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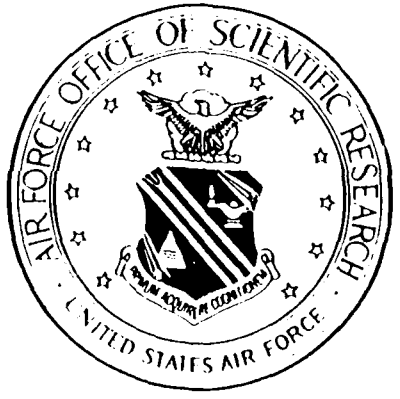
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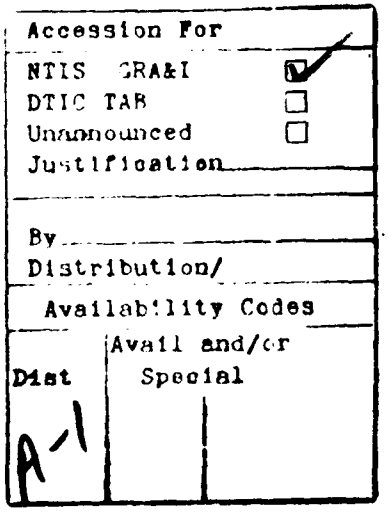
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INTRODUCTION

(Subject Index and Personal Author Index)

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

1) SUBJECT INDEX

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PURPOSE

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

AFOSR MISSION

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

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

KEY TO READING THE DATA

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

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

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

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

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

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

Title - The title of the technical report.

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

Date - Date of the technical report.

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

Personal Author - Person or persons who wrote the report.

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

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

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

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

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

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

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SUBJECT INDEX

• HYDROGEN
On the Stability of Excited Tetrahydrogen.
AD-A207 817

•ABLATION
Population Inversions in Ablation Plasmas Generated by Intense Electron Beams.
AD A205 716

•ACETATES
Lewis Acid Promoted Reactions of Substituted Pentacyclo(5.4.0.0(2,6).0(3,10).0(5,9)undecane-8,11-diones with Ethyl Diazoacetate.
AD-A207 858

•ACETONES
In situ Radical Detection under Very Low Pressure Photolysis Conditions Using Resonance-Enhanced Multiphoton Ionization. Kinetics of CF3 Radicals Produced from IR multiphoton Dissociation of Hexafluoroacetone.
AD-A205 536
The Pyrolysis of Acetylene Initiated by Acetone.
AD-A206 879

•ACETYLENE
Ion-Molecule Reactions in Sooting Acetylene Oxygen Flames.
AD-A205 792
The Pyrolysis of Acetylene Initiated by Acetone.
AD-A206 879

•ACETYLENES
Surface Plasmon Study of Monolayer Bilayer Transition in Poly-4 BCMU and Poly-3 BCMU polydiacetylene Langmuir-Blodgett Films.
AD A207 404

•ACOUSTIC SCATTERING
Two Methods for Solving the Inverse Acoustic Scattering Problem.
AD-A205 360

•ACOUSTIC WAVES
Investigation of the Flame Acoustic Wave Interaction during Axial Solid Rocket Instabilities.
AD-A207 929

•ACOUSTICS
Coordinated Noninvasive Studies (CNS) Project.
AD A205 413

•ACOUSTOOPTICS
Acoustooptic Processing of Two Dimensional Signals Using Temporal and Spatial Integration.
AD-A208 686

•ACRYLONITRILE POLYMERS
A New Catalyst for the Efficient and Selective Beta-Hydrosilylation of Acrylonitrile. Effect of Ultrasound.
AD-A206 384

•ACTUATORS
Active Control of Flexible Space Structures Using the Nitinol Shape Memory Actuators.
AD-A205 948

•ADAPTIVE SYSTEMS
Acoustooptic Processing of Two Dimensional Signals Using Temporal and Spatial Integration.
AD A208 686

•ADDRESSING
Sustained Oscillations in a Symmetric Cooperative Competitive Neural Network: Disproof of a Conjecture About Content Addressable Memory.
AD-A206 154

•ADENOSINE
Role of Adenosine Analogs and Growth Hormone in Waking and Sleep
AD A205 605

•ADSORPTION
Observation of Adsorbate Vibrational Amplitude Modification during a Phase Transformation in the Overlayer.
AD-A206 338

•AERODYNAMIC CONTROL SURFACES
State Space Models for Aeroelastic and Viscoelastic Systems.
AD-A207 092

•AEROELASTICITY
Optimum Aeroelastic Characteristics for Composite Supermaneuverable Aircraft.
AD-A205 503
State Space Models for Aeroelastic and Viscoelastic Systems.
AD-A207 092
Modeling and Computational Algorithms for Parameter Estimation and Optimal Control of Aeroelastic Systems and Large Flexible Structures.
AD-A208 274

•AEROSPACE CRAFT
Experimental and Theoretical Determination of the Thermomechanical Response of Inelastic Structural Materials to High Energy Thermal Inputs.
AD-A206 100
Study of the Influence of Metallurgical Factors on Fatigue and Fracture of Aerospace Structural Materials.
AD-A206 605

•AEROSPACEPLANES
An Instrument for the Simultaneous Measurement of Velocity, Temperature and Density in Unseeded Air Flows.
AD A205 588

•AIR BREATHING ENGINES
Fundamental Combustion Studies

Related to Air Breathing Propulsion.
AD-A207 186

*AIRCRAFT
An Experimental Study of the Effect of Streamwise Vortices on Unsteady Turbulent Boundary-Layer Separation.
AD-A205 462

*AIRFOILS
An Experimental Investigation of High Lift/High Rate Aerodynamics of an Unsteady Airfoil.
AD-A206 964

*ALCOHOLS
Synthesis of Primary-Alcohol-Terminated Polyepichlorohydrin with Molecular Weight of 4000 to 12000.
AD-A207 624

*ALGORITHMS
Numerical Conformal Mapping and Applications.
AD-A205 602
Fast Algorithms for Partial Differential Equations on Advanced Computers.
AD-A206 469
Rapidly Convergent Algorithms for Nonsmooth Optimization.
AD A207 629
Application of Multi Channel Hough Transform to Stereo Vision.
AD-A207 937
Expert Systems for the Scheduling of Image Processing Tasks on a Parallel Processing System
AD A208 613
Statistical Analysis of the LMS and Modified Stochastic Gradient Algorithms
AD A208 618
The Mapping of Parallel Algorithms to Reconfigurable Parallel Architectures
AD A208 870

*ALKALI METAL COMPOUNDS
Alkali-Rare Gas and Metal Halide Molecules as Potential Visible Lasers.
AD A207 114
A Source for Producing Alkali Ion Beams for Low-Energy Surface Scattering Spectroscopies.
AD-A208 022

*ALKANES
Thermotropic Ionic Liquid Crystals. 7. Calculation of Sodium 23 Quadrupole Coupling Constants in Lamellar Phases of Sodium Alkanoates.
AD A205 293
Thermotropic Ionic Liquid Crystals. 6. Structural Parameters of Solid and Liquid Crystal Phases of Anhydrous Short-Chain Sodium Alkanoates.
AD A206 832

*ALLOYS
Study of the Influence of Metallurgical Factors on Fatigue and Fracture of Aerospace Structural Materials.
AD A206 605

*ALUMINIDES
Environmental Effects in Niobium Base Alloys and Other Selected Intermetallic Compounds.
AD A206 072

*ALUMINUM ALLOYS
Al and Mg Alloys for Aerospace Applications Using Rapid Solidification and Powder Metallurgy Processing.
AD A207 085
Probabilistic Description of Fatigue Crack Growth Under Constant- and Variable-Amplitude Loading.
AD A208 717

*ALUMINUM COMPOUNDS
Heterocycles Based on Group III, IV, and V Elements Precursors for Novel Glasses and Ceramics.
AD-A205 586
Highly Oriented Fiber Reinforced Ceramic Composites.
AD-A208 119
27Al and 29Si NMR (Nuclear Magnetic Resonance) Study of Sol-Gel Derived Aluminosilicates and Sodium Aluminosilicates.
AD-A208 262

*ALUMINUM GALLIUM ARSENIDE
Pseudomorphic In(x).
AD-A207 037

*ALUMINUM OXIDES
Fluids, Gels and Glasses Under Extreme Conditions of Pressure and Temperature.
AD-A205 292
Excited-State Resonance Raman Spectroscopy as a Probe of Alumina-Sodium Dodecyl Sulfate Hemimicelles.
AD-A205 359

*ANATOMOY
Perceptual Structure and Shape from Texture.
AD-A207 873

*ANHYDRIDES
Cycloaddition of Anion Derived Homophthalic Anhydride to cis,cisoid,cis-Tricyclo(6.3.0.0(2,6))undeca-4,9-diene-3,11-dione. Aromatization as a Driving Force for Intramolecular Sigmatropic Hydrogen Transfer.
AD-A207 860

*ANTENNA ARRAYS
Acoustooptic Processing of Two Dimensional Signals Using Temporal and Spatial Integration.
AD-A208 686

*ANTIMONY
Strength and Structure of Ga(1-x)In(x)As Alloys.
AD A205 415

*ANTIPROTONS
Antiproton and Millimeter Wave Research.
AD-A208 363

*APPLIED MATHEMATICS
Control and System Theory, Optimization, Inverse and Ill-Posed Problems.
AD-A208 570
A RUTCOR Project on Discrete Applied Mathematics.
AD-A208 572
Analysis and Numerical Analysis of Some Properly and Improperly Posed Problems in Applied Mathematics.
AD-A208 633

*APPROXIMATION(MATHEMATICS)
A Uniformly Differentiable Approximation Scheme for Delay Systems Using Splines.
AD-A208 567
An Averaging Method for Stochastic Approximations with Constant Parameters: Small Parameter Values.
AD-A208 622

*ARCHITECTURE
The Mapping of Parallel Algorithms to Reconfigurable Parallel Architectures.
AD-A208 870

*ARGON
Spectroscopic Diagnostics of Electron Temperature and Energy Conversion Efficiency of Laser-Sustained Plasma in Flowing Argon.
AD-A207 054
Electron Attachment Rate Constants of HBr, CH3Br, and C2H5Br in N2 and Ar.
AD-A208 682

*ARMS(ANATOMY)
Self Organizing Neural Architectures for Eye Movements, Arm Movements, and Eye Arm Coordination.
AD-A206 153

*ASSOCIATIVE PROCESSING
Organo-Metallic Elements for Associative Information Processing.
AD-A206 730
Associative Processors and Directed Graphs for Optical Processing.
AD-A206 739

*ASTRONOMY
Study of the Infrared Celestial Background.
AD-A205 649
Ground-Based Infrared Observations of Sources Discovered by the AFGL, FIRRSE and IRAS infrared Surveys.
AD-A206 335
A Deep Optical Infrared Survey.
AD-A207 930

*ATMOSPHERE MODELS
Use of Four-Dimensional Data Assimilation by Newtonian Relaxation and Latent-Heat Forcing to Improve a Mesoscale-Model Precipitation Forecast: A Case Study.
AD-A208 573

*ATMOSPHERES
Gravity Wave and Turbulence Studies Using a High-Resolution ST Radar.
AD-A205 592

*ATMOSPHERIC MOTION
Propagation and Saturation of Nonlinear Inertia-Gravity Waves in the Atmosphere.
AD-A207 871

*ATOMIC SPECTROSCOPY
Multiphoton Detection Techniques for F and F2.
AD-A208 576

*ATOMIZATION
Fundamental Studies on Spray Combustion and Turbulent Combustion.
AD-A206 438

*ATTENTION
Visual Information-Processing in the Perception of Features and Objects.
AD-A206 948

