical  
Society, v106 p1871-1872 1984.

ABSTRACT: (U) Kinetic and thermodynamic studies of cis-  
and trans-perfluoro-3,4-dimethylcyclobutene indicate that  
the previously reported interpretation of such ring  
opening reactions (based on repulsive steric interactions)  
are in error, and that a new theoretical and mechanistic  
interpretation is required. A new interpretation of these  
results, based on pyramidalization differences is  
proposed. Originator-supplied keywords: fluoroolefin;  
fluorinated dienes; fluorinated organometallics ring-  
opening reactions; cyclobutenes.

DESCRIPTORS: (U) \*CYCLOBUTENES, \*CHEMICAL REACTIONS,  
OLEFIN POLYMERS, FLUOROPOLYMERS, FLUORINATION, DIENES,  
ORGANOMETALLIC COMPOUNDS, RINGS, REACTION KINETICS,  
THERMODYNAMICS, REPRINTS

IDENTIFIERS: (U) Ring opening reactions, MUAFOSR2303B2,  
PE61102F

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IOWA UNIV IOWA CITY DEPT OF CHEMISTRY

IOWA UNIV IOWA CITY DEPT OF CHEMISTRY

(U) The Preparation of Partially Fluorinated Fused Ring Hydrocarbons,

(U) Preparation, Stability, Reactivity and Synthetic Utility of a Cadmium Stabilized Complex of Difluoromethylene Phosphonic Acid Ester,

83 5P

PERSONAL AUTHORS: Burton, D. J. ; Link, B. A. ;

81 7P

CONTRACT NO. AFOSR-80-0259

PERSONAL AUTHORS: Burton, D. J. ; Takel, R. ; Shin-Ya, S. ;

PROJECT NO. 2303

CONTRACT NO. AFOSR-80-0259

TASK NO. 82

PROJECT NO. 2303

MONITOR: AFOSR TR-85-0422

TASK NO. 82  
MONITOR: AFOSR TR-85-0429

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Fluorine Chemistry, v22 p397-400 1983.

SUPPLEMENTARY NOTE: Pub. in Jnl. of Fluorine Chemistry, v18 p197-202 1981.

ABSTRACT: (U) Diels-Alder reactions of fluorinated cyclobutenes and cyclopentenes with 1,3-butadiene and substituted 1,3-butadienes readily provide partially fluorinated fused ring systems. Hydrogenation, aromatization, acid hydrolysis and dehydrohalogenation of these adducts is easily accomplished and affords useful synthetic routes to partially fluorinated compounds. Originator supplied keywords: Fluorinated hydrocarbons; Diels-Alder reaction; fluoroolefin; fused rings; fluoro aromatics.

DESCRIPTORS: (U) \*FLUORINATED HYDROCARBONS, \*SYNTHESIS(CHEMISTRY), FLUOROPOLYMERS, OLEFIN POLYMERS, RINGS, AROMATIC COMPOUNDS, CYCLOBUTENES, CYCLOPENTENES, BUTADIENES, REPRINTS

IDENTIFIERS: (U) WUAFOSR230382. PE81102F

DESCRIPTORS: (U) \*ESTERS, \*PHOSPHONIC ACIDS, \*ORGANOMETALLIC COMPOUNDS, \*SYNTHESIS(CHEMISTRY), CADMIUM, STABILIZATION, METHYLENES, PHOSPHONATES, FLUORINE, ORGANOMETALLIC COMPOUNDS, REPRINTS

IDENTIFIERS: (U) WUAFOSR230382. PE81102F

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FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

IOWA UNIV IOWA CITY DEPT OF CHEMISTRY

(U) A Simple Test for New Better than Used in Expectation.  
84 8P

(U) A Safe Facile Synthesis of Difluorophosphonoacetic  
Acid.

PERSONAL AUTHORS: Borges, W. de Souza ; Rodrigues, J. ;  
Proschan, F. ;

PERSONAL AUTHORS: Burton, D. J. ; Sprague, L. G. ; Pietrzyk, D.  
J. ; Edelmuth, S. H. ;

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR  
TR-85-0441

CONTRACT NO. AFOSR-80-0259

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR  
TR-85-0404

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Communications in Statistics,  
Part A. Theory and Methods, v13 n25 p3217-3223 1984.

UNCLASSIFIED REPORT

ABSTRACT: (U) The authors present a statistical procedure to test that a life distribution is exponential against the alternative that it is continuous new better than used in expectation. The test is shown to be consistent and asymptotic relative efficiency results are obtained against the competitor developed earlier by Hellander and Proschan, for certain families of alternatives. Additional keywords: Reprints; Reliability. (Author)

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organic Chemistry,  
v49 p3437-3438 1984.

ABSTRACT: (U) Copper (I) halide catalyzed acylation of (diethoxyphosphinyl) difluoromethyl zinc bromide with ethyl chloroformate provides a safe, easily scaled up preparation of ethyl difluoro(diethoxyphosphinyl) acetate from readily available precursors. Silylation of this ester, followed by hydrolysis, gives difluorophosphonoacetic acid. Originator supplied keywords include: Phosphonic acids, phosphorus-fluorine chemistry, fluorinated phosphonates, fluorinated acids, chelating agents.

DESCRIPTORS: (U) \*STATISTICAL PROCESSES, DISTRIBUTION FUNCTIONS, CONSISTENCY, EFFICIENCY, RELIABILITY, REPRINTS

IDENTIFIERS: (U) Life distribution, WUAFOSR2304A5,  
PE61102F

DESCRIPTORS: (U) \*SYNTHESIS(CHEMISTRY), \*ACETIC ACID, \*FLUORINE, \*PHOSPHONATES, FORMATES, CHLORINE, SILICON, ACIDS, ACYLATION, BROMIDES, CHELATING AGENTS, COPPER, ETHYL RADICALS, FLUORINATION, HYDROLYSIS, PHOSPHONIC ACIDS, SYNTHESIS, ZINC, REPRINTS

IDENTIFIERS: (U) Acetic acid/Difluorophosphono,  
WUAFOSR2303B2, PE61102

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AD-A154 555 7/3

IOWA STATE UNIV AMES DEPT OF CHEMISTRY

(U) A Convenient Preparation of Deuterated Fluoroolefins.

82 6P

PERSONAL AUTHORS: Burton, D. J.; Mettillie, F. J. ;

CONTRACT NO. AFOSR-80-0259

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR  
TR-85-0431

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Fluorine Chemistry,  
v20 p157-161 1982.

ABSTRACT: (U) The reduction of iodo-containing fluoroolefins with NaAlH<sub>4</sub> in diglyme followed by hydrolysis with D<sub>2</sub>O provides a convenient preparative procedure to the corresponding deuterated fluoroolefin. Polyfluorinated olefins generally react with complex metal hydrides either via nucleophilic displacement of vinylic halogen by hydrogen or allylic displacement of fluorine through an S<sub>N</sub>2 type reaction (1,2). Olefins that contain vinylic iodide, however, do not undergo nucleophilic substitution when reacted with LiAlH<sub>4</sub> in ether. Instead, they form aluminum complexes, which are stable in solution. Evidence for this alternate mode of reaction was obtained from GLPC analysis of the reaction mixture before and after hydrolysis, measurement of the hydrogen gas evolved during the reaction, and an investigation of the amount of deuterated vs. protonated product obtained if hydrolysis of the reaction mixture was carried out with D<sub>2</sub>O.

DESCRIPTORS: (U) \*FLUOROPOLYMERS, \*OLEFIN POLYMERS, \*HYDROLYSIS, \*SYNTHESIS(CHEMISTRY), IODINE, SODIUM COMPOUNDS, ALUMINUM COMPOUNDS, HYDRIDES, HEAVY WATER, REDUCTION(CHEMISTRY), REPRINTS

IDENTIFIERS: (U) Deuteration. PE61102F. WUAFOSR230382

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IOWA UNIV IOWA CITY DEPT OF CHEMISTRY

(U) Metal Dehalogenation Route to Reactive Fluoroolefins.

81 7P

PERSONAL AUTHORS: Burton, D. J.; Kesling, H. S.; Naase, D. G.

CONTRACT NO. AFOSR-80-0259

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR  
TR-85-0428

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Fluorine Chemistry,  
v18 p293-298 1981.

ABSTRACT: (U) Metal dehalogenation of bromodifluoromethyltriphenylphosphonium bromide with Cd, Zn, or Hg provides a practical route to fluoroolefins that contain an allylic halogen or a pentafluorophenyl group. No S<sub>N</sub>2' or ring substituted products are observed. Originator supplied keywords include: Fluoroolefins, phosphonium salts (fluoro), ylides (fluoro), Wittig reaction, monomers.

DESCRIPTORS: (U) \*SYNTHESIS(CHEMISTRY), \*FLUOROPOLYMERS, \*OLEFIN POLYMERS, HALOGENATION, BROMIDES, MONOMERS, PHOSPHONIUM COMPOUNDS, SALTS, REPRINTS

IDENTIFIERS: (U) \*dehalogenation, Ylides, Wittig reactions. PE61102F. WUAFOSR230382

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CLARKSON COLL OF TECHNOLOGY POTSDAM NY

CONNECTICUT UNIV STORRS DEPT OF ELECTRICAL ENGINEERING  
AND COMPUTER SCIENCE

(U) Forced Integrable Systems.

(U) Determining the Updating Interval of a Round Robin  
Sequence for Token Passing Mobile Networks.

84 13P

PERSONAL AUTHORS: Kaup, D. J. ;

MAY 85 7P

CONTRACT NO. AFOSR-82-0154, NSF-MCS82-02117

PERSONAL AUTHORS: Mookerjee, P. ; Gold, Y. I. ;

PROJECT NO. 2304

CONTRACT NO. AFOSR-80-0098

TASK NO. A4

PROJECT NO. 2304

MONITOR: AFOSR  
TR-85-0443

TASK NO. A1

MONITOR: AFOSR  
TR-85-0438

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Wave Phenomena: Modern Theory  
and Applications. p163-174 1984.

UNCLASSIFIED REPORT

ABSTRACT: (U) A discussion is given of boundary value  
problems for nonlinear integrable systems. The forced  
nonlinear Schroedinger equation and the forced Toda  
lattice are used as examples. It is demonstrated that one  
can quite well solve such systems by using reasonable  
approximations. It is demonstrated that one can quite  
well solve such systems by using reasonable  
approximations. As an example, the birthrate for solitons  
in the forced Toda lattice is solved approximately and it  
is shown that the result compares quite favorably with  
the actual birthrate. (Reprints)

DESCRIPTORS: (U) \*BOUNDARY VALUE PROBLEMS, \*SCHRODINGER  
EQUATION, NONLINEAR ANALYSIS, REPRINTS

IDENTIFIERS: (U) Toda lattice. Solitons, PEB1102F,  
WUAFOSR2304A4

SUPPLEMENTARY NOTE: Pub. in Proceedings of IEEE  
Conference on Vehicular Technology, 21-23 May 85.

ABSTRACT: (U) The optimal token passing sequence for a  
round robin token passing protocol depends on node  
spatial configuration (it is the sequence that minimizes  
the sum of token passing times). When a network contains  
mobile nodes, a once optimal sequence can, after some  
time, yield poor performance due to changes in node  
configuration. The sequence must then be updated.  
Performance deterioration is a function of node speeds,  
type of motion, and time. We evaluate this deterioration  
(by means of theoretical analysis and simulation  
experiments) for the purpose of determining an inter-  
update interval that allows the network to maintain good  
performance. Additional keywords: Reprints; Multiple  
Access; Problem Solving; Computations.

DESCRIPTORS: (U) \*INTERVALS, \*NETWORK  
ANALYSIS(MANAGEMENT), COMPUTATIONS, CONFIGURATIONS,  
DETERIORATION, FUNCTIONS, MOBILE, MOTION, MULTIPLE ACCESS,  
NETWORKS, NODES, OPTIMIZATION, PROBLEM SOLVING, REPRINTS,  
SEQUENCES, THEORY, VELOCITY

IDENTIFIERS: (U) PEG1102F, WUAFOSR2304A1

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IOWA STATE UNIV AMES DEPT OF CHEMISTRY

(U) The Hydrolysis of Bromodifluoro-methyltriphenylphosphonium Bromide.

82 7P

PERSONAL AUTHORS: Burton, D. J.; Flynn, R. M.; Manning, R. G.; Kessler, R. M.;

CONTRACT NO. AFOSR-80-0259

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR TR-85-0425

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Fluorine Chemistry, v18 p525-531 1981.

ABSTRACT: (U) Hydrolysis of Ph3P(+)CF2BrBr(-) afforded a high yield of bromodifluoromethane and triphenylphosphine oxide. Hydrolysis in the presence of a radioactive isotope of bromine or sodium iodide gave unequivocal evidence that the mechanism for this reaction proceeds through a difluorocarbene intermediate. Originator supplied keywords include: Carbenes; Difluorocarbene; Phosphonium salts (fluoro); Hydrolysis; Mechanism (fluorine).

DESCRIPTORS: (U) \*PHOSPHONIUM COMPOUNDS, \*HYDROLYSIS, \*BROMIDES, CARBENES, HIGH RATE, SALTS, IODIDES, SODIUM, FLUORINE, BROMINE, RADIOACTIVE ISOTOPES, OXIDES, PHENYL RADICALS, PHOSPHINE, METHYL RADICALS, METHANE, REPRINTS

IDENTIFIERS: (U) PE81102F. WUAFOSR2303B2

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IOWA UNIV IOWA CITY DEPT OF CHEMISTRY

(U) Difluoromethylene Exchange in the Preparation of Fluorinated Bis-Phosphonates.