*AUDITORY PERCEPTION
Coordinated Noninvasive Studies (CNS) Project.
AD-A205 413
Demodulation Processes in Auditory Perception.
AD-A207 131
Levels of Processing of Speech and Non-Speech.
AD-A208 587

*AUDITORY SIGNALS
Levels of Processing of Speech and Non-Speech.
AD-A208 587

*AURORAE
Plasma Simulation of Ion Acceleration by Lower Hybrid Waves in the Suprauroral Region.
AD-A206 062

*AVOIDANCE
Muscarinic Antagonist Enhances One-Trial Food Aversion Learning in the Mollusc Pleurobranchaea.
AD-A208 636

*AXIAL FLOW TURBINES
Three Dimensional Flow and Temperature Profile Attenuation in an Axial Flow Turbine.
AD-A206 736

*AZIDES
Collaborative Experimental and Theoretical Study of the Photodissociation and Reactions of the Azide Radical.
AD-A205 597

*BACKGROUND RADIATION
Study of the Infrared Celestial Background.
AD-A205 649
Observing Primeval Galaxies and Dark Matter with IAIRIS.
AD-A208 286

*BARBITURATES
Effects of Hepatic Tumor Promoters Phenobarbital and Polybrominated Biphenyls on Intercellular Communication between Rat Liver Epithelial Cells.
AD-A206 875

*BEAM FORMING
Acoustooptic Processing of Two Dimensional Signals Using Temporal and Spatial Integration.
AD-A208 686

*BEAMS(STRUCTURAL)
Studies in Stabilization and Control of Beams and Plates.
AD-A208 635

*BENZENE
The Determination of Rate-Limiting Steps during Soot Formation.
AD-A208 866

*BENZOATES
Self-Diffusion in the Compressed, Highly Viscous Liquid 2-Ethylhexyl Benzoate.
AD-A205 294

*BENZYL RADICALS
Physical Chemical Studies of Solutions Processing of Nematic Polymers.
AD-A205 921

*BINARY ALLOYS
High Temperature Oxidation Studies on Alloys Containing Dispersed Phase Particles and Clarification of the Mechanism of Growth of SiO2.
AD-A207 161

*BINARY ARITHMETIC
Binary Time Series.
AD-A208 679

*BIONICS
Connectionist Networks Learn to Transmit Chaos.
AD-A208 642

*BIPHENYL
Anchored Cell Analysis/Sorting Coupled with the Scrape-Loading/Dye-Transfer Technique to Quantify Inhibition of Gap-Junctional Intercellular Communication in WB-F344 Cells by 2,2',4,4',5,5'-Hexabromobiphenyl.
AD-A206 873
Effects of Hepatic Tumor Promoters Phenobarbital and Polybrominated Biphenyls on Intercellular Communication between Rat Liver Epithelial Cells.
AD-A206 875

*BIPOLAR TRANSISTORS
III-V Heterojunction Structures and High Speed Devices.
AD-A205 946

*BIVARIATE ANALYSIS
Nonparametric Test of Independence for Censored Data.
AD-A207 121

*BONDING
Laser Femtochemistry.
AD-A205 357
X-Ray Absorption Spectroscopy of Electrochemically Generated Species.
AD-A205 572
Computational Determination of the Structures and Some Properties of Tetrahedrane, Prismane, and Some of Their Aza Analogues.
AD-A205 603
A New Catalyst for the Efficient and Selective Beta Hydrosilylation of Acrylonitrile. Effect of Ultrasound.
AD-A206 384
Reactions of (eta 5-C5H5)(eta 5-C5Me5)Zr(Si(SiMe3)3)X (X = Cl, M Complexes with Carbon Monoxide and the Isocyanide 2,6-Me2C6H3NC. Crystal Structure of (eta 5-C5H5)-(eta 5-C5Me5)Zr(eta 2-C(N-2,6-Me2C6H3)Si(SiMe3)3)Cl.
AD-A206 494

*BORON COMPOUNDS
Solid State 29Si and 11B NMR (nuclear Magnetic Resonance) Studies of Sol-Gel Derived Borosilicates.
AD-A205 295
Strength and Structure of Ga(1-x)In(x)As Alloys.
AD-A205 415
Boron Trifluoride Mediated Reaction of 1,9-Dihalopentacyclo(5.4.0.0(2,6).0(3,10).0(5,9)undecane-8,11-diones with Ethyl Diazoacetate: A Novel Synthetic Entry into the Cyclopent(a)indene Ring System.
AD-A207 870

*BORON OXIDES
Fluids, Gels and Glasses Under Extreme Conditions of Pressure and Temperature.
AD-A205 292

*BOUNDARY LAYER
An Experimental Study of the Effect of Streamwise Vortices on Unsteady Turbulent Boundary Layer Separation.
AD-A205 462
Reciprocal Interactions of Hairpin-Shaped Vortices and a Boundary Layer.
AD-A206 980

*BOUNDARY LAYER CONTROL
Flow Control for Unsteady and Separated Flows and Turbulent Mixing.

AD A205 989

*BOUNDARY LAYER FLOW
Three Dimensional Structure of Boundary Layers in Transition to Turbulence.
AD A205 587
The Heat Transfer and Fluid Dynamics of Concave Surface Curvature.
AD-A207 811

*BOUNDARY LAYER TRANSITION
Three-Dimensional Structure of Boundary Layers in Transition to Turbulence.
AD A205 587

*BOUNDARY LAYER TURBULENCE
Lagrangian Turbulence Near Walls: Structures and Mixing in Admissible Model Flows.
AD-A208 466

*BOUNDARY VALUE PROBLEMS
Qualitative Results for Distributed Systems.
AD-A207 005

*BRAIN
Long Term Synaptic Plasticity and Learning in Neuronal Networks.
AD A205 993
Self Organizing Neural Architectures for Eye Movements, Arm Movements, and Eye-Arm Coordination.
AD-A206 153

*BRIGHTNESS
Solving the Brightness from-Luminance Problem: A Neural Architecture for Invariant Brightness Perception.
AD-A206 890

*BROADBAND ANTENNAS
Acoustooptic Processing of Two Dimensional Signals Using Temporal and Spatial Integration.
AD-A208 686

*BROMIDES
Molecular State Evolution after Excitation with an Ultra-Short Laser Pulse: A Quantum Analysis of NaI and NaBr Dissociation.
AD-A205 423

*BROMINE COMPOUNDS
(3 + 2) Resonance Enhanced Multiphoton Ionization of I and Br Formed from the Infrared Multiphoton Decomposition of CF3I and CF3Br.
AD-A205 537
Anchored Cell Analysis/Sorting Coupled with the Scrape-Loading/Dye-Transfer Technique to Quantify Inhibition of Gap-Junctional Intercellular Communication in WB-F344 Cells by 2,2',4,4', 5,5'-Hexabromobiphenyl.
AD-A206 873
Effects of Hepatic Tumor Promoters Phenobarbital and Polybrominated Biphenyls on Intercellular Communication between Rat Liver Epithelial Cells.
AD-A206 875

*BUBBLE MEMORIES
High Density Ion Implanted Contiguous Disk Bubble Technology.
AD-A207 018

*BURNERS
Microjet Burners for Molecular-Beam Sources and Combustion Studies.
AD-A205 793

*BURST TRANSMISSION
Studies of the Propagation of Short Burst, High Power Microwave Radiation through Neutral and Ionized Media.
AD A208 664

*BUTYL RADICALS
Convenient Routes to Di tert-butylsilanediyl: Chemical, Thermal and Photochemical Generation.
AD-A206 643

*CADMIUM TELLURIDES
Strength and Structure of Ga(1-x)In(x)As Alloys.
AD-A205 415
Molecular Beam Epitaxial Growth of Hg(1-x)CdxTe.
AD-A207 218

*CALCIUM
Investigation of Radio Frequency/Microwave Effects Upon the Central Nervous System.
AD-A207 188

*CARBENES
Chemistry of Polynuclear metal complexes with Bridging Carbene or Carbyne Ligands. Part 84. Carbarorane Tungsten Platinum Complexes having a Mu-CC6H3ME(2)-2,6 Ligand: Crystal Structures of (WPt(MU- CC6H3ME(2)-2,6)(CO)N-(Pet3)(MU-Alp;ha:ETA5-C2B9HMe2)(N 2 or 3).
AD-A206 414
Addition of Dichlorocarbene to Poly(1,1-dimethyl-1-sila-cis-pent-3-ene) and Poly(1,1-dimethyl-1-silia-cis (and trans)-pent-3 ene. Characterization of Microstructures by 13C and 29Si NMR.
AD-A207 847
Birch Reduction of the Dichlorocarbene Adduct of poly(1,1-dimethyl-1-sila-cis-pent-3-ENE)(C12C-1); Synthesis and Characterization of poly(1,1-dimethyl-3,4-methylene 1-sila-cis-pent-3-ene) (CH2-1).
AD-A208 023

*CARBON
Sticking Coefficient of the SiH2 Free Radical on a Hydrogenated Silicon-Carbon Surface.
AD-A205 532
Kinetics of Surface Reactions of CF3 Radicals.
AD A205 533

In situ Radical Detection under Very Low Pressure Photolysis Conditions Using Resonance-Enhanced Multiphoton Ionization. Kinetics of CF3 Radicals Produced from IR multiphoton Dissociation of Hexafluoroacetone,
AD-A205 536
(3 + 2) Resonance Enhanced Multiphoton Ionization of I and Br Formed from the Infrared Multiphoton Decomposition of CF3I and CF3Br,
AD-A205 537
Spectrometric Studies of Gas Phase Collision Processes.
AD-A205 570
Population Inversions in Ablation Plasmas Generated by Intense Electron Beams.
AD-A205 716
Energy Disposal in Ion-Molecule Reactions.
AD-A205 987
Free Radical-Surface Interactions Using Multiphoton Ionization of Free Radicals.
AD-A206 257

*CARBON CARBON COMPOSITES
Coating and Impregnation of Carbon-Carbon Composites with Ceramics by Electrophoretic Deposition.
AD-A208 873
Investigation of the Feasibility of Engel-Brewer Compounds as High Temperature Oxidation-Resistand Coatings for Carbon-Carbon Composite Materials.
AD-B130 800

*CARBON DIOXIDE
Spectrometric Studies of Gas Phase Collision Processes.
AD-A205 570

*CARBON DIOXIDE LASERS
Nonlinear Spectroscopy of Multicomponent Droplets and Two- and Three Dimensional Measurements in Flames.
AD-A205 449

*CARBON MONOXIDE
Spectrometric Studies of Gas Phase Collision Processes.
AD-A205 570
Observation of Adsorbate Vibrational Amplitude Modification during a Phase Transformation in the Overlayer,
AD-A206 338
Reactions of (eta 5-C5H5)(eta 5-C5Me5)Zr(Si(SiMe3)3)X (X = Cl, M Complexes with Carbon Monoxide and the Isocyanide 2,6-Me2C6H3NC. Crystal Structure of (eta 5-C5H5)-(eta 5 -C5Me5)Zr(eta 2-C(N-2,6-Me2C6H3)Si(SiMe3)3)Cl,
AD-A206 494
Lumped Model Generation and Evaluation: Sensitivity and Lie Algebraic Techniques with Applications to Combustion.
AD-A206 683
Kinetics of Ni(CO)4 formation.
AD-A207 136

*CARBONYL COMPOUNDS
Internal Energy Distribution of OCS Desorbing from a Hot Platinum Surface,
AD-A205 794
Reductive Coupling of Carbonyl Compounds with Zinc and Trimethylchlorosilane to Produce O Silylated Pinacols. Effect of Ultrasonic Waves,
AD-A206 289

*CARBOXYL GROUPS
The Structures of Three Strained Cage Molecules,
AD-A207 868

*CARCINOGENESIS
A Failed Paradigm: Carcinogenesis Is More Than Mutagenesis,
AD-A206 874
Effects of Hepatic Tumor Promoters Phenobarbital and Polybrominated Biphenyls on Intercellular Communication between Rat Liver Epithelial Cells,
AD-A206 875
Nongenotoxic Mechanisms in Carcinogenesis: Role of Inhibited Intercellular Communication,
AD-A206 877

*CARCINOGENS
Inhibited of Gap Junctional Blockage by Palmitoyl Carnitine and TMB-8 in a Rat Liver Epithelial Cell Line,
AD-A206 872
Anchored Cell Analysis/Sorting Coupled with the Scrape-Loading/Dye-Transfer Technique to Quantify Inhibition of Gap-Junctional Intercellular Communication in WB-F344 Cells by 2,2',4,4', 5,5'-Hexabromobiphenyl,
AD-A206 873

*CATALYSTS
A New Catalyst for the Efficient and Selective Beta-Hydrosilylation of Acrylonitrile. Effect of Ultrasound,
AD-A206 384

*CATALYTIC CRACKING
Addition of Dichlorocarbene to Poly(1,1-dimethyl-1 sila-cis-pent-3-ene) and Poly(1,1-dimethyl-1-silia-cis (and trans)-pent-3-ene. Characterization of Microstructures by 13C and 29Si NMR,
AD-A207 847

*CELLS(BIOLOGY)
Inhibited of Gap Junctional Blockage by Palmitoyl Carnitine and TMB-8 in a Rat Liver Epithelial Cell Line,
AD-A206 872
Anchored Cell Analysis/Sorting Coupled with the Scrape-Loading/Dye-Transfer Technique to Quantify Inhibition of Gap Junctional

Intercellular Communication in WB-F344 Cells by 2,2',4,4', 5,5'-Hexabromobiphenyl,
AD A206 873

A Failed Paradigm: Carcinogenesis Is More Than Mutagenesis,
AD-A206 874

Effects of Hepatic Tumor Promoters Phenobarbital and Polybrominated Biphenyls on Intercellular Communication between Rat Liver Epithelial Cells,
AD-A206 875

Chemical and Oncogene Modulation of Gap Junctional Intercellular Communication,
AD-A206 876

Nongenotoxic Mechanisms in Carcinogenesis: Role of Inhibited Intercellular Communication,
AD A206 877

The Role of Chemical Inhibition of Gap-Junctional Intercellular Communication in Toxicology.
AD-A207 130

*CERAMIC MATERIALS

Polyphosphazenes and their Relationship to Ceramics and Metals,
AD-A205 564

Heterocycles Based on Group III, IV, and V Elements Precursors for Novel Glasses and Ceramics.
AD-A205 586

Novel Organoboranes as Intermediates for Ceramic Precursors and High-Energy Fuels.
AD A206 101

Organosilicon Compounds and Polymers and Silicon Ceramics.
AD A206 589

Symposium: Better Ceramics Through Chemistry III. Volume 121.
AD A207 128

Highly Oriented Fiber Reinforced Ceramic Composites.
AD A208 119

*CEREBELLUM

Description and Manipulation of Membrane Lipid Alterations Associated with Synaptic Functions in Isolated Cerebellar Glomeruli.
AD-A206 732

*CHANNEL FLOW

The Dimension of Attractors Underlying Turbulent Poiseuille Flow.
AD-A206 021

*CHANNELS

Application of Multi-Channel Hough Transform to Stereo Vision.
AD-A207 937

*CHARGE TRANSFER

Low-Energy Atomic Collisions.
AD-A207 216

Metal/Metallion System in Low Temperature Molten Salts.
AD-A208 025

*CHEMICAL BONDS

Laser Femtochemistry,
AD-A205 357

Intermolecular Potential Energy Function, Second Virial Coefficients, and Oligomer Properties of Hydrogen Fluoride,
AD-A207 405

*CHEMICAL DISSOCIATION

Collaborative Experimental and Theoretical Study of the Photodissociation and Reactions of the Azide Radical.
AD-A205 597

*CHEMICAL ENGINEERING

Symposium: Better Ceramics Through Chemistry III. Volume 121.
AD-A207 128

*CHEMICAL REACTIONS

Laser Femtochemistry,
AD A205 357

Carbonylation Chemistry of the Tantalum Silyl (Eta5-C5Me5)Cl3TaSiMe3. Synthesis,

Characterization, and Reaction Chemistry of (Eta5-C5Me5)Cl3Ta(Eta2 COSiMe3) and Derivatives.
AD-A205 358

Collaborative Experimental and Theoretical Study of the Photodissociation and Reactions of the Azide Radical.
AD-A205 597

CO Adsorption on Pt(111) Modified with Sulfur,
AD-A205 838

Ultrafast Chemical Reactions in the Liquid State,
AD-A206, 155

Measurement of Rate Constants of Elementary Gas Reactions of Importance to Upper Atmosphere and Combustion Systems.
AD-A207 138

Raman Study of Solid State Reactions.
AD-A207 140

High Temp Toughening and Creep Studies.
AD-A208 714

*CHEMICALS

Chemical and Oncogene Modulation of Gap Junctional Intercellular Communication,
AD-A206 876

*CHEMISTRY

Theory and Experimental and Chemical Instabilities.
AD-A205 571

*CHIPS(ELECTRONICS)

MM - Wave Components - SIS (superconductor-Insulator-Superconductor) Mixers.
AD-A208 632

*CHLORINE COMPOUNDS

Synthesis of Primary Alcohol-Terminated Polyepichlorohydrin with Molecular Weight of 4000 to 12000.
AD A207 624

Birch Reduction of the Dichlorocarbene Adduct of poly(1,1-

dimethyl-1-sila-cis-pent-3-ENE)(C12C-1): Synthesis and Characterization of poly(1,1-dimethyl-3,4-methylene-1-sila-cis-pent-3-ene) (CH2-1),
AD-A208 023

*CLOUDS
Cloud/Cryosphere Interactions.
AD-A208 377

*CLUSTERING
Energy Disposal in Ion-Molecule Reactions.
AD-A205 987

*COATINGS
Kinetics of Surface Reactions of CF3 Radicals.
AD-A205 533

*CODING
Radon Transform Analysis of a Probabilistic Method for Image Generation.
AD-A207 814

*COHERENT RADIATION
Cooperative Phenomena for New Coherent Radiation Sources.
AD-A206 368

*COLLISIONS
Spectrometric Studies of Gas Phase Collision Processes.
AD-A205 570
Low-Energy Atomic Collisions.
AD-A207 216

*COMBUSTION
Ion Molecule Reactions in Sooting Acetylene-Oxygen Flames.
AD-A205 792
Microjet Burners for Molecular-Beam Sources and Combustion Studies.
AD-A205 793
Fundamental Studies on Spray Combustion and Turbulent Combustion
AD-A206 438
Lumped Model Generation and Evaluation: Sensitivity and Lie Algebraic Techniques with Applications to Combustion.
AD-A206 683
Fuel Structure and Pressure Effects on the Formation of Soot Particles in Diffusion Flames.
AD-A206 839
Charged Slurry Droplet Research.
AD-A206 946
Asynchronous Optical Sampling for Laser-Based Combustion Diagnostics in High-Pressure Flames.
AD-A207 003

*COMBUSTION STABILITY
Basic Instability Mechanisms in Chemically Reacting Subsonic and Supersonic Flows.
AD-A206 669
Combustion Instability in Solid Rocket Motors.
AD-A206 843
Investigation of the Flame-Acoustic Wave Interaction during Axial Solid Rocket Instabilities
AD-A207 929

*COMBUSTORS
Demonstration of Oblique Detonation Wave for Hypersonic Propulsion.
AD-A208 268

*COMMAND AND CONTROL SYSTEMS
Workshop on Decision Information for Tactical Command and Control
AD-A208 569

*COMPOSITE AIRCRAFT
Optimum Aeroelastic Characteristics for Composite Supermaneuverable Aircraft.
AD-A205 503

*COMPOSITE MATERIALS
Ultrasonic Nondestructive Evaluation of Damage in Continuous Fiber Composites.
AD-A205 713
Effective Behavior of Composite Materials.
AD-A207 113
Investigation and Modeling of Damage Growth in Composite Laminates.
AD-A207 623
Highly Oriented Fiber Reinforced Ceramic Composites.
AD-A208 119
High Temp Toughening and Creep Studies.
AD-A208 714

*COMPOSITE STRUCTURES
Impulsive Loading of Fiber-Reinforced Structures.
AD-A206 989
Interactions of Ultrasonic Waves with Composite Plates.
AD-A206 991

*COMPREHENSION
Working Memory Capacity: An Individual Differences Approach.
AD-A207 127

*COMPUTER APPLICATIONS
Differential Equations, Related Problems of Pade Approximations and Computer Applications.
AD-A207 888

*COMPUTER ARCHITECTURE
Self-Organizing Neural Network Architectures for Real-Time Adaptive Pattern Recognition.
AD-A206 122
The Pasm Parallel Processing System: Design, Simulation, and Image Processing Applications. Volume 1.
AD-A208 739

*COMPUTER PROGRAM RELIABILITY
International Research Conference on Reliability.
AD-A207 001

*COMPUTER PROGRAMMING

A Fast Algorithm for Non-Newtonian Flow. An Enhanced Particle-Tracking Finite Element Code for Solving Boundary-Valve Problems in Viscoelastic Flow.
AD-A206 997
An Intelligent Mathematical Modelling System - Mathmodel.
AD-A207 807

*COMPUTERIZED SIMULATION
An Intelligent Mathematical Modelling System - Mathmodel.
AD-A207 807
Components of High-Level Vision: A Cognitive Neuroscience Analysis and Accounts of Neurological Syndromes.
AD-A207 848

*COMPUTERS
Unsteady and Separated Flows.
AD-A206 539
Expert Systems for the Scheduling of Image Processing Tasks on a Parallel Processing System.
AD-A208 613

*CONDITIONING(LEARNING)
Muscarinic Antagonist Enhances One-Trial Food-Aversion Learning in the Mollusc Pleurobranchaea.
AD-A208 636

*CONFORMAL MAPPING
Numerical Conformal Mapping and Applications.
AD-A205 602

*CONSERVATION
Nonlinear Systems of Conservation Laws.
AD-A205 837

*CONSTRUCTION MATERIALS
Study of the Influence of Metallurgical Factors on Fatigue and Fracture of Aerospace Structural Materials.
AD-A206 605

*CONTINUUM MECHANICS
Some Mathematical Problems in Continuum Mechanics.
AD-A207 923
Differential Equations and Continuum Mechanics.
AD-A208 637

*CONTROL SYSTEMS
Increasing the Margin of Stability of Arbitrarily Finite Modes of Flexible Large Space Structures with Damping.
AD-A206 487
Unsteady and Separated Flows.
AD-A206 539
Admittance Modeling of Structures with Active Controls.
AD-A207 874
Modeling and Computational Algorithms for Parameter Estimation and Optimal Control of Aeroelastic Systems and Large Flexible Structures.
AD-A208 274
Non-Linear Dynamics and Chaotic Motions in Feedback Controlled Elastic System.
AD-A208 628

*CONTROL THEORY
Control and System Theory, Optimization, Inverse and Ill-Posed Problems.
AD-A208 570

*CONTROLLED NUCLEAR FUSION
Low Energy X-Ray and Electron Physics and Technology for High-Temperature Plasma Diagnostics.
AD A206 486

*CONVECTION(ATMOSPHERIC)
Use of Four-Dimensional Data Assimilation by Newtonian Relaxation and Latent-Heat Forcing to Improve a Mesoscale Model Precipitation Forecast: A Case Study.
AD A208 573
A Numerical Investigation of a Convectively Generated, Inertially Stable, Extratropical Warm-Core Mesovortex Over Land. Part 1. Structure and Evolution.
AD-A208 575