82 7P

PERSONAL AUTHORS: Burton, D. J.; Ishihara, T.; Flynn, R. M.;

CONTRACT NO. AFOSR-80-0259

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR TR-85-0432

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Fluorine Chemistry, v20 p121-126 1982

ABSTRACT: (U) The application of the Michaelis-Becker variation to the preparation of unsymmetrical and F-methylene bis-phosphonates gives a mixture of both symmetrical and unsymmetrical bis-phosphonates. The reaction is best explained by dissociation of the intermediate F-methylene phosphonate ylide and carbene scrambling among the potential dialkyl phosphite anions. Originator supplied keywords include: Phosphonates (fluoro), difluorocarbene, carbenes, ylides, exchange processes, synthetic methods (fluorine).

DESCRIPTORS: (U) \*FLUORINE COMPOUNDS, \*EXCHANGE REACTIONS, \*SYNTHESIS(CHEMISTRY), \*PHOSPHONATES, FLUORINATED HYDROCARBONS, METHYLENES, CARBENES, DISSOCIATION, FLUORINE, CARBENES, REPRINTS

IDENTIFIERS: (U) Y1ides, WUAFOSR2303B2, PE81102F

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IOWA UNIV IOWA CITY DEPT OF CHEMISTRY

IOWA UNIV IOWA CITY DEPT OF CHEMISTRY

(U) A Useful Zinc Reagent for the Preparation of 2-Oxo-1,1-Difluoroalkylphosphonates.

82

6P

PERSONAL AUTHORS: Burton, D. J.; Ishihara, T.; Maruta, M.;

PERSONAL AUTHORS: Burton, D. J.; Wiemers, D. M.;

CONTRACT NO. AFOSR-80-0259

CONTRACT NO. AFOSR-80-0259

PROJECT NO. 2303

PROJECT NO. 2303

TASK NO. 82

TASK NO. 82

MONITOR: AFOSR  
TR-85-0426MONITOR: AFOSR  
TR-85-0434

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemistry Letters, p755-758  
1982.SUPPLEMENTARY NOTE: Pub. in Jnl. of Fluorine Chemistry,  
v18 p573-582 1981.

ABSTRACT: (U) The treatment of dialkyl bromodifluoromethylphosphonates with activated zinc dust in various solvents gave dialkoxylphosphonyldifluoromethylzinc compounds 2, which were acylated with acid halides or fluorinated acid anhydride to afford dialkyl 2-oxo-1,1-difluoroalkylphosphonates in good yields. Originator supplied keywords include: Fluoro organometallics, Zinc reagents, Phosphorous, Fluorine, Acylation, Phosphonates.

DESCRIPTORS: (U) \*ORGANOMETALLIC COMPOUNDS, \*ZINC, \*PHOSPHONATES, \*SYNTHESIS(CHEMISTRY), ACIDS, ACTIVATION, ACYLATION, ANHYDRIDES, CHEMICAL AGENTS, DUST, FLUORINATION, FLUORINE COMPOUNDS, HALIDES, PHOSPHORUS, SOLVENTS, ALKYL RADICALS, REPRINTS

IDENTIFIERS: (U) WUAFOSR2303B2, PE61102F

IDENTIFIERS: (U) WUAFOSR2303B2, PE61102F

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IOWA UNIV IOWA CITY DEPT OF CHEMISTRY

(U) Phosphine- and Phosphite-Mediated Difluorocarbene Exchange Reactions of (Bromodifluoromethyl)phosphonium Salts. Evidence for Facile Dissociation of (Difluoromethylene)tri-phenylphosphorane,

83

4P

PERSONAL AUTHORS: Burton, D. J. ; Naeae, D. G. ; Flynn, R. M. ;

CONTRACT NO. AFOSR-80-0259

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR  
TR-85-0418

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organic Chemistry, v48 n20 p3616-3618 1983.

ABSTRACT: (U) Phosphonium ylide formation by capture of electrophilic carbenes with nucleophilic tertiary phosphines is a well-established synthetic method and has been recently shown to be a symmetry-breaking allowed pathway to ylides. (Bromodifluoromethyl) triphenylphosphonium bromide undergoes facile exchange of the bromodifluoromethyl group with tertiary phosphine and triaryl phosphite. A mechanism that involves formation of the difluoromethylene ylide and dissociation of the ylide into difluorocarbene and triphenylphosphine is proposed to account for the observed exchange processes.

DESCRIPTORS: (U) \*CARBENES, \*EXCHANGE REACTIONS, DISSOCIATION, PHENYL RADICALS, PHOSPHINE, PHOSPHONIUM COMPOUNDS, SALTS, SYNTHETIC MATERIALS, BROMIDES, PHOSPHITES, FLUORINE, REPRINTS

IDENTIFIERS: (U) \*Ylides. Halocarbenes. WUAFOSR2303B2, PE61102F

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CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF MECHANICAL ENGINEERING

(U) Large Eddy Structures in Transitional and Turbulent Flames.

DESCRIPTIVE NOTE: Annual rept. 1 Jul 83-30 Jun 84.

JUL 84

18P

PERSONAL AUTHORS: Chigier, N. ;

CONTRACT NO. AFOSR-82-0266

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR  
TR-85-0379

UNCLASSIFIED REPORT

ABSTRACT: (U) A second generation experimental apparatus has been designed and constructed to provide a uniform co-flowing air stream with no physical enclosure around the flame. A new seeding system has been acquired that provides large quantities of small seeded particles in the secondary air to avoid bias in velocity measurements by LDV (Laser Doppler Velocimetry). More flame height measurements have been made which do not agree with the classical Hawthorne-Hotel data. The LDV electronics processing data acquisition and software systems have all been debugged, calibrated and made ready for measurements with sampling times of 150 KHz. Ionization and thermocouple probes have been designed and are under construction. Preliminary color schlieren photographs using rainbow schlieren have been made. Keywords include: Transition A1 jet flames; Premixed and non-premixed diffusion flames.

DESCRIPTORS: (U) \*FLAMES, AIR, COLOR PHOTOGRAPHY, COMPUTER PROGRAMS, DATA ACQUISITION, DIFFUSION, DOPPLER SYSTEMS, ELECTRONICS, HEIGHT FINDING, IONIZATION, JET FLAMES, LASER VELOCIMETERS, MEASUREMENT, MIXING, PARTICLE SIZE, PHOTOGRAPHS, PROBES, PROCESSING, SCHLIEREN PHOTOGRAPHY, SECONDARY SEEDING, THERMOCOUPLES, TRANSITIONS, TURBULENCE, VELOCITY, AIR FLOW, EDDIES (FLUID MECHANICS), SECONDARY FLOW

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IDENTIFIERS: (U) Rainbow schlieren photography,  
Coflowing air streams. Transition jet flames, PE61102F,  
WJAFOSR2308A2

WISCONSIN UNIV-MADISON MATHEMATICS RESEARCH CENTER

(U) Modelling and Parameter Estimation for Distributed  
Vibratory Systems.

DESCRIPTIVE NOTE: Final rept. 1 Jul 83-30 Sep 84.

MAR 85 43P

PERSONAL AUTHORS: Russell, D. L. ;

CONTRACT NO. DAAG29-83-G-0056, AFOSR-83-0281

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR  
TR-85-0444

UNCLASSIFIED REPORT

ABSTRACT: (U) Citing data collected and analyzed with the University of Wisconsin MIPAC (Modelling, Information Processing and Control) Facility electronic measurement and analysis equipment, the investigators make some general comments concerning mathematical models which appear to be appropriate for modelling certain vibratory systems of distributed parameter type. Aspects discussed include: location of vibrational spectra, damping rates, and spectral displacement due to mass density and/or elasticity variations. Particular emphasis is placed on some properties of segmented beams. The article ends with a preliminary mathematical discussion of the feasibility of parameter identification, from vibrational spectrum data alone, in the wave and Euler-Bernoulli beam equations. (Author)

DESCRIPTORS: (U) \*VIBRATION, \*MATHEMATICAL MODELS, BEAMS(STRUCTURAL), DAMPING, DENSITY, DISPLACEMENT, DISTRIBUTION, ELECTRICAL MEASUREMENT, ESTIMATES, FACILITIES, INFORMATION PROCESSING, MASS, PARAMETERS, RATES, SPECTRA, VIBRATIONAL SPECTRA

IDENTIFIERS: (U) PE61102F, WJAFOSR2304A5

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CALIFORNIA UNIV DAVIS DEPT OF MECHANICAL ENGINEERING

NORTHWESTERN UNIV EVANSTON IL DEPT OF CIVIL ENGINEERING

(U) Fundamental Investigations of Failure during Superplastic Forming Process.

(U) Dynamic Fracture of Concrete and other Heterogeneous Materials.

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

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

MAR 84 19P

NOV 84 33P

PERSONAL AUTHORS: Mukherjee, A. K. ; Gurewitz, G. ; Meier, M. ; Hidalgo-Prada, B. ;

PERSONAL AUTHORS: Belytschko, T. ; Bazant, Z. ; Chang, C. ; Hyun, H. ;

CONTRACT NO AFOSR-82-0081

CONTRACT NO. AFOSR-83-0009

PROJECT NO. 2306

PROJECT NO. 2302

TASK NO. A1

TASK NO. C2

MONITOR: AFOSR TR-85-0375

MONITOR: AFOSR TR-85-0447

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Fine grained superplastic alpha/beta Ti-6Al-4V alloy was deformed in the temperature range 750-925 C and at strain rates of 0.0001 to 0.0001/s. The results indicate that an increase in the deformation temperature or a decrease in the deformation rate is followed by an increase in the value of strain hardening index (SHI). In such a situation, the stress-strain rate relation can no longer be represented by the conventional power law formulation without evaluating the effect of strain. The common assumption that a large value of the (apparent) strain rate sensitivity parameter is associated with a large amount of superplastic ductility is not tenable under test conditions where strain hardening or strain softening effect is noticeable. Keywords: Titanium alloys; Mechanical behavior; Deformation mechanisms.

DESCRIPTORS: (U) \*SUPERALLOYS, \*PLASTICS, \*TITANIUM ALLOYS, DEFORMATION, FAILURE, FORMULATIONS, INDEXES, MECHANICAL PROPERTIES, PARAMETERS, POWER, RATES, SENSITIVITY, SOFTENING, STRAIN HARDENING, STRAIN RATE, STRAIN(MECHANICS), STRESS STRAIN RELATIONS, TEMPERATURE, VALUE

IDENTIFIERS: (U) \*Superplastic alloys. PE6110ZF, WUAFOSR2306A1

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be limited and a finite amount of energy dissipation which is relatively insensitive to element size, can be achieved. Keywords: Concrete; Structures; Failures; Size effects.

DESCRIPTORS: (U) \*CONCRETE. \*STRESS STRAIN RELATIONS SOFTENING. STRESS ANALYSIS, FAILURE(MECHANICS), CONTINUUM MECHANICS, FINITE ELEMENT ANALYSIS

IDENTIFIERS: (U) Strain softening. WUAFOSR2302C2. PE61102F

NORTHWESTERN UNIV EVANSTON IL CRESAP NEUROSCIENCE LAB

(U) Phosphoprotein Regulation of Synaptic Reactivity: Enhancement and Control of a Molecular Gating Mechanism.

DESCRIPTIVE NOTE: Annual scientific technical rept. 30 Sep 83-29 Sep 84.

MAR 85 35P

PERSONAL AUTHORS: Routtenberg, A. ;

CONTRACT NO. AFOSR-83-0335

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR TR-85-0449

UNCLASSIFIED REPORT

ABSTRACT: (U) Protein F1, a brain specific synaptically located protein, is phosphorylated in direct relation to the enhancement of synaptic communication. Studies demonstrated that the kinase involved in phosphorylation of protein F1 is protein kinase C. Results suggest that the mode of activation of the kinase C by synaptic enhancement may involve translocation of the enzyme from the cytosol to the cell membrane.

DESCRIPTORS: (U) \*PROTEINS, \*SYNAPSE, \*PHOSPHORYLATION, \*NERVE TRANSMISSION, ACTIVATION, BRAIN, CELLS(BIOLOGY), MEMBRANES(BIOLOGY), OPTIMIZATION, TRANSLOCATION, TRANSFERASES

IDENTIFIERS: (U) KINASES, Cytosol, WUAFOSR2312A1, PE61102F

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CERAMPHYSICS INC WESTERVILLE OH

integral, Energy density, WUAFOSR3005A1, PE81102F

(U) Capacitive Energy Storage at Cryogenic Temperatures.

DESCRIPTIVE NOTE: Final rept. 1 Sep 84-28 Feb 85 on Phase I.

FEB 85 43P

PERSONAL AUTHORS: Lavless, W. N.; Clark, C. F.;

CONTRACT NO. F49620-84-C-0089

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR  
TR-85-0377

UNCLASSIFIED REPORT

ABSTRACT: (U) A Phase I research program on capacitive energy storage at liquid-nitrogen temperatures is reported. A composition in the cadmium-lead-niobate-tantalate family of ceramic ferroelectrics was chosen with a paraelectric to ferroelectric phase transition at 71 K (so-called CPN17 composition), and prototype multilayer capacitors (MLC's),  $1 \times 1 \times 0.2$  cc with 46 active layers, were fabricated for testing. Dielectric constant, specific-heat, and electrocaloric data were measured on these MLC's in the range 77-100 K at electric fields up to 200 kV/cm. All the measured data can be explained and correlated very satisfactorily using a Ginzburg-Landau expansion of the free energy in combination with the IdS equation for dielectrics. Capacitive-energy-storage densities were computed from the measured electric-field dependence of the dielectric constant at 77 K using the Helmholtz integral. A state-switching phenomenon was observed. The zero-field specific heat of CPN17 is 0.15 J/g/K at 77 K and displays an excess specific heat centered around 82 K.