*CONVECTION(HEAT TRANSFER)
The Heat Transfer and Fluid Dynamics of Concave Surface Curvature.
AD-A207 811

*CONVERGENCE
Rapidly Convergent Algorithms for Nonsmooth Optimization.
AD-A207 629

*COPOLYMERS
Physical-Chemical Studies of Solutions Processing of Nematic Polymers.
AD-A205 921

*COPPER
Growth Studies of Metal-Metal/Semiconductor Structures.
AD-A206 988

*COPPER COMPOUNDS
Kinetics of Surface Reactions of CF3 Radicals.
AD-A205 533

*CORRELATION TECHNIQUES
Fast Digital Correlations and Transforms Using Finite Field Techniques.
AD-A208 623

*COUPLING(INTERACTION)
Magnetosphere - Thermosphere Coupling: An Experiment in Interactive Modeling.
AD-A206 881

*CRACK PROPAGATION
Probabilistic Description of Fatigue Crack Growth Under Constant- and Variable-Amplitude Loading.
AD-A208 717

*CRYSTALS
Molecular Optics Nonlinear Optical Processes in Organic and Polymeric Crystals and Films.
AD-A206 372
Excited Molecules and Clusters in Solid Media. Hydrogen and Tetrahydrogen in Ionic Crystals,
AD-A208 024

*CURVATURE
Fundamental Studies of the Mechanical Behavior of Microelectronic Thin Film Materials.
AD-A206 057

*CYANIDES
Femtosecond Real-Time Probing of Reactions. 2. The Dissociation Reaction of ICN,
AD-A205 567
Ab Initio Study of Excited States of CN- Stabilized in Point-Charge Lattices,
AD-A205 839

*CYBERNETICS
Neural Networks for Visual Perception in Variable Illumination,
AD-A206 151
Self-Organizing Neural Architectures for Eye Movements, Arm Movements, and Eye-Arm Coordination,
AD-A206 153
Solving the Brightness-from-Luminance Problem: A Neural Architecture for Invariant Brightness Perception.
AD-A206 890

*CYCLIC COMPOUNDS
Lewis Acid Promoted Reactions of Substituted Pentacyclo(5.4.0.0(2,6).0(3,10).0(5,9)undecane 8,11-diones with Ethyl Diazoacetate,
AD-A207 858
Cycloaddition of Anion Derived Homophthalic Anhydride to cis,cisoid,cis-Tricyclo(6.3.0.0(2,6))undeca-4,9-diene-3,11-dione. Aromatization as a Driving Force for Intramolecular Sigmatropic Hydrogen Transfer,
AD-A207 860
Pressure Effect on the Product Distribution in Competing Reactions: Formation of a Bis Diels-Alder Adduct Via an Aromatizable Intermediate,
AD-A207 867
The Structures of Three Strained Cage Molecules,
AD-A207 868
Synthesis of 4,4,8,8,11,11-Hexanitropentacyclo(5.4.0.0(2,6).0(3,10).0(5,9)-undecane,
AD-A207 869
Boron Trifluoride Mediated Reaction of 1,9-Dihalopentacyclo(5.4.0.0(2,6).0(3,10).0(5,9)undecane-8,11-diones with Ethyl Diazoacetate: A Novel Synthetic Entry into the Cyclopent(a)indene Ring System,
AD-A207 870

*CYCLOHEXANES
The Structures of Three Strained Cage Molecules,
AD-A207 868

*CYCLOPENTENES
Pressure Effect on the Product Distribution in Competing Reactions: Formation of a Bis Diels-Alder Adduct Via an Aromatizable Intermediate,
AD-A207 867

*CYTOCHEMISTRY
The Role of Chemical Inhibition of Gap-Junctional Intercellular Communication in Toxicology.
AD-A207 130

*CYTOCHROME OXIDASE
Electron Redistribution in Mixed Valence Cytochrome Oxidase Following Photolysis of Carboxy-Oxidase,
AD-A207 804

*DAMPING
Increasing the Margin of Stability of Arbitrarily Finite Modes of Flexible Large Space Structures with Damping.
AD-A206 487

*DATA ACQUISITION
Coordinated Noninvasive Studies (CNS) Project.
AD-A205 413

*DATA COMPRESSION
Geometric Methods with Application to Robust Detection and Estimation.
AD-A206 999

*DATA REDUCTION
Data Fitting.
AD-A207 086
Mathematical Techniques for System Realization and Identification.
AD-A207 927

*DECANES
Lewis Acid Promoted Reactions of Substituted Pentacyclo(5.4.0.0(2,6).0(3,10).0(5,9)undecane-8,11-diones with Ethyl Diazoacetate.
AD-A207 858
2,3:6,7-Bis(2'3'-quinolino)pentacyclo(6.5.0.0(4,12).0(5,10).0(9,13)tridecane,
AD-A207 859
Synthesis of 4,4,8,8,11,11-Hexanitropentacyclo(5.4.0.0(2,6).0(3,10).0(5,9)-undecane,
AD-A207 869

*DECISION MAKING
Stochastic Systems with Multiple Decision Makers and Parametric Uncertainties.
AD-A206 655

•DELTA WINGS
Flow Control for Unsteady and Separated Flows and Turbulent Mixing.
AD-A205 989
Unsteady Flows Around Three-Dimensional Lifting Surfaces.
AD-A206 331

•DEMODULATION
Demodulation Processes in Auditory Perception.
AD-A207 131

•DENSE GASES
Dense Plasma Jet Propagation for Endoatmospheric Ballistic Missile Defense.
AD-A208 655

•DEPOSITION
X-Ray Absorption Spectroscopy of Electrochemically Generated Species.
AD-A205 572

•DESORPTION
Internal Energy Distribution of OCS Desorbing from a Hot Platinum Surface,
AD-A205 794

•DETONATION WAVES
Demonstration of Oblique Detonation Wave for Hypersonic Propulsion.
AD-A208 268

•DEUTERIUM
Dynamics of Excited High-Lying States of H2 and D2.
AD-A206 936

•DIAGNOSIS(GENERAL)
Optical Measurements of Soot Particles in Flames,
AD-A206 238
Asynchronous Optical Sampling for Laser-Based Combustion Diagnostics in High-Pressure Flames.
AD-A207 003

•DIATOMIC MOLECULES
On the Electronic Structure of the He + H2 System: Characterization of, and Nonadiabatic Interactions between, the 1 1A' and 2 1A' Potential Energy Surfaces,
AD-A205 835
Reduced Potential-Energy Curves for Diatomic Molecules,
AD-A206 206

•DICHROISM
Circular Dichroism in Photoelectron Angular Distributions from Two-Color (1+1) REMPI (resonantly Enhanced Multiphoton Ionization) of NO.
AD-A205 387

•DIELDRIN
Dieldrin Inhibition of Gap Junctional Intercellular Communication in Rat Glial Cells as Measured by the Fluorescence Photobleaching and Scrape Loading/Dye Transfer Assays,
AD-A206 878

•DIENES
Cycloaddition of Anion Derived Homophthalic Anhydride to cis,cisoid,cis-Tricyclo(6.3.0.0(2,6))undeca-4,9-diene-3,11-dione. Aromatization as a Driving Force for Intramolecular Sigmatropic Hydrogen Transfer,
AD-A207 860

•DIFFERENTIAL EQUATIONS
Development of Adaptive Grid Schemes Based on Poisson Grid Generators.
AD-A206 922
Differential Equations, Related Problems of Pade Approximations and Computer Applications.
AD-A208 590
Differential Equations and Continuum Mechanics.
AD-A208 637

•DIGITAL SIMULATION
An Algorithm for Tracking Fluid Particles in Numerical Simulations of Homogeneous Turbulence,
AD-A206 239
Mathematical Modeling and Numerical Simulation of the Dynamics of Flexible Structures Subject to Large Overall Motions.
AD-A207 004
Use of Four-Dimensional Data Assimilation by Newtonian Relaxation and Latent-Heat Forcing to Improve a Mesoscale-Model Precipitation Forecast: A Case Study,
AD-A208 573

•DIMERS
The Silanoic Acid Dimer (HSiOOH)2: A Simple Molecular System Incorporating Two Very Strong Hydrogen Bonds,
AD-A208 774

•DIOXIDES
Multiresonant Spectroscopy and Dynamics of Molecular Extravalent States: State-Resolved Intramolecular Relaxation of NO2 Above 9 eV,
AD-A205 841

•DISPLAY SYSTEMS
Perception of Motion in Statistically-Defined Displays.
AD-A208 695

•DISSOCIATION
Molecular State Evolution after Excitation with an Ultra-Short Laser Pulse: A Quantum Analysis of NaI and NaBr Dissociation,
AD-A205 423
In situ Radical Detection under Very Low Pressure Photolysis Conditions Using Resonance-Enhanced Multiphoton Ionization. Kinetics of

CF3 Radicals Produced from IR multiphoton Dissociation of Hexafluoroacetone,
AD-A205 536
(3 + 2) Resonance Enhanced Multiphoton Ionization of I and Br Formed from the Infrared Multiphoton Decomposition of CF3I and CF3Br,
AD-A205 537
Femtosecond Real-Time Probing of Reactions. 2. The Dissociation Reaction of ICN,
AD-A205 567
Reduced Potential-Energy Curves for Diatomic Molecules,
AD-A206 206
Reactions of Laser-Generated CF2 (Free Radicals) on Silicon and Silicon Oxide Surfaces.
AD-A206 599

*DODECANE
Excited-State Resonance Raman Spectroscopy as a Probe of Alumina-Sodium Dodecyl Sulfate Hemimicelles.
AD-A205 359

*DRAINAGE
Three-Dimensional Modelling for Contact Resistance of Current Flow into a Source/Drain Region.
AD-A206 694

*DROPS
Nonlinear Spectroscopy of Multicomponent Droplets and Two- and Three-Dimensional Measurements in Flames.
AD-A205 449
Charged Slurry Droplet Research
AD-A206 946

*DRUGS
Inhibited of Gap Junctional Blockage by Palmitoyl Carnitine and TM8-8 in a Rat Liver Epithelial Cell Line,
AD-A206 872

*DYNAMIC LOADS
Dynamic Response of Embedded Structures.
AD-A206 682
Impulsive Loading of Fiber-Reinforced Structures.
AD-A206 989

*DYNAMIC RESPONSE
Dynamic Response of Embedded Structures.
AD-A206 682
State Space Models for Aeroelastic and Viscoelastic Systems.
AD-A207 092

*DYNAMICS
Laser Femtochemistry,
AD-A205 357
Energy Disposal in Ion-Molecule Reactions.
AD-A205 987
Dynamics of Gas-Surface Interactions.
AD-A206 210
Dynamics of Excited High-Lying States of H2 and D2.
AD-A206 936
Perceptual Constraints on Understanding Physical Dynamics.
AD-A207 129

*EDDIES(FLUID MECHANICS
Fast-Algorithm Development for Large-Eddy Simulation of Circular-Jet Turbulence.
AD-A207 928

*ELASTIC PROPERTIES
Experimental and Theoretical Determination of the Thermomechanical Response of Inelastic Structural Materials to High Energy Thermal Inputs.
AD-A206 100
Dynamic Response of Embedded Structures.
AD-A206 682
Nonlinear Stability in Fluid and Plasma Dynamics.
AD-A207 715

*ELECTRIC ENGINES
MPD Thruster Erosion Research.
AD-A205 644

*ELECTRIC FIELDS
High Electric Field Phenomena in Insulation.
AD-A205 525

*ELECTRICAL CONDUCTIVITY
Conductive and Optically Non-Linear Polymeric Langmuir-Blodgett Films of Poly(3-Dodecylthiophene),
AD-A205 529
Effect of Finite Size on Magnetoresistance,
AD-A206 234

*ELECTRICAL CORONA
Spectrometric Studies of Gas Phase Collision Processes.
AD-A205 570

*ELECTRICAL INSULATION
High Electric Field Phenomena in Insulation.
AD-A205 525

*ELECTRICAL PROPERTIES
High Electric Field Phenomena in Insulation.
AD-A205 525

*ELECTROCHEMISTRY
X-Ray Absorption Spectroscopy of Electrochemically Generated Species.
AD-A205 572
Surface Plasmon Study of Monolayer-Bilayer Transition in Poly-4-BCMU and Poly-3-BCMU polydiacetylene Langmuir-Blodgett Films,
AD-A207 404
Metal/Metallion System in Low Temperature Molten Salts.
AD-A208 025

*ELECTROMAGNETIC PROPERTIES

Effective Behavior of Composite Materials.
AD-A207 113

*ELECTROMAGNETIC RADIATION
Investigation of Radio Frequency/Microwave Effects Upon the Central Nervous System.
AD-A207 188

*ELECTROMAGNETIC SPECTRA
Energy and Chemical Change.
AD A206 595

*ELECTRON BEAMS
Establishment of an Electron Beam Lithography Facility.
AD-A206 215

*ELECTRON IMPACT SPECTRA
Autoionization of H2 Induced by a Doubly Excited Triplet State.
AD-A205 565
Population Inversions in Ablation Plasmas Generated by Intense Electron Beams.
AD-A205 716

*ELECTRON IRRADIATION
Studies on Ions and Neutrals Desorbed from Solid Surfaces by Ion and Electron Bombardment.
AD-A206 734

*ELECTRON MICROSCOPY
Pseudomorphic In(x).
AD-A207 037

*ELECTRON TRANSITIONS
Spin-Forbidden Radiative Decay Involving Quasidegenerate States. Application to the Beta 1 Sigma+ Yields a 3 Pi Transition in MgO,
AD-A205 836

*ELECTRON TRANSPORT
Electron Redistribution in Mixed Valence Cytochrome Oxidase Following Photolysis of Carboxy Oxidase,
AD A207 804

*ELECTRONIC STATES
Spin-Forbidden Radiative Decay Involving Quasidegenerate States. Application to the Beta 1 Sigma+ Yields a 3 Pi Transition in MgO,
AD-A205 836
Ab Initio Study of Excited States of CN- Stabilized in Point-Charge Lattices,
AD-A205 839

*ELECTRONS
On the Electronic Structure of the He + H2 System: Characterization of, and Nonadiabatic Interactions between, the 1 1A' and 2 1A' Potential Energy Surfaces,
AD-A205 835

*ELECTROOPTICS
III-V Heterojunction Structures and High Speed Devices.
AD-A205 946

*ELECTROSTATIC ANALYZERS
Versatile Apparatus for Low-Energy and Hyperthermal Energy Ion Scattering Spectroscopies,
AD-A205 832

*ELECTROSTATIC CHARGE
Computational Determination of the Structures and Some Properties of Tetrahedrane, Prismane, and Some of Their Aza Analogues.
AD-A205 603

*EMISSION SPECTRA
Population Inversions in Ablation Plasmas Generated by Intense Electron Beams.
AD-A205 716
Calculation of Kinetic Data for Processes Leading to UV Signatures.
AD A206 656

*ENERGETIC PROPERTIES
Ab Initio Studies of Molecular Structures and Energies. 2. Energies and Stabilities of PH(n), SH(n), and ClH(n) Compounds,
AD-A206 594

*ENERGY STORAGE
Efficient Energy Storage and Conversion Using Adiabatic Compression of Relativistic-Electron Plasmas.
AD-A208 657

*ENERGY TRANSFER
Projection Methods for Obtaining Intramodular Energy Transfer Rates from Classical Trajectory Results: Application to 1,2-Difluoroethane,
AD-A205 566

*ENVIRONMENTAL TESTS
Environmental Effects in Niobium Base Alloys and Other Selected Intermetallic Compounds.
AD-A206 072

*EPIDERMIS
Altered Regulation of Intercellular Communication by Epidermal Growth Factor, Transforming Growth Factor-Beta and Peptide Hormones in Normal Human Keratinocytes,
AD-A206 871

*EPITAXIAL GROWTH
Laboratory for X-Ray Optics.
AD-A206 468
Non-Linear Optical Techniques for Thin Film Growth and Visible Ultraviolet Lasers.
AD-A206 811
Molecular Beam Epitaxial Growth of Hg(1-x)CdxTe.
AD-A207 218

*EPITHELIUM
Inhibited of Gap Junctional Blockage by Palmitoyl Carnitine and TMB-8 in a Rat Liver Epithelial Cell Line,
AD A206 872
Effects of Hepatic Tumor Promoters Phenobarbital and

Polybrominated Biphenyls on Intercellular Communication between Rat Liver Epithelial Cells,
AD-A206 875

*ERBIUM
Cooperative Phenomena for New Coherent Radiation Sources.
AD-A206 368

*ESTIMATES
An Investigation of Estimation Techniques in Optimally Guided Air-to-Air Missiles.
AD-A208 841

*ETCHING
Reaction Probability for the Spontaneous Etching of Silicon by CF3 Free Radicals,
AD-A205 534
Summary Abstract: Spontaneous Thermal Etching of Silicon by CF3 Radicals,
AD-A205 535

*ETHANES
Projection Methods for Obtaining Intramodular Energy Transfer Rates from Classical Trajectory Results: Application to 1,2-Difluoroethane,
AD-A205 566

*ETHERS
Mechanism of the Claisen Rearrangement of Allyl Vinyl Ethers,
AD-A205 531

*ETHYL RADICALS
Self-Diffusion in the Compressed, Highly Viscous Liquid 2 Ethylhexyl Benzoate,
AD-A205 294
Electron Attachment Rate Constants of HBr, CH3Br, and C2H5Br in N2 and Ar,
AD-A208 682

*ETHYLENES
Relative Energies of Silaethylene and Methylsilylene.
AD-A205 368

*EXCITATION
Bifurcating Jets at High Reynolds Numbers.
AD-A205 718
Dynamics of Excited High-Lying States of H2 and D2.
AD-A206 936

*EXHAUST PLUMES
Calculation of Kinetic Data for Processes Leading to UV Signatures.
AD-A206 656

*EXPERIMENTAL DESIGN
Design of Experiments and Reliability Models.
AD-A207 108

*EXTRATERRESTRIAL RADIATION
Study of the Infrared Celestial Background.
AD-A205 649
Observing *Primeval Galaxies* and Dark Matter with LAIRTS.
AD-A208 286

*EYE MOVEMENTS
Self-Organizing Neural Architectures for Eye Movements, Arm Movements, and Eye-Arm Coordination,
AD-A206 153

*F REGION
A Fully Analytic, Low- and Middle-Latitude Ionospheric Model,
AD-A206 880

*FABRICATION
Establishment of an Electron Beam Lithography Facility.
AD-A206 215

*FAST FOURIER TRANSFORMS
Fast Digital Correlations and Transforms Using Finite Field Techniques.
AD-A208 623

*FATIGUE(MECHANICS)
Study of the Influence of Metallurgical Factors on Fatigue and Fracture of Aerospace Structural Materials.
AD-A206 605
Probabilistic Description of Fatigue Crack Growth Under Constant- and Variable-Amplitude Loading.
AD-A208 717

*FIBER REINFORCED COMPOSITES
Ultrasonic Nondestructive Evaluation of Damage in Continuous Fiber Composites.
AD-A205 713
Ultrasonic Nondestructive Evaluation of Damage in Continuous Fiber Composites.
AD-A208 840

*FIBER REINFORCEMENT
Impulsive Loading of Fiber-Reinforced Structures.
AD-A206 989

*FIELD EFFECT TRANSISTORS
III-V Heterojunction Structures and High Speed Devices.
AD-A205 946

*FITTING FUNCTIONS(MATHEMATICS)
Data Fitting.
AD-A207 086

*FLAME PROPAGATION
Basic Instability Mechanisms in Chemically Reacting Subsonic and Supersonic Flows.
AD-A206 669

*FLAMES
Nonlinear Spectroscopy of Multicomponent Droplets and Two- and Three-Dimensional Measurements in Flames.
AD-A205 449
Optical Measurements of Soot Particles in Flames.
AD-A206 238
Computer Modeling of Soot

Formation Comparing Free Radical and Ionic Mechanisms.
AD A206 693
Asynchronous Optical Sampling for Laser Based Combustion Diagnostics in High-Pressure Flames.
AD-A207 003
Investigation of the Flame-Acoustic Wave Interaction during Axial Solid Rocket Instabilities.
AD-A207 929

*FLEXIBLE MATERIALS
A New Perspective on Rutting in Flexible Pavements.
AD A205 797

*FLEXIBLE STRUCTURES
Active Control of Flexible Space Structures Using the Nitinol Shape Memory Actuators.
AD-A205 948
Increasing the Margin of Stability of Arbitrarily Finite Modes of Flexible Large Space Structures with Damping.
AD A206 487
Mathematical Modeling and Numerical Simulation of the Dynamics of Flexible Structures Subject to Large Overall Motions.
AD-A207 004
Modelling, Information, Processing, and Control.
AD-A207 810
Nonlinear Dynamics and Control of Flexible Structures.
AD-A208 120
Modeling and Computational Algorithms for Parameter Estimation and Optimal Control of Aeroelastic Systems and Large Flexible Structures.
AD-A208 274

*FLOODING
Numerical Simulation of the Meso Beta Scale Structure and Evolution of the 1977 Johnstown Flood Part 3. Internal Gravity Waves and Squall Line,
AD-A208 574

*FLOW FIELDS
Unsteady and Separated Flows.
AD-A206 539

*FLOW SEPARATION
Unsteady Flows Around Three-Dimensional Lifting Surfaces.
AD-A206 331
Unsteady and Separated Flows.
AD-A206 539

*FLUID DYNAMICS
A Fast Algorithm for Non-Newtonian Flow. An Enhanced Particle-Tracking Finite Element Code for Solving Boundary-Valve Problems in Viscoelastic Flow.
AD-A206 997
Nonlinear Behavior in Optical and Other Systems.
AD-A207 872

*FLUID FLOW
Potential Complex-Lamellar Decomposition of Fluid Flows.
AD-A207 111

*FLUIDS
Fluids, Gels and Glasses Under Extreme Conditions of Pressure and Temperature.
AD-A205 292

*FLUORIDES
Kinetics of Surface Reactions of CF3 Radicals,
AD-A205 533
(3 + 2) Resonance Enhanced Multiphoton Ionization of I and Br Formed from the Infrared Multiphoton Decomposition of CF3I and CF3Br,
AD A205 537
Free Radical-Surface Interactions Using Multiphoton Ionization of Free Radicals.
AD A206 257

*FLUORINATED HYDROCARBONS
Reactions of Laser-Generated CF2 (Free Radicals) on Silicon and Silicon Oxide Surfaces.
AD-A206 599

*FLUORINE
Multiphoton Detection Techniques for F and F2.
AD-A208 576

*FLUORINE COMPOUNDS
In situ Radical Detection under Very Low Pressure Photolysis Conditions Using Resonance-Enhanced Multiphoton Ionization. Kinetics of CF3 Radicals Produced from IR multiphoton Dissociation of Hexafluoroacetone,
AD-A205 536
Projection Methods for Obtaining Intramodular Energy Transfer Rates from Classical Trajectory Results: Application to 1,2-Difluoroethane,
AD-A205 566
Theoretical Investigations of Molecules Composed only of Fluorine, Oxygen and Nitrogen: Determination of the Equilibrium Structures of FOOF, (NO)2 and FNNF and the Transition State Structure for FNNF cis-transisomerization,
AD-A208 720

*FORCE(MECHANICS)
The Anharmonic Force Fields of Silyl Fluoride and Silyl Chloride,
AD-A208 779