DESCRIPTORS: (U) CERAMIC CAPACITORS, ENERGY STORAGE, CRYOGENICS, FERROELECTRIC MATERIALS, FREE ENERGY, CHARGE DENSITY, HIGH DENSITY, SPECIFIC HEAT, NIOBATES, TANTALATES, CADMIUM COMPOUNDS, LEAD COMPOUNDS

IDENTIFIERS: (U) Ginzburg-Landau theory, Helmholtz

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AD-A154 507 6 4 9/2

MASSACHUSETTS UNIV AMHERST DEPT OF COMPUTER AND  
INFORMATION SCIENCE

IDENTIFIERS: (U) Adaptive architectures, Machine vision,  
Image understanding, Visual cortex, Neuroscience, Memory  
traces, Firing patterns, Engrams, Memory(Physiology),  
Evoked potentials, WUAFOSR2312A1, PE61102F

(U) The Representation of Knowledge in Image Understanding.

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

MAR 85 20P

PERSONAL AUTHORS: Spinelli, D. N. ;

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR  
TR-85-0448

UNCLASSIFIED REPORT

ABSTRACT: (U) The author believes that understanding adaptation and knowledge representation is fundamental to make progress in image understanding by animal brains. He has been studying the anatomical structures and the temporal requirements that lead to adaptation. This report makes a brief excursion into some experiments which have been demonstrated in the past. Also discussed is the enormous complexity of the problem in hand and it is concluded that only a method which allows the reading out of recognizable visual memories has any chance to make progress in this complex endeavor. Determined were some of the parameters that produce powerful adaptation and have methods that allow memory read-outs. A preliminary conclusion is that image understanding requires a learning principle that takes into account the nature of the information and not just temporal and/or spatial relationships. Animal brains possess extremely effective vision systems. Architectural and functional principles gained by studying them will certainly lead to new ideas for new computer architectures especially in the fields of machine vision, adaptation, and parallel computation.

DESCRIPTORS: (U) \*BIONICS, \*PARALLEL PROCESSING,  
\*ADAPTIVE SYSTEMS, \*PATTERN RECOGNITION, \*IMAGE  
PROCESSING, VISION, EYE, RETINA, CYCLIC RATE, CODING,  
NEUTRONS, MEMORY DEVICES, CEREBELLUM, CATS, SYNAPSE,  
TRANSMITTERS

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AD-A154 430 21/2

ILLINOIS UNIV AT URBANA COORDINATED SCIENCE LAB

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES

(U) Future Perception and Shape from Texture.

(U) Transient Combustion Dynamics.

DESCRIPTIVE NOTE: Interim scientific rept. 1 Sep 82-31 Aug 83.

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

SEP 83 2P

JUN 84 8P

PERSONAL AUTHORS: Ahuja, N. ;

PERSONAL AUTHORS: Choudhury, P. R. ; Gerstein, M. ;

CONTRACT NO. AFOSR-82-0317

CONTRACT NO. AFOSR-82-0222

PROJECT NO. 2304

PROJECT NO. 2308

TASK NO. A7

TASK NO. A2

MONITOR: AFOSR  
TR-85-0349

MONITOR: AFOSR  
TR-85-0380

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Research during this period has resulted in the development of algorithms for perceptual segmentation of the most basic of the texture representations-the dot pattern representation. Segmentation is based on a variety of perceptual grouping criteria, including dot density, magnitude and direction of density gradients, and shape characteristics of the segments. (Author)

DESCRIPTORS: (U) \*ALGORITHMS, \*PATTERN RECOGNITION, \*SEGMENTED, TEXTURE, DENSITY, GRADIENTS, PATTERNS, PERCEPTION, SHAPE

IDENTIFIERS: (U) PEG1102F, WUAFOSR2304A7

ABSTRACT: (U) Characteristics of pressure fluctuations due to the instability of the shear layer at the sudden expansion step of a dump combustor are being studied experimentally. Results show that the disturbances induced by the step are centered around a characteristic frequency which is a function of the shape of the chamber. The center frequency appear to be independent of either the step height of the free stream velocity within the range of the experimental variables. The step height and the free-stream velocity affect only the amplitude and not the frequency of the disturbance. Closely spaced frequencies around the center frequency lead to a low frequency 'beating' phenomenon which is clearly seen on a oscilloscope. Axisymmetric and two-dimensional chambers have different characteristic center frequencies and beat frequency distributions. This coherent beating appears to be responsible for the low frequency combustion instability in dump combustors. Work is continuing in order to understand the nature of the coherent beating and its influence on the combustor. A feedback control is to be used to destroy the coherence of the critical 'beating' and minimize the effect of combustion instability.

DESCRIPTORS: (U) \*COMBUSTORS, \*COMBUSTION STABILITY, AXISYMMETRIC, BEAT SIGNAL, CHAMBERS, CONTROL, DISTRIBUTION, FEEDBACK, FREE STREAM, FREQUENCY, LAYERS, LOW FREQUENCY, SHEAR PROPERTIES, TWO DIMENSIONAL.

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AD-A154 415 6/20 6/1

VELOCITY, AMPLITUDE

CALIFORNIA UNIV SAN FRANCISCO

IDENTIFIERS: (U) WUAFOSR2308A2, PE61102F

(U) Molecular Toxicology of Chromatin: The Role of Poly(ADP-Ribose) in Gene Control.

DESCRIPTIVE NOTE: Annual progress rept. Oct 83-31 Dec 84.

FEB 85 137P

PERSONAL AUTHORS: Kun.E. ;

CONTRACT NO. F49620-81-C-0007

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR  
TR-85-0487

UNCLASSIFIED REPORT

ABSTRACT: (U) This report pertains to the following research projects: Chemical and macromolecular structure of poly(ADP-ribose). 1. HPLC-isolation of poly(ADP-ribose). 2. Fractionation, size analysis branching of poly (ADP-ribose) by HPLC and chemical analysis of subunits. 3. Mathematical model of polymerization of ADP-ribose. II. Biosystems. III. Molecular studies on purified poly(ADP-ribose) in cellular and subcellular systems. III. Molecular studies on purified poly(ADP-ribose) polymerase system. 1. DNA-association of benzamide. 2. The role of lysine residues in the catalysis and DNA binding of poly(ADP-ribose)polymerase. IV. Cell transformation and poly ADP-riboseylation. 1. Inhibition of carcinogen initiated transformation. 2. Ultraviolet light induced transformation and its inhibition.

DESCRIPTORS: (U) \*RIBOSE, \*ADENOSINE PHOSPHATES, \*CHROMATIN, \*TOXICOLOGY, \*GENES, CATALYSIS, CELLS(BIOLOGY), INHIBITION, MACROMOLECULES, MATHEMATICAL MODELS, MOLECULAR STRUCTURE, POLYMERIZATION, TRANSFORMATIONS, ULTRAVIOLET RADIATION, MOLECULES, FRACTIONATION, LIQUID CHROMATOGRAPHY, DEOXYRIBONUCLEIC ACIDS, AMIDES, AMINO ACIDS

IDENTIFIERS: (U) Lysine, WUAFOSR2312A5, PE61102F

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OREGON GRADUATE CENTER BEAVERTON IDENTIFIERS: (U) \*Semi-insulating GaAs, WUAFOSR230681, PE81102F

(U) Conference on Semi-Insulating III-V Materials (3rd), Held at Warm Springs, Oregon, 1984.

DESCRIPTIVE NOTE: Final technical rept. 1 Apr-31 Dec 84.

JAN 85 518P

PERSONAL AUTHORS: Blakemore, J. S. :

REPORT NO. 71-449-SIMC-85-2

CONTRACT NO. AFOSR-84-0081, NO0014-84-G-0038

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR TR-85-0165

UNCLASSIFIED REPORT

Availability: Shiva Publishing Limited, 84 Welsh Row, Nantwich, Cheshire CW5 5ES, England (No copies furnished by DTIC/NIS).

ABSTRACT: (U) Problems discussed included the growth of uniform and stable crystals of semi-insulating GaAs, defect identification and characterization, and the effects of a semi-insulating substrate on realizable device properties. The nature of the midgap native 'EL2' donor still remained incompletely determined, but useful progress was reported in the control of this defect in making substrates for microwave devices and integrated circuits. Sections: Diffusion, gettering, and annealing; Dislocations and extended defects; Crystal growth and related problems; EL2 and other point defects; Devices as effected by the substrate; and Theory and Impurity/state characterization.

DESCRIPTORS: (U) \*CRYSTAL GROWTH, \*GALLIUM ARSENIDES, \*INSULATION, ANNEALING, CRYSTALS, DEFECTS/MATERIALS, DISLOCATIONS, GETTERING, GROUP III COMPOUNDS, GROUP V COMPOUNDS, IDENTIFICATION, INTEGRATED CIRCUITS, MATERIALS, MICROWAVE EQUIPMENT, OREGON, POINT DEFECTS, STABILITY, SUBSTRATES, DIFFUSION, IMPURITIES

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVN39H

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ALASKA UNIV FAIRBANKS GEOPHYSICAL INST

(U) A Quasi-Linear Study of Gravity-Wave Saturation and Self-Acceleration.

NOV 84 21P

PERSONAL AUTHORS: Fritts, D. C.; Dunkerton, T. J.;

CONTRACT NO. AFOSR-82-0125

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR  
TR-85-0471

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Atmospheric Sciences, v41 n22 p3272-3289, 15 Nov 84.

ABSTRACT: (U) We present the results of quasi-linear simulations performed to illuminate the effects of saturation and self-acceleration on gravity waves propagating into the middle atmosphere. It is shown for transient, horizontally monochromatic wave packets that self-accelerations due to transient mean wind accelerations can be a significant factor in the evolution. Self-accelerations represent a possibly major change in the phase speed of the wave motion and permit larger vertical wavelengths and vertical group velocities than would otherwise occur. In some instances, self-accelerations permit gravity wave motions to propagate well beyond an initial critical level, a phenomenon we label 'critical-level dislocation'. This phenomenon does not occur under the slowly-varying (WKB) and single phase speed assumptions. As such, it may be an intrinsically non-WKB effect. Saturation was modeled using a relaxation convective adjustment scheme. This was found to limit wave amplitudes without radically affecting the structure of the primary wave, as anticipated in the linear saturation theory. Due to gradual adjustment, however, wave amplitudes and momentum fluxes were larger than predicted by linear theory. Local saturation was also found to reduce but not eliminate the effects of self-acceleration and to permit the excitation of harmonics of the primary wave motion in a coherent manner.

DESCRIPTORS: (U) \*GRAVITY WAVES, \*HARMONICS, \*ATMOSPHERIC MOTION, AMPLITUDE, EXCITATION, LINEARITY, MESOSPHERE, MOMENTUM, MOTION, SATURATION, THEORY, VELOCITY, VERTICAL ORIENTATION, WAVES, REPRINTS

IDENTIFIERS: (U) WUAFOSR2310A1, PEG1102F

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AD-A154 366 20/5

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PENNSYLVANIA STATE UNIV UNIVERSITY PARK

BOSTON COLL CHESTNUT HILL MA

(U) Development and Application of a High Power Nd-Glass Laser Instrument.

(U) Strong Coupling Effects on Bound States in Plasmas.

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

DESCRIPTIVE NOTE: Final rept. 1 Feb 81-31 Jan 84.

JAN 85 88P

FEB 85 21P

PERSONAL AUTHORS: Merkle, C. L.; York, T. M.;

PERSONAL AUTHORS: Kalman, G. J.;

CONTRACT NO. AFOSR-84-0048

CONTRACT NO. AFOSR-81-0091

PROJECT NO. 2308

PROJECT NO. 2301

TASK NO. A1

TASK NO. A8

MONITOR: AFOSR  
TR-85-0358

MONITOR: AFOSR  
TR-85-0458

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Research on the interaction between an incident laser beam and a flowing gas is described. The results include a discussion of the development and evaluation of a high power short wavelength source for experimental investigation of these interactions, as well as summary of work on theoretical analysis of the interaction. The source uses an Nd-Yag oscillator followed by two high-gain amplifier stages to provide requisite power levels. At present, testing has been done with only the oscillator and the first-stage amplifier in place. Energy delivery for the first half of an anticipated ten millisecond duty cycle is closely in line with predictions and overall system performance looks promising. The analytical results describe initial results of the first detailed investigation of the stability characteristics of the interaction, as well as the first ever two-dimensional flowfield solutions for this problem. (Author)

DESCRIPTORS: (U) \*LASER BEAMS, \*GAS FLOW, \*NEODYMIUM LASERS, \*AMPLIFIERS, HIGH GAIN, INTERACTIONS, LASER BEAMS, OSCILLATORS, POWER LEVELS, SOLUTIONS(GENERAL), STABILITY, SYSTEMS ANALYSIS, THEORY, TWO DIMENSIONAL, YAG LASERS

IDENTIFIERS: (U) WUAFOSR2308A1, PE61102F

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AD-A154 338 5/1 15/3

FLORIDA UNIV GAINESVILLE DEPT OF CHEMISTRY

SOUTHEASTERN CENTER FOR ELECTRICAL ENGINEERING EDUCATION  
INC ST CLOUD FL

(U) Laser-Excited Atomic Fluorescence Techniques for  
Temperature Measurements in Flames: A Summary.

(U) United States Air Force Summer Faculty Research  
Program (1984). Program Management Report. Volume 3.

DEC 84 8P

DESCRIPTIVE NOTE: Final rept..

PERSONAL AUTHORS: Zizak, G.; Omenetto, N.; Winefordner, J. D.

DEC 84 1061P

CONTRACT NO. F49620-80-C-0005

PERSONAL AUTHORS: Peele, W. D.; Steele, E. L.; Otis, A. L.;

PROJECT NO. 2303

CONTRACT NO. F49620-82-C-0035

TASK NO. A1

PROJECT NO. 2301

MONITOR: AFOSR  
TR-85-0412

TASK NO. D5

MONITOR: AFOSR  
TR-85-0481

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Optical Engineering, v23 n6  
p749-755 Nov/Dec 84.

UNCLASSIFIED REPORT

ABSTRACT: (U) Twelve laser-excited atomic fluorescence  
methods suitable for absolute temperature measurements in  
flames and other atomic and/or ionic reservoirs are  
reviewed and summarized. The different characteristics of  
the techniques are discussed. Several important  
parameters that need to be evaluated experimentally and  
the assumptions that need to be made in order to obtain  
meaningful temperature data from the selected method are  
emphasized. Additional keywords: Reprints; Laser  
spectroscopy; and Combustion diagnosis.

DESCRIPTORS: (U) \*ATOMIC SPECTROSCOPY, \*FLAMES,  
TEMPERATURE, LASERS, MEASUREMENT, TEMPERATURE, REPRINTS,  
LASER APPLICATIONS, FLUORESCENCE, COMBUSTION

IDENTIFIERS: (U) Atomic fluorescence spectroscopy, Laser  
spectroscopy, PE61102F, WUAFOSR2303A1

SUPPLEMENTARY NOTE: See also Volume 1, AD-A154 336,  
Volume 2, AD-A154 337 and AD-A154 335.

ABSTRACT: (U) This volume contains 51 papers generated  
during the summer '84 program. Titles include: Evaluation  
of Models for Liquid Propellant Rocket Combustion  
Instability; Large Space Structure Dynamic Testing;  
Acquisition of Wind Tunnel Wall Pressure Distributions  
for use in Developing 3-D Transonic Wall Correction Code;  
Leadership Effects as Measured by the Organizational  
Assessment Package--Multilevel perspective; Ramah  
Spectroscopy of Unstimulated and Stimulated Cultured  
Normal and Neoplastic Human or Mammalian Cells;  
Preliminary Monte Carlo Studies of the Structure of  
Molten Salts; Military Family Stress; Air Oxidation of  
Hydrazine -- A kinetic study; Conceptual Design of the  
USAF Installation Restoration Program Information System;  
Cytotoxic Effects of Trimethylpentane on Rat Renal Tissue;  
Computer-Based Optimization Algorithms for LOGAIR Cargo  
Allocation; Laser Damage Studies in Urigified and  
Plasticized Polyakylmethacrylates; and Experimental  
Physics Aspects of the AFATL Railgun Effort.

DESCRIPTORS: (U) \*AIR FORCE RESEARCH, \*RESEARCH  
MANAGEMENT, REPORTS, ACQUISITION, AIR, ALGORITHMS, CARGO,  
CELLS(BIOLOGY), COMPUTER APPLICATIONS, CYTOTOXIN, DAMAGE

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ASSESSMENT, FAMILIES(HUMAN), HYDRAZINES, KIDNEYS, LASER  
DAMAGE, LEADERSHIP, MAMMALS, MANAGEMENT, MONTE CARLO  
METHOD, OPTIMIZATION, OXIDATION, PHYSICS, RATS,  
TISSUES(BIOLOGY), LIQUID ROCKET PROPELLANTS, COMBUSTION  
STABILITY, WIND TUNNELS, RAMAN SPECTROSCOPY, SALTS,  
INFORMATION SYSTEMS, KINETICS

SOUTHEASTERN CENTER FOR ELECTRICAL ENGINEERING EDUCATION  
INC ST CLOUD FL

(U) United States Air Force Summer Faculty Research  
Program (1984). Program Management Report. Volume 2.

DESCRIPTIVE NOTE: Final rept..

IDENTIFIERS: (U) PEB1102F. WUAFOSR2301DS

DEC 84 1171P

PERSONAL AUTHORS: Peele, W. D. ; Steele, E. L. ; Otis, A. L. ;

CONTRACT NO. F49620-82-C-0035

PROJECT NO. 2301

TASK NO. D5

MONITOR: AFOSR  
TR-85-0480

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 1, AD-A154 338,  
Volume 3, AD-A154 338 and AD-A154 335.

ABSTRACT: (U) This volume contains 50 papers generated during the summer '84 program. Titles include: Manual and Computer-Aided Sequential Diagnostic Inference; Angle Resolved Ion-Scattering Spectroscopy-A feasibility study; Electrogastrogram and its Effectiveness in Evaluation of Motion Sickness; Far-Infrared Absorption Profiles for Shallow Donors in GaAs-GaAlAs Quantum Well Structures; Digital Signal Processing Approaches for Analysis and Evaluation of Communication Systems; Production Rate Variations Cost Models; Thermal Stability Characteristics of Silahydrocarbons; Calculations of Electron Spin Resonance Coupling Constants; Effects of Pyridostigmine on Performance of Mission-ready Pilots in the OT Simulation Facility; Propulsion Facility Planning for Test Information Productivity Improvement with Emphasis on Data Measurement Uncertainty in the Engine Test Facility; Point Diffraction Interferometry Plus Holographic Measurements of a Turbulent Boundary Layer on a Roughened Wind Tunnel Wall; Effects of Temperature and Reactant Solvation Upon the Rates of Gas-Phase Ion-Molecule Reactions; A Monte Carlo Sampling of BDR Times.

DESCRIPTORS: (U) \*AIR FORCE RESEARCH, \*RESEARCH

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MANAGEMENT, REPORTS, COMPUTER AIDED DIAGNOSIS, SPECTROSCOPY, COST MODELS, ELECTRONS, SPIN RESONANCE, COMPUTATIONS, COMMUNICATION AND RADIO SYSTEMS, DIGITAL SYSTEMS, SIGNAL PROCESSING, ENGINES, TEST FACILITIES, ALUMINUM GALLIUM ARSENIDE, QUANTUM THEORY, STRUCTURES, MONTE CARLO METHOD, SAMPLING, DATA MANAGEMENT, MEASUREMENT, TEMPERATURE, ABSORPTION, FAR INFRARED RADIATION, PROFILES, CHEMICAL REACTIONS, IONS, MOLECULES, REACTIVE GASES, MOTION SICKNESS, MANAGEMENT, PRODUCTIVITY, TURBULENT BOUNDARY LAYER, SOLVATION, SIMULATION, THERMAL STABILITY, WALLS, WIND TUNNELS

SOUTHEASTERN CENTER FOR ELECTRICAL ENGINEERING EDUCATION  
INC ST CLOUD FL

(U) United States Air Force Summer Faculty Research Program (1984). Program Management Report. Volume 1.

DESCRIPTIVE NOTE: Final rept..

DEC 84 1189P

PERSONAL AUTHORS: Peele, W. D.; Steele, E. L.; Otis, A. L.;

IDENTIFIERS: (U) Silahydrocarbons, PE8110ZF,  
WUAFSDR2301DS

CONTRACT NO. F49620-82-C-0035

PROJECT NO. 2301

TASK NO. D5

MONITOR: AFOSR  
TR-85-0479

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 2. AD-A154 337,  
Volume 3, AD-A154 338 and AD-A154 335.

ABSTRACT: (U) This volume contains 49 papers generated during the summer '84 program. Titles include: Centrifuge Modeling of Structural Response during Underground Explosions; New Synthetic Techniques for Advanced Propellant Ingredients--Selective chemical transformations and new structures-Bis-Fluorodinitroethylamino Derivatives; Infrared Adsorption Spectra of Silane and Disilane; Characterization of C-14-Serotonin Uptake into Cerebellar Glomeruli; Automatic Controller for Space Experiments; Two-Color Refractometry for Astronomical Geodesy; Long Wavelength Infrared Emissions from a Recombining Oxygen Plasma; Development of a High Frequency Lung Ventilation Model for Testing under Hypobaric Conditions; Astronomical Observations Using the Imaging Camera of the Large Aperature Infrared Telescope System; Recommendations for Improvements in the Theory and Practice of DoD Incentive Contracting; Simulation of Radar Reception from Terrain and Airborne Targets.

DESCRIPTORS: (U) \*AIR FORCE RESEARCH, \*RESEARCH MANAGEMENT, ADSORPTION, AERIAL TARGETS, ASTRONOMY, AUTOMATIC, CENTRIFUGES, CONTROL, EMISSION, GEODESY,

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GLOMERULI, HYPERBARIC CONDITIONS, INFRARED RADIATION, INFRARED SPECTRA, INFRARED TELESCOPES, MODELS, OBSERVATION, OXYGEN, RADAR RECEIVERS, SILANES, SIMULATION, SYNTHETIC MATERIALS, TERRAIN, REPORTS, PROPELLANTS, STRUCTURAL RESPONSE, UNDERGROUND EXPLOSIONS, SEROTONIN, LONG WAVELENGTHS

SOUTHEASTERN CENTER FOR ELECTRICAL ENGINEERING EDUCATION  
INC ST CLOUD FL

(U) United States Air Force Summer Faculty Research Program (1984). Program Management Report.

DESCRIPTIVE NOTE: Final rept..

IDENTIFIERS: (U) PE61102F, WUAFOSR2301D5

DEC 84 263P

PERSONAL AUTHORS: Peele, W. D. ; Steele, E. L. ; Otis, A. L. ;

CONTRACT NO. F49620-82-C-0035

PROJECT NO. 2301

TASK NO. D5

MONITOR: AFOSR  
TR-85-0478

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 1, AD-A154 336, Volume 2, AD-A154 337 and Volume 3, AD-A154 338.

ABSTRACT: (U) This program provides opportunities for research in the physical sciences, engineering life sciences, business, and administrative sciences. The program has been effective in providing basic research opportunities to the faculty of universities, colleges, and technical institutions throughout the United States. The program is available to faculty members in all academic grades; instructors, assistant professor, associate professor, professor, department chairman, and research facility directors. It has proven especially beneficial to young faculty members who are starting their academic research programs and to senior faculty members who have spent time in university administration and are desirous of returning to scholarly research programs. Abstracts of 151 research reports generated during this program are included in this volume.

DESCRIPTORS: (U) \*AIR FORCE RESEARCH, \*RESEARCH MANAGEMENT, REPORTS, ABSTRACTS, ENGINEERING, LIFE SCIENCES, INSTRUCTORS, MANAGEMENT, UNIVERSITIES, PHYSICAL SCIENCES

IDENTIFIERS: (U) PE61102F, WUAFOSR2301D5

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVN39M

AD-A154 332 20/1 12/1 AD-A154 332 CONTINUED

DREXEL UNIV PHILADELPHIA PA DEPT OF ELECTRICAL AND  
COMPUTER ENGINEERING

STATISTICS, STRUCTURAL PROPERTIES, TRANSMITTERS,  
ULTRASONICS, ULTRASONIC FREQUENCIES

(U) Grain Structure Identification by Ultrasound Frequency  
Averaging and Deconvolution.

IDENTIFIERS: (U) PE61102E, WUAFOSR2308A2

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

MAR 85 38P

PERSONAL AUTHORS: Newhouse, V. L. ; Amir, I. ; Nash, S. ; Yu, G.

CONTRACT NO. F49620-82-K-0026

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR  
TR-85-0459

UNCLASSIFIED REPORT

**ABSTRACT:** (U) The goal of this research project is to measure local grain size and concentration deep in the interior of a medium ultrasonically. It will be shown that information on the scatterers' statistics can be obtained if either the field structure or the scatterer density exhibits gradients. It will be shown theoretically, and by numerical computation, that the received echo from a configuration of piston transmitter and a point receiver in the center of the piston contains a coherent component which should allow concentration estimation. This report will also show theoretically and confirm experimentally that a gradient in scattering concentration will return a coherent echo from whose degree of coherence the scatterer concentration can be estimated. We expect to apply these results soon to the estimation of grain size inside a medium. Additional keywords: Coherent scattering; Estimates; Statistics; Microstructure; Nondestructive testing. (Author)

**DESCRIPTORS:** (U) GRAIN SIZE, ULTRASONIC TESTS, MEASUREMENT, COHERENCE, COHERENT SCATTERING, COMPUTATIONS, CONFIGURATIONS, ECHOS, ESTIMATES, FREQUENCY, GRAIN STRUCTURES (METALLURGY), IDENTIFICATION, MEAN, MICROSTRUCTURE, NONDESTRUCTIVE TESTING, NUMERICAL METHODS AND PROCEDURES, PISTONS, RECEIVERS, SCATTERING.

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AD-A154 303 20/9 20/5

AD-A154 303 CONTINUED

ILLINOIS UNIV AT URBANA DEPT OF MECHANICAL AND INDUSTRIAL  
ENGINEERING

IDENTIFIERS: (U) Heat addition models, Plasma initiation,  
Laser sustained plasmas, Beamed energy propulsion,  
WUAFDSR2308A1, PE61102F

(U) Experiments in Plasma Initiation and Laser Absorption  
in Flowing Gases.

DESCRIPTIVE NOTE: Annual technical rept. 15 Jan 84-15 Jan  
85.

APR 85 38P

PERSONAL AUTHORS: Krier, H.; Mazumder, J.; Glumb, R. J.;  
Bender, T. D.; Rockstroh, T. J.;

REPORT NO. UIIU-ENG-85-4004

CONTRACT NO. AFOSR-83-0041

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, AFOSR  
TR-85-0452, AR-85-01

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Original contains color plates. All  
DTIC and NTIS reproductions will be in black and white.

ABSTRACT: (U) This report summarizes the preliminary  
results of experiments designed to characterize the  
thermal and gasdynamic behavior of laser-sustained  
plasmas in flowing argon. Calorimetric measurements of  
global absorption have been made over a range of laser  
power and pressure. Temperature field mappings yield  
preliminary estimates of thermal gas energy and radiative  
losses. An infrared imaging system has been used to study  
plasma properties as a function of power and flow rate.  
Spectroscopic and laser-induced fluorescence diagnostic  
systems, now being installed, are highlighted. Physical  
implications of the data are discussed, and results of a  
2-D heat addition model are presented. Keywords include:  
Beamed energy propulsion, and Absorption of laser energy  
in gases.