*FRACTURE(MECHANICS)
Study of the Influence of Metallurgical Factors on Fatigue and Fracture of Aerospace Structural Materials.
AD A206 605

*FRAGMENTS
Femtosecond Real-Time Probing of Reactions. 3. Inversion to the Potential from Femtosecond Transition State Spectroscopy

Experiments.
AD-A206 680

*FREE RADICALS
Free Radical Surface Interactions Using Multiphoton Ionization of Free Radicals.
AD-A206 257
Computer Modeling of Soot Formation Comparing Free Radical and Ionic Mechanisms.
AD-A206 693

*FRONTS(METEOROLOGY)
Studies of Frontal Zone Dynamics with a High-Resolution Wind Profiling System.
AD-A205 988

*FUELS
Novel Organoboranes as Intermediates for Ceramic Precursors and High-Energy Fuels.
AD-A206 101
Charged Slurry Droplet Research
AD-A206 946
Thermodynamics of Organic Compounds.
AD-A207 120

*FUNCTIONAL ANALYSIS
Applications of Functional Analytical Methods to Problems in Queueing Network Theory and Reliability Theory.
AD-A208 736

*FUNCTIONS
Large Scale Function Minimization
AD A207 718

*GALLIUM ARSENIDES
Strength and Structure of Ga(1-x)In(x)As Alloys.
AD-A205 415
III V Heterojunction Structures and High Speed Devices
AD A205 946
Non Linear Optical Techniques for Thin Film Growth and Visible Ultraviolet Lasers.
AD-A206 811
Pseudomorphic In(x).
AD A207 037
Multilayered Electronic Materials and Devices Based on III V Compounds.
AD A208 861

*GANGLIA
Evidence for Heterogeneity of Muscarinic Receptors in the Mollusc Pleurobranchaea.
AD A208 656

*GAS DYNAMICS
Spectrometric Studies of Gas Phase Collision Processes.
AD A205 570

*GAS FLOW
Spectroscopic Diagnostics of Electron Temperature and Energy Conversion Efficiency of Laser-Sustained Plasma in Flowing Argon
AD-A207 054

*GAS SURFACE INTERACTIONS
Dynamics of Gas-Surface Interactions.
AD-A206 210
State to State Collision Induced Dissociation and Gas/Surface Interactions.
AD A206 676
A Perturbation-Trajectory Method for the Study of Gas-Surface Collision Dynamics,
AD A207 816

*GASES
Measurement of Rate Constants of Elementary Gas Reactions of Importance to Upper Atmosphere and Combustion Systems.
AD A207 138

*GASTROPODA
Evidence for Heterogeneity of Muscarinic Receptors in the Mollusc Pleurobranchaea.
AD-A208 656

*GELS
Fluids, Gels and Glasses Under Extreme Conditions of Pressure and Temperature.
AD-A205 292
Solid State 29Si and 11B NMR (nuclear Magnetic Resonance) Studies of Sol-Gel Derived Borosilicates,
AD-A205 295

*GEOMETRY
Geometrical Foundations of Mesomechanics and Lagrangian Formalism.
AD-A205 589

*GERMANIUM
Non-Linear Optical Techniques for Thin Film Growth and Visible Ultraviolet Lasers.
AD-A206 811

*GLASS
Fluids, Gels and Glasses Under Extreme Conditions of Pressure and Temperature.
AD-A205 292
27Al and 29Si NMR (Nuclear Magnetic Resonance) Study of Sol-Gel Derived Aluminosilicates and Sodium Aluminosilicates,
AD-A208 262

*GLASS LASERS
Optically Controlled Devices and Ultrafast Laser Sources for Signal Processing.
AD-A208 432

*GLOMERULI
Description and Manipulation of Membrane Lipid Alterations Associated with Synaptic Functions in Isolated Cerebellar Glomeruli.
AD-A206 732

*GOLD
Kinetics of Surface Reactions of

CF3 Radicals.
AD A205 533

*GRAMMARS
Research in Knowledge Delivery.
AD A208 327

*GRANULES
Plastic Deformation of Granular Materials.
AD A208 589

*GRAPHS
Associative Processors and Directed Graphs for Optical Processing.
AD A206 739
Applications of Graph Theory and System Theory to Large Scale Systems.
AD A207 110

*GRATINGS(SPECTRA)
Ultrasmall Holographic X-Ray Gratings Using Synchrotron Radiation and X-Ray Lithographic Techniques.
AD A206 731

*GRAVITY WAVES
Gravity Wave and Turbulence Studies Using a High-Resolution ST Radar.
AD A205 592
Mesospheric Wind Measurement.
AD A205 593
Propagation and Saturation of Nonlinear Inertia-Gravity Waves in the Atmosphere.
AD A207 871
Numerical Simulation of the Meso-Beta Scale Structure and Evolution of the 1977 Johnstown Flood. Part 3. Internal Gravity Waves and Squall Line.
AD A208 574

*GRIDS
Investigation of Three Dimensional Mesh Generation with Precise Controls.
AD A205 967

*GROUP II VI COMPOUNDS
Strength and Structure of Ga(1-x)In(x)As Alloys.
AD A205 415

*GROWTH SUBSTANCES
Role of Adenosine Analogs and Growth Hormone in Waking and Sleep.
AD A205 605
Altered Regulation of Intercellular Communication by Epidermal Growth Factor, Transforming Growth Factor Beta and Peptide Hormones in Normal Human Keratinocytes.
AD A206 871

*GUIDANCE
An Investigation of Estimation Techniques in Optimally Guided Air-to-Air Missiles.
AD A208 841

*HALOGENS
Extension of AM1 to the Halogens.
AD A205 530

*HEAT TRANSFER
Experimental and Theoretical Determination of the Thermomechanical Response of Inelastic Structural Materials to High Energy Thermal Inputs.
AD A206 100

*HELIUM
On the Electronic Structure of the He + H2 System: Characterization of, and Nonadiabatic Interactions between, the 1 1A' and 2 1A' Potential Energy Surfaces.
AD A205 835
Metastable Negative Ions and Ion Pair Formation.
AD A207 886

*HERPETIC VIRUSES
Effect of Chemical Mutagens on Herpes Virus - Induced Cellular Transformation and Testing for Mutagenesis in Mouse Cells.
AD A207 137

*HETEROCYCLIC COMPOUNDS
Heterocycles Based on Group III, IV, and V Elements Precursors for Novel Glasses and Ceramics.
AD A205 586

*HETEROJUNCTIONS
III-V Heterojunction Structures and High Speed Devices.
AD A205 946

*HEXANES
Synthesis of 4,4,8,8,11,11-Hexanitropentacyclo(5.4.0.0(2,6).0(3,10).0(5,9)-undecane.
AD A207 869

*HEXYL RADICALS
Self-Diffusion in the Compressed, Highly Viscous Liquid 2-Ethylhexyl Benzoate.
AD A205 294

*HIGH ENERGY
Thermodynamics of Organic Compounds.
AD A207 120

*HIGH LATITUDES
Gravity Wave and Turbulence Studies Using a High-Resolution ST Radar.
AD A205 592

*HORMONES
Role of Adenosine Analogs and Growth Hormone in Waking and Sleep.
AD A205 605
Altered Regulation of Intercellular Communication by Epidermal Growth Factor, Transforming Growth Factor Beta and Peptide Hormones in Normal Human Keratinocytes.
AD A206 871

*HYDRAZOIC ACID
Collaborative Experimental and Theoretical Study of the Photodissociation and Reactions of the Azide Radical.
AD-A205 597

*HYDRIDES
Sticking Coefficient of the SiH2 Free Radical on a Hydrogenated Silicon-Carbon Surface.
AD-A205 532
Ab Initio Studies of Molecular Structures and Energies. 2. Energies and Stabilities of PH(n), SH(n), and ClH(n) Compounds.
AD-A206 594
A Perturbation-Trajectory Method for the Study of Gas-Surface Collision Dynamics.
AD-A207 816

*HYDROCARBONS
Computational Determination of the Structures and Some Properties of Tetrahedrane, Prismane, and Some of Their Aza Analogues.
AD-A205 603
A Study of the Nephrotoxicity and Metabolism of Tetralin and Indan in Fischer 344 Rats.
AD-A208 588

*HYDRODYNAMICS
Self-Diffusion in the Compressed, Highly Viscous Liquid 2 Ethylhexyl Benzoate.
AD-A205 294

*HYDROGEN
Autoionization of H2 Induced by a Doubly Excited Triplet State.
AD-A205 565
On the Electronic Structure of the He + H2 System: Characterization of, and Nonadiabatic Interactions between, the 1 1A' and 2 1A' Potential Energy Surfaces.
AD-A205 835
Dynamics of Excited High Lying States of H2 and D2.
AD-A206 936
Hydrogen Adsorption at Nb(100): Photoemission Evidence of Two-Stage Exchange Involving Subsurface States.
AD-A207 846
Metastable Negative Ions and Ion Pair Formation.
AD-A207 886

*HYDROGEN CHLORIDE
Measurement of Rate Constants of Elementary Gas Reactions of Importance to Upper Atmosphere and Combustion Systems.
AD-A207 138
Low-Energy Atomic Collisions.
AD-A207 216

*HYDROGEN COMPOUNDS
Ab Initio Studies of Molecular Structures and Energies. 2. Energies and Stabilities of PH(n), SH(n), and ClH(n) Compounds.
AD-A206 594
Electron Attachment Rate Constants of HBr, CH3Br, and C2H5Br in N2 and Ar.
AD-A208 682

*HYDROGEN FLUORIDE
Measurement of Rate Constants of Elementary Gas Reactions of Importance to Upper Atmosphere and Combustion Systems.
AD-A207 138

*HYDROXIDES
Metastable Negative Ions and Ion Pair Formation.
AD-A207 886

*HYDROXYL RADICALS
Calculation of Kinetic Data for Processes Leading to UV Signatures
AD-A206 656

*HYPERSONIC VEHICLES
An Instrument for the Simultaneous Measurement of Velocity, Temperature and Density in Unseeded Air Flows.
AD-A205 588

*HYPNOTICS AND SEDATIVES
Role of Adenosine Analogs and Growth Hormone in Waking and Sleep.
AD-A205 605

*HYSTERESIS
Theory and Experimental and Chemical Instabilities.
AD-A205 571

*IDENTIFICATION SYSTEMS
Mathematical Techniques for System Realization and Identification.
AD-A207 927

*IMAGE PROCESSING
Associative Processors and Directed Graphs for Optical Processing.
AD-A206 739
Geometric Methods with Application to Robust Detection and Estimation.
AD-A206 999
Radon Transform Analysis of a Probabilistic Method for Image Generation.
AD-A207 814
Recognizing 3-D Objects from 2D Images Using Structural Knowledge Base of Genetic Views.
AD-A207 875
Expert Systems for the Scheduling of Image Processing Tasks on a Parallel Processing System.
AD-A208 613
The Pasm Parallel Processing System: Design, Simulation, and Image Processing Applications. Volume 1.
AD-A208 739

*IMAGES
Perceptual Structure and Shape from Texture.