DESCRIPTORS: (U) \*LASER BEAMS, \*PLASMAS (PHYSICS),  
\*RADIATION ABSORPTION, ARGON, GAS FLOW, ELECTRIC  
PROPULSION, PLASMA DIAGNOSTICS, TWO DIMENSIONAL

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INC ST CLOUD FL

SOUTHEASTERN CENTER FOR ELECTRICAL ENGINEERING EDUCATION  
INC ST CLOUD FL

(U) USAF/SCEEE Graduate Student Summer Research Program  
(1984). Program Management Report. Volume 2.

(U) USAF/SCEEE Graduate Student Summer Research Program  
(1984). Program Management Report. Volume 1.

DESCRIPTIVE NOTE: Final rept..

DESCRIPTIVE NOTE: Final rept..

OCT 84 823P

OCT 84 897P

PERSONAL AUTHORS: Peele,W. D. ;Steele,E. L. ;Otts,A. L. ;

PERSONAL AUTHORS: Peele,W. D. ;Steele,E. L. ;Otts,A. L. ;

CONTRACT NO. F49620-82 C-0035

CONTRACT NO. F49620-82-C-0035

PROJECT NO. 2301

PROJECT NO. 2301

TASK NO. D5

TASK NO. D5

MONITOR: AFOSR  
TR-85-0477

MONITOR: AFOSR  
TR-85-0478

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 1, AD-A154 300 and AD-A154 299.

SUPPLEMENTARY NOTE: See also Volume 2, AD-A154 301 and AD-A154 299.

ABSTRACT: (U) A pilot program for the Graduate Student Summer Research Program (GSSRP) was initiated by contract modification to the AFOSR Summer Faculty Research Program (SFRP) on 26 March, 1982. The program was developed as an adjunct effort to the SFRP. Its purpose is to provide funds for selected graduate students to do research at an appropriate Air Force laboratory or center with a supervising professor who holds a concurrent SFRP appointment. In the 1982 pilot program, SCEEE appointed 17 graduate students representing 15 schools and 10 disciplines in science and engineering. In 1983 the program was expanded to 53 students representing 36 schools and 18 disciplines. The 53 participants were selected from 117 applicants. In 1984 we had 112 applicants and made 84 graduate student appointments.

ABSTRACT: (U) A pilot program for the Graduate Student Summer Research Program (GSSRP) was initiated by contract modification to the AFOSR Summer Faculty Research Program (SFRP) on 26 March, 1982. The program was developed as an adjunct effort to the SFRP. Its purpose is to provide funds for selected graduate students to do research at an appropriate Air Force laboratory or center with a supervising professor who holds a concurrent SFRP appointment. In the 1982 pilot program, SCEEE appointed 17 graduate students representing 15 schools and 10 disciplines in science and engineering. In 1983 the program was expanded to 53 students representing 36 schools and 18 disciplines. The 53 participants were selected from 117 applicants. In 1984 we had 112 applicants and made 84 graduate student appointments.

DESCRIPTORS: (U) \*AIR FORCE RESEARCH, \*RESEARCH MANAGEMENT, \*GRADUATES, ENGINEERING, PHYSICAL SCIENCES, PERSONNEL SELECTION, STUDENTS, INSTRUCTORS, SUMMER

DESCRIPTORS: (U) \*AIR FORCE RESEARCH, \*RESEARCH MANAGEMENT, \*GRADUATES, \*PERSONNEL SELECTION, ENGINEERING, PHYSICAL SCIENCES, STUDENTS, INSTRUCTORS, SUMMER

IDENTIFIERS: (U) Air force research laboratories, PE81102F, WUAFOSR2301D5

IDENTIFIERS: (U) Air force research laboratories, PE81192F, WUAFOSR2301D5

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SOUTHEASTERN CENTER FOR ELECTRICAL ENGINEERING EDUCATION  
INC ST CLOUD FL

(U) USAF/SCEE Graduate Student Summer Research Program  
(1984). Program Management Report.

DESCRIPTIVE NOTE: Final rept.,

OCT 84 143P

PERSONAL AUTHORS: Peele, W. D. ; Steele, E. L. ; Otis, A. L. ;

CONTRACT NO. F49620-82-C-0035

PROJECT NO. 2301

TASK NO. D5

MONITOR: AFOSR  
TR-85-0475

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Volume 1, AD-154 299 and  
Volume 2, AD-A154 301.

ABSTRACT: (U) A pilot program for the Graduate Student  
Summer Research Program (GSSRP) was initiated by contract  
modification to the AFOSR Summer Faculty Research Program  
(SFRP) on 26 March, 1982. The program was developed as an  
adjunct effort to the SFRP. Its purpose is to provide  
funds for selected graduate students to do research at an  
appropriate Air Force laboratory or center with a  
supervising professor who holds a concurrent SFRP  
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program was expanded to 53 students representing 36  
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DESCRIPTORS: (U) \*AIR FORCE RESEARCH, \*RESEARCH  
MANAGEMENT, \*GRADUATES, PERSONNEL SELECTION, PHYSICAL  
SCIENCES, ENGINEERING, STUDENTS, INSTRUCTORS, SUMMER

IDENTIFIERS: (U) Air Force research laboratories,  
PE61102F, WJAFOSR2311D5

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ALASKA UNIV FAIRBANKS GEOPHYSICAL INST

(U) Gravity Wave Saturation in the Middle Atmosphere: A  
Review of Theory and Observations.

AUG 84 35P

PERSONAL AUTHORS: Fritts, D. C. ;

CONTRACT NO. AFOSR-82-0125

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR  
TR-85-0470

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Reviews of Geophysics and  
Space Physics, v22 n3 p275-308 Aug 84.

ABSTRACT: (U) This paper provides a review of recent  
advances in our understanding of gravity wave saturation  
in the middle atmosphere. A brief discussion of those  
studies leading to the identification of gravity wave  
effects and their role in middle atmosphere dynamics is  
presented first. This is followed by a simple development  
of the linear saturation theory to illustrate the  
principal effects. Recent extensions to the linear  
saturation theory, including quasi-linear, nonlinear, and  
transient effects, are then described. Those studies  
addressing the role of gravity wave saturation in the  
mean circulation of the middle atmosphere are also  
discussed. Finally, observations of gravity wave motions,  
distribution, variability and those measurements  
specifically addressing gravity wave saturation are  
reviewed. Keywords include: gravity waves, turbulence,  
saturation, and middle atmosphere.

DESCRIPTORS: (U) \*GRAVITY WAVES, \*SATURATION,  
\*MESOSPHERE, MOTION, CIRCULATION, MEAN, DYNAMICS,  
TRANSIENTS, LINEARITY, THEORY, TURBULENCE, REPRINTS

IDENTIFIERS: (U) WJAFOSR2310A1, PE61102F

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ILLINOIS UNIV AT URBANA COORDINATED SCIENCE LAB

(U) Texture Perception and Shape from Texture.

DESCRIPTIVE NOTE: Interim rept. 1 Sep 83-31 Aug 84.

OCT 84 2P

PERSONAL AUTHORS: Ahuja, N. ;

CONTRACT NO. AFOSR-82-0317

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR  
TR-85-0350

UNCLASSIFIED REPORT

ABSTRACT: (U) The investigators are completing the first phase of the algorithm for perceptual segmentation of dot patterns. The results of expert processes that, in parallel, detect interiors, borders and curves due to lack of local evidence for the global role of dot. Each result is corrected such that (1) it agrees with the results of other experts, and (2) it provides locally smooth borders. The second phase will proceed from the lowest level groupings and build a hierarchy of groupings. The investigators have also started to investigate the use of a 'scale-space' representation to separate components of image textural variation due to three-dimensional distance and orientation changes.

DESCRIPTORS: (U) \*ALGORITHMS, \*TEXTURE, SHAPE, PATTERNS, GLOBAL, RANGE(DISTANCE), THREE DIMENSIONAL, IMAGES, PARTS, PERCEPTION, SEGMENTED

IDENTIFIERS: (U) Dot patterns. WUAFOSR2304A7, PE61102F

AD-A154 269 11/2

NATIONAL BUREAU OF STANDARDS GAITHERSBURG MD CENTER FOR CHEMICAL PHYSICS

(U) Thermodynamics of High Temperature Materials.

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

MAR 85 256P

PERSONAL AUTHORS: Abramowitz, S. ;

CONTRACT NO. AFOSR-ISSA-84-00034

PROJECT NO. 2306

TASK NO. C4, A2

MONITOR: AFOSR  
TR-85-0394

UNCLASSIFIED REPORT

ABSTRACT: (U) This research encompasses six tasks each of which treats, from either an experimental or theoretical base, the measurement or interpretation of the high-temperature thermophysical behavior of model systems which show potential applications to environmental resistant materials and the spacecraft survivability programs. Topics include: the heat capacity, electrical resistivity and hemispherical total emittance of graphite in the range of 1500-3000 K. The heat capacity and electrical resistivity of nickel in the range 1300-1700K. Determination of the melting point of nickel. Determination of the specific heat of both hexagonal and cubic boron nitride in the range of 273.15-1200 K. The heat capacity of aluminum has been calculated using several theoretical models. The thermodynamic effects of elastic and inelastic collisions have been determined. The problem of how to treat polyatomic molecules having highly distorted vibrational states, as can be expected after laser irradiation, has been addressed. High temperature equilibria have been modeled using a square well potential. A program for evaluation of the classical partition function and resultant thermodynamic quantities for molecules at high temperatures has been developed. An efficient computer code has been developed which allows calculation of the equilibrium configuration of the symmetric carbon structures present in graphite-like layers. Experiments

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have been initiated to test the predictions of this code. The gas phase ionic reactions leading to the build up of unsaturated hydrogen deficient carbon chain hydrocarbons has been studied.

DESCRIPTORS: (U) \*THERMODYNAMICS. \*HEAT RESISTANT METALS. \*REFRACTORY MATERIALS. \*GRAPHITE, ALUMINUM, BORON NITRIDES, CARBON, COMPUTER PROGRAMS, ELECTRICAL RESISTANCE, EMISSION, HIGH TEMPERATURE, HYDROCARBONS, LASERS, MELTING POINT, MODELS, NICKEL, SPACECRAFT, SPECIFIC HEAT, SURVIVABILITY, THERMODYNAMIC PROPERTIES, THERMOPHYSICAL PROPERTIES, MOLECULAR STRUCTURE

IDENTIFIERS: (U) WUAFOSR2306A2, WUAFOSR2306C4, PEB1102F

NORTH CAROLINA UNIV AT CHAPEL HILL CURRICULUM IN OPERATIONS RESEARCH AND SYSTEMS ANALYSIS

(U) A Comparison of Four Monte Carlo Methods for Estimating the Probability Of S-T Connectedness.

DESCRIPTIVE NOTE: Technical rept..

DEC 84 36P

PERSONAL AUTHORS: Fishman, G. S. :

REPORT NO. UNC/ORSA/TR-84/14

CONTRACT NO. AFOSR-84-0140

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR  
TR-85-0367

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper describes and compares the performance of four alternative Monte Carlo sampling plans for estimating the probability that two nodes  $s$  and  $t$  are connected in an acyclic undirected network whose arcs fail randomly and independently. Models of this type are commonly used when computing the reliability of a system of randomly failing components. The first method, dagger sampling, relies for its advantage on inducing negative correlation between the outcomes of the replications in the sample. The second method, called sequential destruction or sequential construction, exploits permutation properties of arc failures and successes. The third method uses easily determined bounds on the reliability probability to gain an advantage. The fourth approach calls for the enumeration of all failure sets of the network to achieve its appeal. An example based on a 30 arc 20 node network illustrates the variance reducing features and the time and space needs of each sampling plan. Keywords include: Monte Carlo sampling; s-t connectedness; system reliability.

DESCRIPTORS: (U) \*MONTE CARLO METHOD, \*PROBABILITY, APPROACH, CONSTRUCTION, CORRELATION, DESTRUCTION, FAILURE, GAIN, NODES, PERMUTATIONS, PLANNING, RELIABILITY,

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SAMPLING SEQUENCES

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE  
ENGINEERING

IDENTIFIERS: (U) WUAFOSR230AA5. PEG1102F

(U) The Effect of Surface Reactions in Catalytic  
Combustion.

DESCRIPTIVE NOTE: Final rept. 15 Sep 83-14 Sep 84,

JAN 85 24P

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

CONTRACT NO. AFOSR-83-0326

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR  
TR-85-0451

UNCLASSIFIED REPORT

ABSTRACT: (U) Experiments were conducted in order to better understand the role of catalytic surface reactions in determining the ignition characteristics of practical catalytic combustors. Measurements of hydrocarbon concentrations, carbon monoxide and carbon dioxide temperature were made at the exit of a platinum coated, stacked plated, catalytic combustor during the ignition of lean propane-air mixtures. The substrate temperature profile was also measured during the ignition transient. In these experiments, ignition was initiated by suddenly turning on the fuel and the time to reach steady state was of the order of ten minutes. The gas phase reactions, which were clearly observable from these measurements, showed no pronounced effect due to the catalytic surface reactions, except possibly the absence of an hydroxyl radical overshoot. The transient ignition measurements were found to be valuable in understanding the steady state performance characteristics.

DESCRIPTORS: (U) \*CATALYTIC CRACKING, \*COMBUSTORS, \*SURFACE REACTIONS, \*COMBUSTION, CARBON DIOXIDE, CARBON MONOXIDE, CONCENTRATION (COMPOSITION), FUELS, GASES, HYDROXYL RADICALS, IGNITION, MEASUREMENT, PROFILES, SUBSTRATES, SURFACE REACTIONS, TEMPERATURE, TRANSIENTS,

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VAPOR PHASES, HYDROCARBONS, FUEL AIR RATIO, PROPANE,  
MIXTURES

IOWA UNIV IOWA CITY DEPT OF CHEMISTRY

IDENTIFIERS: (U) PEG1102F. hJAFOSR2308A2

(U) New Approaches to Functionalized Fluorocarbons.

DESCRIPTIVE NOTE: Final rept. 15 Sep 80-14 Nov 84.

FEB 85 39P

PERSONAL AUTHORS: Burton, D. J. ;

CONTRACT NO. AFOSR-80-0259

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR  
TR-85-0385

UNCLASSIFIED REPORT

ABSTRACT: (U) Initial efforts were directed at the preparation of functionalized organometallic reagents. In order to detect spectroscopically the formation of the desired reagent, organocadmium reagents were investigated. Subsequent work with activated zinc gave the analogous organozinc moiety - which exhibited enhanced thermal and hydrolytic stability compared to the cadmium reagent. The bis-phosphonates developed via the organometallic methodology were also utilized in efforts to prepare difluoromethylene phosphonate ylides. Methods for the in situ generation and capture of a fluorinated Wittig reagent were explored as a potential route to the synthesis of difluoromethylene olefins from aldehyde and ketone precursors. The mechanism of the reaction of polyhalo fluoromethanes with phosphines, phosphites, and mercaptides has been demonstrated to proceed via a series of successive polyhalogen abstraction processes (nucleophilic attack on halogen) and not via conventional SN2 type of attack on carbon. The first synthesis of a stable fluorinated arsonium ylide was achieved.

DESCRIPTORS: (U) \*FLUORINE COMPOUNDS, \*CARBON COMPOUNDS, \*SYNTHESIS(CHEMISTRY), CADMIUM, CHEMICAL AGENTS, HYDROLYSIS, KETONES, METHYLENES, NUCLEOPHILIC REACTIONS, OLEFIN POLYMERS, PHOSPHINE, PHOSPHITES, PRECURSORS, THERMAL STABILITY, ZINC, ORGANOMETALLIC COMPOUNDS, SPECTROSCOPY, PHOSPHATES, FLUORINATED HYDROCARBONS

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IDENTIFIERS: (U) WUAFOSR2303B3, PE61102F

WESTINGHOUSE RESEARCH AND DEVELOPMENT CENTER PITTSBURGH  
PA

(U) Superconducting Electronic Film Structures.

DESCRIPTIVE NOTE: Final rept. 1 Jan 83-31 Dec 84.

MAR 85

23P

PERSONAL AUTHORS: Braginski, A. I. ; Gavalet, J. R. ;

REPORT NO. 85-9C9-SUPER-R1

CONTRACT NO. F49620-83-C-0035

PROJECT NO. 2306

TASK NO. C1

MONITOR: AFOSR  
TR-85-0461

UNCLASSIFIED REPORT

ABSTRACT: (U) Progress toward the fulfillment of the five main objectives of this program include the following results: V-Si and Nb-Ge films with critical temperatures of approx. 12K were reactively sputtered at deposition temperatures of < 300 deg C. NbN film with critical temperatures of 12K were magnetron reactively sputtered on 20 C substrates. Critical temperatures of > 15 K were obtained on 300 C. Solid state epitaxial growth of NbN single crystals was achieved on six different surface orientations of sapphire by annealing sputtered amorphous Nb-N. Epitaxial films of Nb, Nb-Sn, and Nb-Ge were e-beam evaporated on sapphire. A LEED study of Nb-Ir single crystals lead to an in situ procedure for producing epitaxial quality surfaces. A new UHV facility capable of e-beam evaporation and magnetron sputtering of films and equipped with in situ RHEED, XPS, and Auger spectroscopy was installed and became operational. An XPS study of tunnel barrier thickness discovered large fluctuations in thickness across each junction which appear to be a universal property of tunnel barriers. Single crystal films evaporated from ultrahigh purity Nb (< 10 ppm interstitials) were prepared for rf loss studies. Keywords: Superconductors, Transition, Temperature, Sputtering, Evaporation, Films, Niobium, Germanium, Tin, A15, B1, Microstructure, Vanadium.

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Silicon, Josephson, and junction.

DESCRIPTORS: (U) \*SUPERCONDUCTORS, \*TIN, \*NIOBIUM, ANNEALING, AUGER ELECTRON SPECTROSCOPY, BARRIERS, DEPOSITION, ELECTRON BEAMS, EPITAXIAL GROWTH, EVAPORATION, FILMS, GERMANIUM, INTERSTITIAL, LOSSES, MICROSTRUCTURE, ORIENTATION/DIRECTION, QUALITY, RADIOFREQUENCY, SAPPHIRE, SILICON, SINGLE CRYSTALS, SPUTTERING, SURFACES, TEMPERATURE, THICKNESS, TUNNELS

NORTHWESTERN UNIV EVANSTON IL DEPT OF ENGINEERING SCIENCE AND APPLIED MATHEMATICS

(U) The Stability and Dynamics of Elastic Structures and Fluid Flows.

DESCRIPTIVE NOTE: Final rept. 1 Feb 82-31 Jan 85.

MAR 85 14P

IDENTIFIERS: (U) PE61102F. WUAFOSR2306C1

PERSONAL AUTHORS: Reiss, E. L. ;

CONTRACT NO. AFOSR-80-0016

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR  
TR-85-0369

UNCLASSIFIED REPORT

ABSTRACT: (U) The main thrust of this research program has been the development and applications of asymptotic and perturbation methods for analyzing: the stability and dynamics of inelastic structures, fluid flow, and other nonlinear problems; and for problems of scattering of acoustic, electromagnetic and other waves. The work is summarized in abstracts of 28 papers which have been published, accepted for publication, submitted for publication, or are in preparation for publication.

DESCRIPTORS: (U) \*NONLINEAR ANALYSIS, DYNAMICS, ELASTIC PROPERTIES, FLUID FLOW, NONLINEAR SYSTEMS, PERTURBATION THEORY, SCATTERING, STRUCTURES, ACOUSTIC SCATTERING, ELECTROMAGNETIC SCATTERING, STABILITY, ABSTRACTS

IDENTIFIERS: (U) Asymptotic methods

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVN39M  
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CALIFORNIA UNIV IRVINE COMBUSTION LAB

(U) Mechanisms of Exhaust Pollutants and Plume Formation  
in Continuous Combustion.

performance and comparability with a list of criteria for laboratory complex flow combustors established the DSC as a viable configuration for non-premixed, complex flow combustors studies in which swirl was a major aerodynamic feature.

DESCRIPTIVE NOTE: Final rept. 1 Apr 81-31 Mar 82.

JUN 84 142P

DESCRIPTORS: (U) \*COMBUSTION, \*COMBUSTORS, \*POLLUTANTS, \*PLUMES, AIR BREATHING ENGINES, CONFIGURATIONS, DIAGNOSIS(GENERAL), EXHAUST SYSTEMS, FLOW, FLOW FIELDS, GAS TURBINES, INJECTION, MIXING, MODELS, MOMENTUM, PLUMES, SAMPLING, STATE OF THE ART, TURBULENT FLOW, LABORATORY EQUIPMENT, MASS TRANSFER

PERSONAL AUTHORS: Samuelsen, G. S. ;

REPORT NO. UCI-ARTR-84-7

CONTRACT NO. AFOSR-78-3586

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR  
TR-85-0387

UNCLASSIFIED REPORT

ABSTRACT: (U) The development of combustors that are both fuel efficient and fuel flexible requires spatially resolved measurements of velocity, temperature, and concentration in complex flows representative of both premixed and non-premixed systems. Such data are needed to provide the physical insight necessary to understand the basic processes of turbulent mixing and transport and support the evolution of modeling. The goals of the AFOSR program was to develop laboratory model combustors and experimental methodology suitable for the acquisition of the desired information. The objectives of the program were to establish and evaluate laboratory model combustors for both premixed and non-premixed fuel air injection suitable for studies of the complex flows; to acquire spatially resolved flowfield data using state-of-the-art diagnostics for the purposes of model verification and providing insight into the transport of mass, momentum, and energy in complex flows; and to conduct supplementary studies to support the development of methodologies required for measurements in complex flows. Four Combustion modules were considered: the Opposed Jet Combustor (OJC) for premixed injection and for non-premixed injection, the Centerbody Combustor (CBC), the Centerbody Combustor with swirl, and the Dilute Swirl Combustor (DSC). An evaluation of combustor

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

CALIFORNIA UNIV SAN DIEGO LA JOLLA INST FOR PURE AND APPLIED PHYSICAL SCIENCES

(U) Interim Scientific Report, AFOSR-82-0016, November 1, 1983 - October 31, 1984.

(U) Instrumentation for Particle-Beams Research Using Laser Excited Merging Beams.

JAN 85 11P

DESCRIPTIVE NOTE: Final rept. 25 Jun 83-24 Dec 84.

PERSONAL AUTHORS: Lebovitz, J. L. ;

FEB 85 10P

CONTRACT NO. AFOSR-82-0016

PERSONAL AUTHORS: Neynaber, R. H. ; Tang, S. Y. ;

PROJECT NO. 2301

CONTRACT NO. AFOSR-83-0242

TASK NO. A3

PROJECT NO. 2917

MONITOR: AFOSR TR-85-0374

TASK NO. A6

MONITOR: AFOSR TR-85-0373

UNCLASSIFIED REPORT

ABSTRACT: (U) Our work during this period continued to have as its main objective the study of (a) the thermodynamics and structure of plasmas and dense molecular fluids and (b) the distribution of the microfield in a strongly coupled plasma. Our research included both rigorous analysis and approximation schemes. We continued applying our medium approximation to a variety of systems. This method continues to be the simplest scheme available for dealing with dense diatomic fluids. It also seems to work reasonably well for simple mixtures. In fact, we found a new scheme for reproducing a mixture to a one component fluid, which we hope to explore further. In the area of plasmas our APEX approximation seems to be the best one around for static microfield distribution. We have, during the last year, obtained some new results about the time dependent gas, but no simple approximation scheme yet.

DESCRIPTORS: (U) \*PLASMAS(PHYSICS), \*FLUIDS, \*THERMODYNAMIC PROPERTIES, \*MOLECULAR STRUCTURE, COUPLING(INTERACTION), DIATOMIC MOLECULES, GASES, HIGH DENSITY, MIXTURES, MOLECULES, TIME DEPENDENCE, RESEARCH MANAGEMENT, APPROXIMATION(MATHEMATICS)

IDENTIFIERS: (U) PES1102F. WUAFOSR2301A3

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UNCLASSIFIED REPORT

ABSTRACT: (U) A summary of research performed under AFOSR Grant No. 83-0242 is given. The review describes molecular-beam studies of ion-pair production and measurements of the fraction of excited Na atoms, F\*, in a composite beam of ground-state and excited Na atoms. Molecular beam techniques will be employed to study two-body reactions that will result in an intense, collimated beam of Li atoms at an energy of several hundred keV. Generating such a beam by charge transfer of a Li(+) beam is not efficient at this energy. It appears that it can most efficiently be produced by forming a Li(-) beam and stripping away valence electrons in a suitable gas. We plan to study reactions associated with the production of Li(-) beam which is formed when a Li(+) beam interacts with a vapor of ground and excited (resonance state) Na atoms. One of the reactions (after Li(+) has been converted to Li) is Li + Na yields Li(-) + Na(+). This will be examined by merging a Li beam with a beam of Na atoms excited with a single frequency dye laser. The instrumentation required to complete this study consists of some laser and optical components, some vacuum equipment, and a laboratory computer system for data acquisition and analysis. This apparatus will supplement as well as rejuvenate an existing merging-beam apparatus.

DESCRIPTORS: (U) \*MOLECULAR BEAMS, \*IONIZATION, ATOMS,



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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVN39M

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COMPUTERS, DATA ACQUISITION, DYE LASERS, ELECTRONS,  
FREQUENCY, GROUND STATE, LASERS, OPTICAL EQUIPMENT,  
PARTICLE BEAMS, RESEARCH MANAGEMENT, RESONANCE, VACUUM,  
VALENCE, VAPORS, SODIUM, LITHIUM, EXCITATION, CROSS  
SECTIONS, REACTION KINETICS

IDENTIFIERS: (U) PEG1102F, WUAFOSR2917A6

AD-A154 149 11/6 18/8

WESTINGHOUSE ADVANCED ENERGY SYSTEMS DIV LARGE PA

(U) An Investigation of the Irradiation Swelling  
Mechanisms in Refractory Metals at High Temperatures.

DESCRIPTIVE NOTE: Final technical rept. 1983-1984 on  
Phase 1.

FEB 85 128P

PERSONAL AUTHORS: BajaJ.R. ;Hall,B. O. ;Fenske,G. R. ;

REPORT NO. WAESD-TR-85-005

CONTRACT NO. F49620-83-C-0120

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR  
TR-85-0378

UNCLASSIFIED REPORT

ABSTRACT: (U) This report presents the results of  
progress made during the first year of a three year  
program on the investigation of swelling mechanisms in  
refractory metals irradiated at elevated temperatures, i.  
e. 0.3 T sub m - 0.6 T sub m (where T sub m = melting  
point in K). The objective of this work is to achieve an  
understanding of the elevated temperature swelling in  
these body centered cubic (bcc) metals by a close  
coupling of theoretical development and experimental  
verification. Originator supplied keywords include:  
Swelling, Radiation effects, Ion bombardment, Refractory  
metals, Theory of swelling, Ion-simulation irradiation.

DESCRIPTORS: (U) \*IRRADIATION, \*REFRACTORY METALS,  
COUPLING(INTERACTION), HIGH TEMPERATURE, ION BOMBARDMENT,  
MELTING POINT, METALS, RADIATION EFFECTS

IDENTIFIERS: (U) Irradiation swelling mechanisms,  
PEG1102F, WUAFOSR2301A7

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVN39M

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PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF CHEMISTRY

(U) Vertical Channeling of Pyridine Molecules Ejected in Ion Bombardment Experiments.

DESCRIPTIVE NOTE: Technical rept..