AD-A207 873
Application of Multi-Channel Hough Transform to Stereo Vision.
AD-A207 937
Theoretical Analysis of Models for Texture.
AD-A208 486

*INDIUM COMPOUNDS
Strength and Structure of Ga(1-x)In(x)As Alloys
AD-A205 415
Pseudomorphic In(x).
AD-A207 037

*INFORMATION PROCESSING
Organo-Metallic Elements for Associative Information Processing.
AD-A206 730
Components of High-Level Vision: A Cognitive Neuroscience Analysis and Accounts of Neurological Syndromes.
AD-A207 848
Levels of Processing of Speech and Non-Speech.
AD-A208 587

*INFRARED RADIATION
Study of the Infrared Celestial Background.
AD-A205 649
Ground-Based Infrared Observations of Sources Discovered by the AFGL, FIRRSE and IRAS infrared Surveys.
AD-A206 335
A Deep Optical Infrared Survey.
AD-A207 930

*INFRARED SIGNATURES
Calculation of Kinetic Data for Processes Leading to UV Signatures.
AD-A206 656

*INSECTICIDES
A Characterization of Chlordecone Pretreatment - Altered Pharmacokinetics in Mice.
AD-A208 738

*INTERACTIONS
Gravity Wave and Turbulence Studies Using a High-Resolution ST Radar.
AD-A205 592
Magnetosphere - Thermosphere Coupling: An Experiment in Interactive Modeling.
AD-A206 881
Kinetics of Ni(CO)4 Formation.
AD-A207 136

*INTERMETALLIC COMPOUNDS
Environmental Effects in Niobium Base Alloys and Other Selected Intermetallic Compounds.
AD-A206 072

*INTERPOLATION
Investigations in Improved Iterative Methods for Solving Sparse Systems of Linear Equations.
AD-A207 266

*INVERSE SCATTERING
Two Methods for Solving the Inverse Acoustic Scattering Problem.
AD-A205 360

*IODIDES
Molecular State Evolution after Excitation with an Ultra-Short Laser Pulse: A Quantum Analysis of NaI and NaBr Dissociation.
AD-A205 423

*IODINE
Femtosecond Real-Time Probing of Reactions. 2. The Dissociation Reaction of ICN.
AD-A205 567

*IODINE COMPOUNDS
(3 + 2) Resonance Enhanced Multiphoton Ionization of I and Br Formed from the Infrared Multiphoton Decomposition of CF3I and CF3Br.
AD-A205 537
Femtochemistry of the Reaction: IHgI* Yields (IHg...I)* Yields HgI + I.
AD-A208 648

*ION BEAMS
Versatile Apparatus for Low-Energy and Hyperthermal Energy Ion Scattering Spectroscopies.
AD-A205 832
A Source for Producing Alkali Ion Beams for Low-Energy Surface Scattering Spectroscopies.
AD-A208 022

*ION IMPLANTATION
High Density Ion Implanted Contiguous Disk Bubble Technology.
AD-A207 018

*ION ION INTERACTIONS
Energy Disposal in Ion-Molecule Reactions.
AD-A205 987

*ION PROPULSION
Experimental and Numerical Studies of Laser Sustained Gas Plasmas.
AD-A208 129

*IONIZATION
Multiresonant Spectroscopy and Dynamics of Molecular Extravalent States: State-Resolved Intramolecular Relaxation of NO2 Above 9 eV.
AD-A205 841
Fundamental Processes in Partially Ionized Plasmas.
AD-A207 910

*IONIZATION POTENTIALS
Multiresonant Spectroscopy and Dynamics of Molecular Extravalent States: State-Resolved Intramolecular Relaxation of NO2 Above 9 eV.
AD A205 841

*IONOSPHERE
Multi-Instrument Studies of the

Auroral Ionosphere.
AD-A206 733

*IONOSPHERIC DISTURBANCES
Plasma Simulation of Ion Acceleration by Lower Hybrid Waves in the Supraauroral Region.
AD-A206 062

*IONOSPHERIC MODELS
A Fully Analytic, Low- and Middle-Latitude Ionospheric Model.
AD-A206 880

*IONS
Computer Modeling of Soot Formation Comparing Free Radical and Ionic Mechanisms.
AD-A206 693
Studies on Ions and Neutrals Desorbed from Solid Surfaces by Ion and Electron Bombardment.
AD-A206 734
Metastable Negative Ions and Ion Pair Formation.
AD-A207 886

*ISOMERS
Mechanism of the Claisen Rearrangement of Allyl Vinyl Ethers.
AD-A205 531

*ITERATIONS
Investigations in Improved Iterative Methods for Solving Sparse Systems of Linear Equations.
AD-A207 266
Investigations in Improved Iterative Methods for Solving Sparse Systems of Linear Equations.
AD-A208 847

*JET FLOW
Bifurcating Jets at High Reynolds Numbers.
AD-A205 718
Microjet Burners for Molecular-Beam Sources and Combustion Studies.
AD-A205 793
Fast-Algorithm Development for Large-Eddy Simulation of Circular-Jet Turbulence.
AD-A207 928
Ideal Jet Flow in Two Dimensions.
AD-A208 275

*JOSEPHSON JUNCTIONS
Fluxons and Order in Long Josephson Junctions.
AD-A207 925
Vortices in Long Josephson Junctions.
AD-A207 936

*KALMAN FILTERING
An Investigation of Estimation Techniques in Optimally Guided Air-to-Air Missiles.
AD-A208 841

*KIDNEYS
A Study of the Nephrotoxicity and Metabolism of Tetralin and Indan in Fischer 344 Rats.
AD-A208 588

*LAGRANGIAN FUNCTIONS
A Numerical Study of an Augmented Lagrangian Method for the Estimation of Parameters in Elliptic Systems.
AD-A208 658

*LAMINATES
Investigation and Modeling of Damage Growth in Composite Laminates.
AD-A207 623
Superconductivity and Magnetism in Layered Materials.
AD-A208 487

*LASER APPLICATIONS
Partial Support of the International Laser Science Conference (3rd) Held in Atlantic City, New Jersey on 1-4 November 1987.
AD-A206 812
Asynchronous Optical Sampling for Laser-Based Combustion Diagnostics in High-Pressure Flames.
AD-A207 003

*LASER BEAMS
The Interaction of Solid Particles with Laser Beams.
AD-A207 055

*LASER INDUCED FLUORESCENCE
Molecular State Evolution after Excitation with an Ultra-Short Laser Pulse: A Quantum Analysis of NaI and NaBr Dissociation.
AD-A205 423
Spectroscopic Diagnostics of Electron Temperature and Energy Conversion Efficiency of Laser-Sustained Plasma in Flowing Argon.
AD-A207 054

*LASER MATERIALS
Cooperative Phenomena for New Coherent Radiation Sources.
AD-A206 368

*LASER PUMPING
Experimental and Numerical Studies of Laser Sustained Gas Plasmas.
AD-A208 129

*LASERS
Laser Femtochemistry.
AD-A205 357
Ultrafast Chemical Reactions in the Liquid State.
AD-A206 155
Nuclear Magnetic Resonance and Laser Scattering Techniques at High Pressure.
AD-A206 654
Partial Support of the International Laser Science Conference (3rd) Held in Atlantic City, New Jersey on 1 4 November 1987.
AD-A206 812
Spectroscopic Diagnostics of

Electron Temperature and Energy Conversion Efficiency of Laser-Sustained Plasma in Flowing Argon.
AD-A207 054
Alkali Rare Gas and Metal Halide Molecules as Potential Visible Lasers.
AD-A207 114
Optically Controlled Devices and Ultrafast Laser Sources for Signal Processing.
AD-A208 432

*LATENT HEAT
Use of Four-Dimensional Data Assimilation by Newtonian Relaxation and Latent-Heat Forcing to Improve a Mesoscale-Model Precipitation Forecast: A Case Study.
AD-A208 573

*LEARNING
Solutions to a Class of Nonstandard Stochastic Control Problems with Active Learning.
AD-A207 803

*LIFTING SURFACES
Unsteady Flows Around Three-Dimensional Lifting Surfaces.
AD-A206 331

*LIGANDS
Chemistry of Polynuclear metal complexes with Bridging Carbene or Carbyne Ligands. Part 84. Carbarorane Tungsten Platinum Complexes having a Mu-CC6H3ME(2)-2,6 Ligand: Crystal Structures of (WPt(MU- CC6H3ME(2)-2,6)(CO)N-(Pet3)(MU-Alp,ha:ETA5-C2B9H(Me2)(N=2 or 3).
AD-A206 414

*LIGHT SCATTERING
Nuclear Magnetic Resonance and Laser Scattering Techniques at High Pressure.
AD-A206 654
The Interaction of Solid Particles with Laser Beams.
AD-A207 055

*LINEAR ALGEBRA
Numerical Conformal Mapping and Applications.
AD-A205 602
Special Year on Numerical Linear Algebra.
AD-A208 199

*LINEAR DIFFERENTIAL EQUATIONS
Differential Equations, Related Problems of Pade Approximations and Computer Applications.
AD-A207 888

*LINEAR SYSTEMS
Some Remarks on Reachability of Infinite-Dimensional Linear Systems.
AD-A207 112
Regulation of Nonlinear and Generalized Linear Systems.
AD-A207 725

*LIOUVILLE EQUATION
A Dilogarithmic Extension of Liouville's Theorem on Integration in Finite Terms.
AD-A206 681

*LIPID METABOLISM
Description and Manipulation of Membrane Lipid Alterations Associated with Synaptic Functions in Isolated Cerebellar Glomeruli.
AD-A206 732

*LIQUID CRYSTALS
Thermotropic Ionic Liquid Crystals. 6. Structural Parameters of Solid and Liquid Crystal Phases of Anhydrous Short-Chain Sodium Alkanoates.
AD-A206 832

*LIQUID PHASES
Thermotropic Ionic Liquid Crystals. 6. Structural Parameters of Solid and Liquid Crystal Phases of Anhydrous Short-Chain Sodium Alkanoates.
AD-A206 832

*LIQUIDS
Ultrafast Chemical Reactions in the Liquid State.
AD-A206 155
Charged Slurry Droplet Research.
AD-A206 946

*LITHIUM FLUORIDES
Dynamics of Gas-Surface Interactions.
AD-A206 210
Cooperative Phenomena for New Coherent Radiation Sources.
AD-A206 368

*LITHOGRAPHY
Establishment of an Electron Beam Lithography Facility.
AD-A206 215
Ultrasmall Holographic X-Ray Gratings Using Synchrotron Radiation and X-Ray Lithographic Techniques.
AD-A206 731

*LIVER
Inhibited of Gap Junctional Blockage by Palmitoyl Carnitine and TMB-8 in a Rat Liver Epithelial Cell Line.
AD-A206 872
Effects of Hepatic Tumor Promoters Phenobarbital and Polybrominated Biphenyls on Intercellular Communication between Rat Liver Epithelial Cells.
AD-A206 875

*LOGIC DEVICES
Subpicosecond Optical Digital Computation Using Conjugate Parametric Generators.
AD A207 908

*LOGISTICS
Instrumentation Requirements for the Princeton University Electric

Propulsion Laboratory Research Program.
AD-A207 840

*LOGISTICS MANAGEMENT
Final Technical Report for Grant AFOSR-79-0043 (University of Rochester, Graduate School of Management).
AD-A208 722

*LUMINANCE
Solving the Brightness-from-Luminance Problem: A Neural Architecture for Invariant Brightness Perception.
AD-A206 890

*MAGNESIUM ALLOYS
Al and Mg Alloys for Aerospace Applications Using Rapid Solidification and Powder Metallurgy Processing.
AD-A207 085

*MAGNESIUM OXIDES
Spin-Forbidden Radiative Decay Involving Quasidegenerate States. Application to the Beta 1 Sigma+ Yields a 3 Pi Transition in MgO.
AD-A205 836
State to State Collision Induced Dissociation and Gas/Surface Interactions.
AD-A206 676

*MAGNETIC DISKS
High Density Ion Implanted Contiguous Disk Bubble Technology.
AD-A207 018

*MAGNETIC MIRRORS
Efficient Energy Storage and Conversion Using Adiabatic Compression of Relativistic-Electron Plasmas.
AD-A208 657

*MAGNETOHYDRODYNAMIC WAVES
Problems in Dynamic Phase Transition.
AD-A207 027

*MAGNETORESISTANCE
Effect of Finite Size on Magnetoresistance.
AD-A206 234

*MAGNETOSPHERE
Magnetosphere - Thermosphere Coupling: An Experiment in Interactive Modeling.
AD-A206 881