FEB 85 7P

PERSONAL AUTHORS: Moon, D. W. ; Winograd, N. ; Garrison, B. J.

REPORT NO. TR-8

CONTRACT NO. N00014-83-K-0052, AFOSR-85-0028

MONITOR: AFOSR TR-85-0529

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics Letters, v114 n2 p237-240, 22 Feb 85.

ABSTRACT: (U) Recent secondary ion mass spectrometry experiments of organic molecules on metal surfaces show that the bonding geometry of the molecules on the surface is reflected in the polar angle distributions. Specifically, the polar distribution of pyridine molecules ejected from a sigma-bonded configuration on a Ag (111) is narrower than the polar distribution of benzene molecules ejected from a pi-bonded configuration. Classical dynamics calculations presented here identify a new channeling mechanism in which the sigma-bonded pyridine molecules on the surface focus the ejection direction of other pyridine molecules.

DESCRIPTORS: (U) \*MOLECULES, \*PYRIDINES, \*ION BOMBARDMENT, \*MOLECULAR STRUCTURE, ANGLES, BENZENE, COMPUTATIONS, DISTRIBUTION, DYNAMICS, EJECTION, GEOMETRY, ORGANIC COMPOUNDS, SURFACES, POLARITY, SILVER, CHEMICAL BONDS, MASS SPECTROSCOPY, REPRINTS

IDENTIFIERS: (U) SIMS(Secondary Ion Mass Spectrometry)

AD-A154 141 7/5 7/3

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) Photolysis of Dibenzyl Ketones Adsorbed on Zeolite Molecular Sieves. Correlation of Observed Cage Effects with Carbonyl (13C) Enrichment Efficiencies.

85 6P

PERSONAL AUTHORS: Turro, N. J. ; Wan, P. ;

CONTRACT NO. AFOSR-84-0040

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-85-0413

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical Society, v107 p678-682, 1985.

ABSTRACT: (U) The photolysis of 3-(4-methylphenyl)-1-phenyl-2-propanone (4-MeDBK) and 1,3-diphenyl-2-propanone-13C2 (DBK-13C) has been carried out on several commonly available zeolites. Dramatic changes in product distributions for 4-MeDBK photolysis were observed on the several zeolites. Percent cage effects were calculated and rationalized in terms of molecular mobility of photogenerated benzyl radicals in the void volumes of zeolites. Percent cage effects correlate well with 13C-enrichment efficiencies for DBK-13C photolysis on these zeolites and, with the yield of a DBK isomer (PMAP), the para-coupling product of the primary geminate radical pair in the photolysis of DBK-13C.

DESCRIPTORS: (U) \*PHOTOLYSIS, \*KETONES, \*BENZYL RADICALS, DISTRIBUTION, EFFICIENCY, ENRICHMENT, MOBILITY, MOLECULES, PHOTOLYSIS, ION EXCHANGE RESINS, MOLECULAR SIEVES, CARBONYL COMPOUNDS, ISOMERS, REPRINTS

IDENTIFIERS: (U) Cage compounds, Zeolite, Propanone/3-(4-Methylphenyl)-1-Phenyl-2, Propanone/1-3-Diphenyl-2, PE61102F, WJAFOSR230382

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AFOSR-TR-85-0985

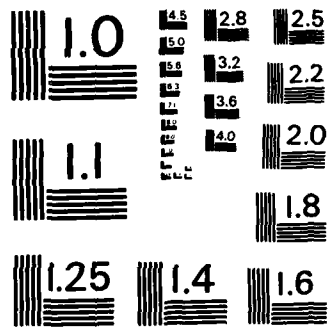
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M L ENERGIA INC PRINCETON NJ

(U) Radiative Augmented Combustion.

DESCRIPTIVE NOTE: Annual rept. no. 1, 15 Jul 83-14 Jul 84.

AUG 84 55P

PERSONAL AUTHORS: Lavid.M. :

REPORT NO. ENG-101-ATR-8408

CONTRACT NO. F49620-83-C-0133

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR  
TR-75-0394

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Continuation of work performed under  
Contract F49620-81-C-0028, Exxon Research and Engineering  
Co., Linden, NJ.

ABSTRACT: (U) Radiative Augmented Combustion has been identified as a potential technique for extending aircraft operating limits associated with combustion processes. This technique is based on the fact that radiation of selected wavelengths is capable of photodissociating stable molecules, combustion intermediates and other inhibiting species in the flame zone into reactive radicals. Subsequent reactions involving these reactive radicals lead to radiative ignition and combustion enhancement. This program emphasizes research on the interaction between radiation and combustion under flow conditions. Research is divided into two main subjects; ignition and enhancement. The objective of the experimental work is to demonstrate both ignition and enhancement in flow systems. For this purpose, two specially tailored apparatus were designed and fabricated: a plug flow combustor to conduct radiative ignition tests, and a pancake burner to measure combustion enhancement in terms of increase in burning velocity. It is expected that experiments will demonstrate proof of concept by igniting combustible mixtures at conditions where thermal ignition is

unreliable, and by increasing the flame speed. Since the role of photochemical reactions within the whole kinetic scheme is currently not completely understood, it is further expected that this research will identify the most effective photodissociative paths. This, in turn, will assist in determining the feasibility of the concept based on the availability of newly developed light sources and their compatibility with the harsh combustion environment.

DESCRIPTORS: (U) \*PHOTODISSOCIATION, \*COMBUSTION, AIRCRAFT, AUGMENTATION, BURNERS, CHEMICAL RADICALS, COMBUSTORS, FLAMES, IGNITION, INTERACTIONS, KINETICS, MIXTURES, MOLECULES, OPTIMIZATION, RADIATION, STABILITY, VELOCITY, BURNING RATE, XENON LAMPS, EXCIMER, LASERS

IDENTIFIERS: (U) WUAFOSR2308A2, PEB1102F

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AD-A154 136 CONTINUED

SCRIPPS INSTITUTION OF OCEANOGRAPHY LA JOLLA CA

DESCRIPTORS: (U) \*SEISMIC WAVES, \*NOISE, DISCRIMINATION, BOREHOLES, BOTTOM, CURRENTS, ESTIMATES, HYPOTHESES, LEVEL(QUANTITY), MEASUREMENT, MICROSEISMS, MODELS, OCEAN BOTTOM, PHYSICAL PROPERTIES, RELIABILITY, ROCK, SCALE, SEDIMENTS, SEISMIC DETECTION, SEISMIC WAVES, SEISMOGRAPHS, TIME, VORTEX SHEDDING, WEATHER

(U) Seismic Detection and Discrimination Using Ocean-Bottom Seismographs.

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 81-30 Sep 83.

SEP 83 83P

IDENTIFIERS: (U) \*Seismic noise, PE81101E

PERSONAL AUTHORS: Ocutt, J. A. ; Jordan, T. H. ;

CONTRACT NO. F49620-79-C-0019, ARPA Order-3291

PROJECT NO. 9D60

MONITOR: AFOSR  
TR-85-0388

UNCLASSIFIED REPORT

ABSTRACT: (U) We have developed a model for generating seismic noise at the sea floor which will enable us to extrapolate measurements made at sea floor with ocean bottom seismographs to depths within the underlying sediment and basement. This physical model is consistent with sea floor noise measurements made during the past decade and largely discounts the hypothesis that noise is generated at the sea floor by current motion inducing instrument 'rocking' through mechanisms such as vortex shedding. Although we have never been able to demonstrate a correlation between bottom currents and seismic noise on the sea floor, there is a definite correlation between sea floor noise and the general weather in the vicinity of the seismographs using data from a DARPA-sponsored experiment using Marine Seismic System (MSS), a vertical-component, digitally-recording, short-period seismograph system which was part of the borehole instrumentation of Deep Sea Drilling Project 788. The instrument package rested unclamped in Hole 395 A, 517 meters within basement rock. Reliable estimates of microseismic noise levels were obtained between 0.16 and 2.2 Hz. The observed microseismic noise was quasi-stationary on the time scale of one hour, but not ten. If the relationship observed between noise at and below the sea floor during Leg 788 is a general one, the range of ocean bottom levels implies that borehole noise levels could approach those at quiet continental sites.

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CARNEGIE MELLON UNIV PITTSBURGH PA DEPT OF METALLURGICAL  
ENGINEERING AND MATERIALS SCIENCE

(U) Fundamental Studies of Beta Phase Decomposition Modes  
in Titanium Alloys

DESCRIPTORS: (U) \*PHASE TRANSFORMATIONS, \*TITANIUM  
ALLOYS, ALLOYS, GROWTH(GENERAL), KINETICS, MECHANICAL  
PROPERTIES, TITANIUM, YIELD, NUCLEATION, GRAIN BOUNDARIES,  
PLATES, EUTECTICS, THERMODYNAMICS, BAINITE,  
CRYSTALLOGRAPHY

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 83-30 Sep  
84.

IDENTIFIERS: (U) Alpha plates, Black plates,  
Allotriomorphs, Proeutectoids, Nodules, PE61102F,  
WUAFOSR2308A1

JAN 85 83P

PERSONAL AUTHORS: Aaronson, H. I. ; Dalley, A. M. ; Lee, H. J.  
; Menon, E. S. K. ;

CONTRACT NO. AFOSR-80-0021

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR  
TR-85-0393

UNCLASSIFIED REPORT

ABSTRACT: (U) These studies on diffusional phase transformations in titanium and related alloy systems are intended to develop further the scientific base needed to design alloys based upon these transformations which may exhibit significantly improved combinations of mechanical properties. Kinetics of beta yields alpha sub m massive transformation were compared with those of grain boundary proeutectoid alpha precipitation in Ti-Ag and Ti-Co alloys, using measured or calculated nucleation and growth kinetics data and Cahn analysis of overall transformation kinetics of grain boundary nucleated reactions, successfully explained presence of massive transformation only in Ti-Ag and alpha allotriomorphs only in Ti-Co. New explanation developed, on thermodynamic grounds, for replacement of 'normal' proeutectoid alpha plates with a well-formed 'black plates' alpha + lower reaction temperatures. Bainite nodules in hypereutectoid Ti-Cr and in hypoeutectoid Ti-Co and Ti-Fe were found to exhibit misfit dislocation and ledge structures. Nodules in Ti-Cr grew at approximately volume diffusion-controlled rates; but reanalysis is now needed in terms of ledge mechanism. Eutectoid alpha is often found to differ slightly in orientation from adjacent proeutectoid alpha plates.

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ROYAL NORWEGIAN COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH KJELLER

GEORGIA INST OF TECH ATLANTA CENTER FOR THE ADVANCEMENT OF COMPUTATIONAL MECHANICS

(U) Deployment of a Regional Array in Norway.

(U) Computational Methods in Advanced Stress and Durability Analyses.

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

DESCRIPTIVE NOTE: Final rept. 15 Nov 80-01 Dec 83.

JAN 85 28P

NOV 84 18P

PERSONAL AUTHORS: Mykkelveit, S. ;

PERSONAL AUTHORS: Atluri, S. N. ;

CONTRACT NO. F49820-84-C-0013. ARPA Order-4950

REPORT NO. GIT-CACM-SNA-84-48

PROJECT NO. 4950

CONTRACT NO. AFOSR-81-0057

TASK NO. 00

PROJECT NO. 2307

MONITOR: AFOSR

TASK NO. B2

TR-85-0398

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of the development of an experimental regional array in Norway is to take advantage of the extremely good propagation of high-frequency energy for regional seismic phases in Eurasia. The actual field work has been started with the deployment of the seismic vaults and filling of two boreholes for seismometers. A central terminal building was completed. Trenching and cable laying was to start implementing the seismic system until completion of system deployment. The work related to transmission of data from the new array to various locations in the US via satellite and to the NORSTAR Data Processing Center was installed and continuous recording of NORESS data was started at Kjeller.

DESCRIPTORS: (U) \*ARRAYS, \*SEISMOMETERS, BOREHOLES, BUILDINGS, DATA PROCESSING, DATA TRANSMISSION SYSTEMS, DEPLOYMENT, ENERGY, EURASIA, HIGH FREQUENCY, INFORMATION CENTERS, NORWAY, PROPAGATION, RECORDING SYSTEMS, REGIONS, SEISMIC WAVES, SEISMOLOGY

IDENTIFIERS: (U) PE62714E, WUAFOSR495000

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UNCLASSIFIED REPORT

ABSTRACT: (U) In this report, research accomplished under AFOSR grant titled Computational Methods in Advanced Stress and Durability Analyses during the period 15 November 1980 - 1 December 1983, is summarized. The report is organized as follows. In Section II, the results of research on computational methods for advanced stress analysis are summarized. In Section III, the results of research pertaining to fracture and durability analyses are summarized. A list of publications and presentations arising out of this research is given in Section IV. Section V contains a list of students and post-doctoral fellows who participated in this research effort. Originator supplied keywords include: Stress analysis, Durability analysis, Fracture, Fatigue, Finite elements, Boundary elements, Surface flaws, Shell theory, Finite deformation, Kinematic modes, Hybrid/mixed elements, Stability conditions, Stokes flow, Navier stokes equations, Mixed methods for flow analysis, Objective time integration, Plate elements, Hole elements, Laminated composites, Fracture of composites, Alternating methods for surface flaws, Path-independent integrals, Creep crack growth, Moving-element methods, Dynamic fracture.



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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVN39M

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DESCRIPTORS: (U) \*STRESS ANALYSIS, \*COMPUTATIONS, \*BOUNDARIES, COMPOSITE MATERIALS, CRACK PROPAGATION, CREEP, DEFECTS(MATERIALS), DOCUMENTS, FINITE ELEMENT ANALYSIS, FLOW, FRACTURE(MECHANICS), HYBRID SYSTEMS, INTEGRALS, LAMINATES, MIXING, NAVIER STOKES EQUATIONS, NUMERICAL METHODS AND PROCEDURES, PATHS, SHELLS(STRUCTURAL FORMS), STABILITY, STRESSES, STUDENTS, SURFACES, TABLES(DATA), THEORY, ENDURANCE(GENERAL), BIBLIOGRAPHIES, FATIGUE(MECHANICS), LAMINATES

DUKE UNIV DURHAM NC DEPT OF COMPUTER SCIENCE

(U) The Completion Time of a Job on Multi-Mode Systems.

DESCRIPTIVE NOTE: Technical rept..

JAN 85 28P

PERSONAL AUTHORS: Kulkarni,V. G. ;Nicola,V. ;Trivedi,K. S.

IDENTIFIERS: (U) PEG1102F, WUAFOSR230782

REPORT NO. CS-1985-8

CONTRACT NO. AFOSR-84-0132, NSF-MCS83-0200

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-85-0400

UNCLASSIFIED REPORT

ABSTRACT: (U) In this paper the authors present a general model of the completion time of a single job on a computer system whose state changes according to a semi-Markov process. When the state of the system changes the job service is preempted. The job service is then resumed or restarted (with or without resampling) in the new state at, possibly, a different service rate. Different types of preemption disciplines are allowed in the model. Successive aggregation and transform techniques are used to obtain the Laplace Stieltjes Transform of the job completion time. The authors specialize to the case of Markovian state process. Finally the authors demonstrate the use of the techniques developed here by means of an application. Keywords include: Semi-Markov chains; repair models; pre-emptions; job completion time.

DESCRIPTORS: (U) \*COMPUTERIZED SIMULATION, \*MATHEMATICAL MODELS, \*JOBS, \*MULTIMODE, COMPUTERS, MARKOV PROCESSES, MODELS, RATES

IDENTIFIERS: (U) Completion time, WUAFOSR2304A5, PEG1102F

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. E. J9M

AD-A154 106 7/5 7/3

IOWA UNIV IOWA CITY DEPT OF CHEMISTRY

(U) Selectivity and Energetics in the MPD (Multiphoton Decomposition) of Isomeric Fluoropentanes.

JUL 84 4P

PERSONAL AUTHORS: Wanna, J. T. ; Yao, J. ; Feezel, L. L. ; Burton, D. J. ; Tardy, D. C. ;

CONTRACT NO. AFOSR-80-0259, NSF-CHE78-16702

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR  
TR-85-0415

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v108 n4 p413-414, 13 Jul 84.

ABSTRACT: (U) The multiphoton gas-phase HF elimination from 1-, 2- and 3- fluoropentanes (1FP, 2FP and 3FP) has been studied; 1FP does not react. The conversion per flash for 3FP is 1000 times greater than that for 2FP. The average excitation energies for 3FP and 2FP are 125 and 110 kcal/mole, respectively; the 3FP undergoes secondary reaction. The difference in photophysical properties of 2FP and 3FP can be used as the basis for a purification technique. Originator supplied keywords include: Lasers, fluoroalkanes, multi-photon decomposition.

DESCRIPTORS: (U) \*PHOTOCHEMICAL REACTIONS, \*FLUORINATED HYDROCARBONS, \*PENTANES, ENERGETIC PROPERTIES, ENERGY, EXCITATION, LASERS, VAPOR PHASES, HYDROGEN FLUORIDE, ELIMINATION REACTIONS, ALKANES, ISOMERS, REPRINTS

IDENTIFIERS: (U) PE81102F, WJAFOSR2303B2

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AD-A154 104 21/8

JET PROPULSION LAB PASADENA CA

(U) An Experimental Investigation of Two-Dimensional Thrust Augmenting Ejectors. Part 1.

DESCRIPTIVE NOTE: Final rept. 1 Feb 82-31 Dec 83.

AUG 84 104P

PERSONAL AUTHORS: Bernal, L. ; Sarohia, V. ;

REPORT NO. JPL-PUB-84-50-PT-1

CONTRACT NO. AFOSR-ISSA-84-00054

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR  
TR-85-0371

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also Part 2, AD-A154 083.

ABSTRACT: (U) Experiments were performed with subsonic and underexpanded choked two-dimensional primary nozzle ejector flow systems without diffusion to evaluate the role of entrainment and mixing in thrust augmentation. Two-component Laser Doppler velocity measurements (mean and fluctuating values), thrust measurements, ejector shroud surface pressure measurements and flow visualization were used to determine the evolution of the velocity profiles and their relationship to the ejector performance. Key findings include: (1) Primary jet growth is significantly altered by the ejector shroud. (2) Primary jet turbulent characteristics when normalized with the local mean centerline velocity are in agreement with those for the free-jet. (3) In the neighborhood of the ejector shroud the flow field can be classified into two regions--the potential flow region and the region close to the ejector exit which is dominated by the turbulent transport. (4) Pressure recovery is very sharp close to the ejector exit. The investigation is continuing toward the near-term objectives of obtaining measurements within diffused flow and with heated primary air. This volume emphasizes the laser doppler velocimetry

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developed especially for this program. Part II (AD-A154 083) presents detailed cold flow measurements along with preliminary primary hot flow data.

CALIFORNIA UNIV BERKELEY OPERATIONS RESEARCH CENTER  
(U) Statistical Estimation of Software Reliability.

DESCRIPTORS: (U) THRUST AUGMENTATION, EJECTORS, \*NOZZLE GAS FLOW, TWO DIMENSIONAL, AIR, COLD FLOW, COVERINGS, DIFFUSION, DOPPLER SYSTEMS, ENTRAINMENT, EXITS, FLOW, FLOW FIELDS, FLOW VISUALIZATION, HEAT, LASER VELOCIMETERS, MEASUREMENT, PERFORMANCE(ENGINEERING), PRESSURE, PRESSURE MEASUREMENT, PROFILES, RECOVERY, SURFACES, THRUST, TRANSPORT, TURBULENCE, TWO DIMENSIONAL, VELOCITY, SUBSONIC FLOW, TWO DIMENSIONAL FLOW, POTENTIAL FLOW, TURBULENT FLOW

DESCRIPTIVE NOTE: Technical rept..

MAR 85 24P

PERSONAL AUTHORS: Ross,S. M. ;

REPORT NO. ORC-85-3

CONTRACT NO. AFOSR-81-0122

IDENTIFIERS: (U) Underexpanded flow, Shrouded ejectors.  
PE81102F. WUAFOSR2307A1

PROJECT NO. 2304

MONITOR: AFOSR  
TR-85-0685

UNCLASSIFIED REPORT

ABSTRACT: (U) When a new computer software package is developed, a testing procedure is often put into effect to eliminate the faults, or bugs, in the package. One common procedure is to try the package on a set of well known problems to try to see if any errors result. This goes on for some fixed time with all detected errors being noted. Then the testing stops and the package is carefully checked to determine the specific bugs that were responsible for the observed errors, and the package is then altered to remove these bugs. A problem of great importance is the estimation of the error rate of this revised software package. To model the above, we suppose that initially the package contains  $m$ , an unknown number, of bugs which cause errors to occur in accordance with independent Poisson process having unknown rates  $\lambda$  and  $\mu$ . We suppose that the package is to be run for  $t$  time units and that each error is independently detected with some known probability  $p$ . At the end of this time, a careful check of the package is made to determine the specific bugs that caused the detected errors (that is, a 'debugging' takes place). These bugs are then removed and the problem of interest is to determine the error rate for the revised package. In this paper we show how to estimate this quantity under a variety of assumptions as to what is learned when the debugging occur.

DESCRIPTORS: (U) \*COMPUTER PROGRAM VERIFICATION.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVN39M

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\*STATISTICAL TESTS, \*DEBUGGING (COMPUTERS), COMPUTER PROGRAMS, ERRORS, ESTIMATES, POISSON EQUATION, RATES, STATISTICS, TIME, RELIABILITY, ERROR ANALYSIS

JET PROPULSION LAB PASADENA CA

(U) An Experimental Investigation of Two-Dimensional Thrust Augmenting Ejectors. Part 2.

IDENTIFIERS: (U) PE61102F

DESCRIPTIVE NOTE: Final rept. 2 Feb 82-31 Dec 83.

AUG 84 97P

PERSONAL AUTHORS: Bernal, L. ; Sarohia, V. ;

REPORT NO. JPL-PUB-84-50-PT-2

CONTRACT NO. AFOSR-ISSA-84-00054

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR  
TR-85-0370

UNCLASSIFIED REPORT

ABSTRACT: (U) The flow-field within a two-dimensional thrust augmenting ejector has been documented experimentally. Results are presented on the mean velocity field and the turbulent correlations by laser doppler velocimeter, surface pressure distribution, surface temperature distribution, and thrust performance for two shroud geometries. The maximum primary nozzle pressure ratio tested was 3.0. The tests were conducted at primary nozzle temperature ratios of 1.0, 1.8, and 2.7. Two ejector characteristics lengths were identified based on the dynamics of the ejector flow field--a minimum length below which no significant mixing occurs, and a critical length associated with the development of U-V' correlation in the ejector. These characteristic lengths divide the ejector flow field into three distinctive regions: the entrance region where there is no direct interaction between the primary flow and the ejector shroud; the interaction region where there is an increased momentum of induced flow near the shroud surface; and a 'pipe' flow region characterized by an increased skin friction. The effect of the following induced flow shown to produce inside the ejector a centerline velocity that increased over the free-jet data. The normalized turbulent correlations are found to be 25% lower than those in free jets. Effects of pressure ratio

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on the ejector flow field are small. Present measurements also show that the ejector performance was not influenced by the primary nozzle temperature ratio up to 2.7.

DESCRIPTORS: (U) \*EJECTORS, \*THRUST AUGMENTOR NOZZLES, \*JET FLOW, CORRELATION, COVERINGS, DISTRIBUTION, DOPPLER SYSTEMS, DYNAMICS, FLOW, FLOW FIELDS, GEOMETRY, INTERACTIONS, LASER VELOCIMETERS, LENGTH, MEAN, MOMENTUM, NOZZLES, PERFORMANCE(ENGINEERING), PRESSURE, RATIOS, SKIN FRICTION, SURFACE TEMPERATURE, SURFACES, TEMPERATURE, THRUST, TURBULENCE, TWO DIMENSIONAL, VELOCITY, THRUST AUGMENTATION, PRESSURE DISTRIBUTION, MIXING, SECONDARY FLOW, JET MIXING FLOW, TURBULENT FLOW

IDENTIFIERS: (U) Induced flow, Shrouds, Pipe flow, Coflowing induced flow, Thrust augmenting ejectors, PE61102F, WUAFOSR2307A1

MASSACHUSETTS UNIV AMHERST DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Fault-Tolerant Computing Research.

DESCRIPTIVE NOTE: Interim scientific rept. 15 Jan 84-14 Jan 85.

MAR 85 22P

PERSONAL AUTHORS: Pradhan, D. K. ;

CONTRACT NO. AFOSR-84-0052

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR  
TR-85-0368

UNCLASSIFIED REPORT

ABSTRACT: (U) This report provides a synopsis of research performed in fault-tolerant computing, for the first year of grant AFOSR-84-0052. Also included is a list of publications that have resulted from the research supported by this grant. Additionally, this report reviews the future direction for the continuing research under this grant. In the past year, this effort has focused on the following problems: (1) Investigation of novel fault-tolerant processor array architectures with the potential of a high degree of defect tolerance, but having low processor and interconnect overhead associated with the fault tolerance mechanisms; (2) Development of realistic models to evaluate the yield, redundancy and performance tradeoffs for the designs. Such models would help establish the viability of these architectures, also enabling them to be compared with other designs in the literature; (3) Development of new and efficient testing strategies, and reconfiguration schemes for their structures; (4) Testable design of large size VLSI memory; and (5) Development of novel sorting networks that can be implemented on a single chip or wafer. Three journal articles were supported during the grant period: 'Synthesis of Directed Multicommodity Flow Networks,' Vol. 14, pp. 213-224 (with A. Stal); 'Fault-Tolerant Multiprocessor Link and Bus Network Architectures,' IEEE Transactions on Computers, Vol. C-34, No. 1, January 1985.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVN39M

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pp. 33-46; and 'Dynamically Restructurable Fault-Tolerant Processor Network Architectures', IEEE Transactions on Computers (to appear).

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG DEPT OF AEROSPACE AND OCEAN ENGINEERING

DESCRIPTORS: (U) \*FAULT TOLERANT COMPUTING, \*RESEARCH MANAGEMENT, ARRAYS, CHIPS(ELECTRONICS), COMPUTERS, DOCUMENTS, NETWORKS, PERIODICALS, PROCESSING EQUIPMENT, SIZES(DIMENSIONS), SORTING, SYNTHESIS, TEST METHODS, TRADE OFF ANALYSIS, VIABILITY, BIBLIOGRAPHIES, COMPUTER ARCHITECTURE, MODELS, MEMORY DEVICES

(U) Injection, Atomization, Ignition and Combustion of Liquid Fuels in High-Speed Air Streams.

DESCRIPTIVE NOTE: Annual scientific rept. 1 Dec 82-30 Nov 83.

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IDENTIFIERS: (U) PE81102F, WUAFOSR2304A6

PERSONAL AUTHORS: Schetz, J. A. ;

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UNCLASSIFIED REPORT

ABSTRACT: (U) Experimental and numerical studies of liquid and slurry jet penetration, break-up and atomization were performed. The measurements were done mainly at Mach 3.0 with P sub 0 = 4 atm. and T sub 0 = 300 K. Brief summaries of recent progress on various tasks are given.

DESCRIPTORS: (U) \*ATOMIZATION, \*COMBUSTION, \*FUELS, \*IGNITION, \*FUEL INJECTION, LIQUIDS, NUMERICAL ANALYSIS, SLURRY FUELS, JET FLOW, PENETRATION, AIR FLOW

IDENTIFIERS: (U) PE81102F, WUAFOSR2308A2

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