*MAMMALS
Long Term Synaptic Plasticity and Learning in Neuronal Networks.
AD-A205 993

*MANGANESE COMPOUNDS
Strength and Structure of Ga(1-x)In(x)As Alloys.
AD-A205 415

*MARKOV PROCESSES
Radon Transform Analysis of a Probabilistic Method for Image Generation.
AD-A207 814
Markov Processes Applied to Control, Reliability and Replacement.
AD-A208 634

*MASS TRANSFER
The Structure of Normal-Shock/Turbulent-Boundary-Layer Interactions Modified by Mass Removal.
AD-A208 402

*MATCHING
Application of Multi-Channel Hough Transform to Stereo Vision.
AD-A207 937

*MATERIALS
Fundamental Studies of the Mechanical Behavior of Microelectronic Thin Film Materials.
AD-A206 057

*MATHEMATICAL ANALYSIS
Theoretical Investigations of Chaotic Dynamics.
AD-A207 724

*MATHEMATICAL MODELS
Solving the Brightness-from-Luminance Problem: A Neural Architecture for Invariant Brightness Perception.
AD-A206 890
Mathematical Modeling and Numerical Simulation of the Dynamics of Flexible Structures Subject to Large Overall Motions.
AD-A207 004
Design of Experiments and Reliability Models.
AD-A207 108
An Intelligent Mathematical Modelling System - Mathmodel.
AD-A207 807
Modelling, Information, Processing, and Control.
AD-A207 810
Numerical Modeling of Two-Terminal Quantum Well Devices.
AD-A208 238

*MATHEMATICAL PREDICTION
Fast-Algorithm Development for Large-Eddy Simulation of Circular-Jet Turbulence.
AD-A207 928

*MATHEMATICS
Conference on Mathematical Frontiers and the Physical World.
AD-A208 681

*MECHANICAL COMPONENTS
Nonlinear Stability in Fluid and Plasma Dynamics.
AD-A207 715

*MECHANICAL PROPERTIES
Fundamental Studies of the Mechanical Behavior of Microelectronic Thin Film Materials.
AD-A206 057

•MEMBRANES(BIOLOGY)
Description and Manipulation of Membrane Lipid Alterations Associated with Synaptic Functions in Isolated Cerebellar Glomeruli.
AD-A206 732

•MEMORY DEVICES
Sustained Oscillations in a Symmetric Cooperative-Competitive Neural Network: Disproof of a Conjecture About Content Addressable Memory,
AD-A206 154
Sustained Oscillations in a Symmetric Cooperative-Competitive Neural Network: Disproof of a Conjecture about Content Addressable Memory,
AD-A206 377
Working Memory Capacity: An Individual Differences Approach.
AD-A207 127

•MEMORY(PSYCHOLOGY)
Long Term Synaptic Plasticity and Learning in Neuronal Networks.
AD-A205 993
Visual Information-Processing in the Perception of Features and Objects.
AD-A206 948

•MERCURY COMPOUNDS
Molecular Beam Epitaxial Growth of Hg(1-x)CdxTe.
AD-A207 218
Femtochemistry of the Reaction: IHgI* Yields (IHg...I)* Yields HgI + I,
AD-A208 648

•MESH
Investigation of Three-Dimensional Mesh Generation with Precise Controls.
AD-A205 967

•MESOPAUSE
Mesospheric Wind Measurement
AD-A205 593

•METAL COMPLEXES
Chemistry of Polynuclear metal complexes with Bridging Carbene or Carbyne Ligands. Part 84. Carbarorane Tungsten Platinum Complexes having a Mu-CC6H3ME(2)-2,6 Ligand: Crystal Structures of (WPt(MU- CC6H3ME(2)-2,6)(CO)N-(Pet3)(MU-Alp;ha:ETA5-C2B9HMe2)(N=2 or 3).
AD-A206 414
Chemistry of Polynuclear Metal Complexes with Bridging Carbene or Carbyne Ligands. Part 83. Molybdenum and Tungsten Complexes Containing the Alkylidyne Group C(eta6-C6H4(OMe-2)Cr(CO)3),
AD-A206 495

•METAL COMPOUNDS
Chemistry of Polynuclear Metal Complexes with Bridging Carbene or Carbyne Ligands. Part 83. Molybdenum and Tungsten Complexes Containing the Alkylidyne Group C(eta6-C6H4(OMe-2)Cr(CO)3),
AD-A206 495

•METAL FILMS
Non-Linear Optical Techniques for Thin Film Growth and Visible Ultraviolet Lasers.
AD-A206 811

•METALS
Polyphosphazenes and their Relationship to Ceramics and Metals,
AD-A205 564
Reactions of (eta 5-C5H5)(eta 5-C5Me5)Zr(Si(SiMe3)3)X (X = Cl, M Complexes with Carbon Monoxide and the Isocyanide 2,6-Me2C6H3NC. Crystal Structure of (eta 5-C5H5)-(eta 5 -C5Me5)Zr(eta 2-C(N-2,6-Me2C6H3)Si(SiMe3)3)Cl,
AD-A206 494

•METEOROLOGICAL RADAR
Studies of Frontal Zone Dynamics with a High-Resolution Wind Profiling System.
AD-A205 988

•METHYL RADICALS
Relative Energies of Silaethylene and Methylsilylene.
AD-A205 368
Reductive Coupling of Carbonyl Compounds with Zinc and Trimethylchlorosilane to Produce O-Silylated Pinacols. Effect of Ultrasonic Waves,
AD-A206 289
Birch Reduction of the Dichlorocarbene Adduct of poly(1,1-dimethyl-1-sila-cis-pent-3-ENE)(C12C-1): Synthesis and Characterization of poly(1,1-dimethyl-3,4-methylene-1-sila-cis-pent-3-ene) (CH2-1),
AD-A208 023

•MICROELECTRONICS
Fundamental Studies of the Mechanical Behavior of Microelectronic Thin Film Materials.
AD-A206 057
Organo-Metallic Elements for Associative Information Processing.
AD-A206 730

•MICROPROCESSORS
The Mapping of Parallel Algorithms to Reconfigurable Parallel Architectures.
AD-A208 870

•MICROSTRUCTURE
Addition of Dichlorocarbene to Poly(1,1-dimethyl-1-sila-cis-pent-3-ene) and Poly(1,1-dimethyl-1-silia-cis (and trans)-pent-3-ene. Characterization of Microstructures by 13C and 29Si NMR,
AD-A207 847

•MICROWAVES
Investigation of Radio Frequency/Microwave Effects Upon the Central Nervous System.

AD-A207 188
Studies of the Propagation of Short Burst, High Power Microwave Radiation through Neutral and Ionized Media.
AD-A208 664

*MILLIMETER WAVES
Antiproton and Millimeter Wave Research.
AD-A208 363

*MIXERS(ELECTRONICS)
MM - Wave Components - SIS (superconductor-Insulator-Superconductor) Mixers.
AD-A208 632

*MODELS
Three-Dimensional Modelling for Contact Resistance of Current Flow into a Source/Drain Region.
AD-A206 694
Proceedings of the Connectionists Models Summer School Held in Pittsburgh, Pennsylvania on June 17-26, 1988.
AD-A207 014

*MOLECULAR ENERGY LEVELS
Theory and Implementation of the MBPT Density Matrix. An Application to One-Electron to One-Electron Properties,
AD-A205 833
Nonlocal and Quasilocal Potentials in the Spontaneous Emission of Molecular Exciplexes Coupled to the Phonon Bath of a Solid Matrix,
AD-A206 883

*MOLECULAR ORBITALS
Theory and Implementation of the MBPT Density Matrix. An Application to One-Electron to One-Electron Properties,
AD-A205 833

*MOLECULAR SPECTROSCOPY
Multiphoton Detection Techniques for F and F2.
AD-A208 576

*MOLECULAR STRUCTURE
Theoretical Investigations of Molecules Composed only of Fluorine, Oxygen and Nitrogen: Determination of the Equilibrium Structures of FOOF, (NO)2 and FNNF and the Transition State Structure for FNNF cis-transisomerization,
AD-A208 720
The Silanoic Acid Dimer (HSiOOH)2: A Simple Molecular System Incorporating Two Very Strong Hydrogen Bonds,
AD-A208 774

*MOLECULAR VIBRATION
On the Stability of Excited Tetrahydrogen,
AD-A207 817

*MOLECULE MOLECULE INTERACTIONS
Intermolecular Potential Energy Function, Second Virial Coefficients, and Oligomer Properties of Hydrogen Fluoride,
AD-A207 405

*MOLECULERMOLECULE INTERACTIONS
On the Stability of Excited Tetrahydrogen,
AD-A207 817

*MOLECULES
Energy Disposal in Ion-Molecule Reactions.
AD-A205 987

*MOLYBDENUM
Chemistry of Polynuclear Metal Complexes with Bridging Carbene or Carbyne Ligands. Part 83. Molybdenum and Tungsten Complexes Containing the Alkylidyne Group C(eta6-C6H4(OMe-2)Cr(CO)3),
AD-A206 495

*MOSFET SEMICONDUCTORS
Three-Dimensional Modelling for Contact Resistance of Current Flow into a Source/Drain Region.
AD-A206 694

*MOTION
Is There a Constancy for Velocity?
AD-A208 675
Perception of Motion in Statistically-Defined Displays.
AD-A208 695

*MOTOR NEURONS
Evidence for Chaos in Spike Trains of Neurons That Generate Rhythmic Motor Patterns.
AD-A208 625
Variability and Chaos: Neurointegrative Principles in Self-Organization of Motor Patterns.
AD-A208 864

*MOTOR REACTIONS
Self-Organizing Neural Architectures for Eye Movements, Arm Movements, and Eye-Arm Coordination,
AD-A206 153

*MULTIPHASE FLOW
Structure of the Near-Injector Region of Non-Evaporating Pressure-Atomized Sprays,
AD-A206 237

*MULTIPROCESSORS
On the Use of Multiprocessing Computers for Global Numerical Weather Prediction.
AD-A206 102

*MULTIVARIATE ANALYSIS
Multivariate Analysis and Its Applications.
AD-A205 585
International Symposium on Multivariate Analysis (5th) Held in Pittsburgh, Pennsylvania on June 19-24, 1978.
AD-A208 680

*MUTAGENS
Effect of Chemical Mutagens on Herpes Virus - Induced Cellular Transformation and Testing for Mutagenesis in Mouse Cells.
AD-A207 137

*MUTATIONS
A Failed Paradigm: Carcinogenesis Is More Than Mutagenesis,
AD-A206 874
Effect of Chemical Mutagens on Herpes Virus - Induced Cellular Transformation and Testing for Mutagenesis in Mouse Cells.
AD-A207 137

*N BODY PROBLEM
Theory and Experimental and Chemical Instabilities.
AD-A205 571

*N TYPE SEMICONDUCTORS
Summary Abstract: Spontaneous Thermal Etching of Silicon by CF3 Radicals,
AD-A205 535

*NAVIER STOKES EQUATIONS
Exploitation of Multiple Solutions of the Navier-Stokes Equations to Achieve Radically Improved Flight.
AD-A205 939

*NEGATIVE RESISTANCE CIRCUITS
Fluxons and Order in Long Josephson Junctions.
AD-A207 925

*NEOPLASMS
Nongenotoxic Mechanisms in Carcinogenesis: Role of Inhibited Intercellular Communication,
AD-A206 877

*NERVE CELLS
Long Term Synaptic Plasticity and Learning in Neuronal Networks.
AD A205 993
Dieldrin Inhibition of Gap Junctional Intercellular Communication in Rat Glial Cells as Measured by the Fluorescence Photobleaching and Scrape Loading/Dye Transfer Assays,
AD-A206 878

*NERVE IMPULSES
Evidence for Chaos in Spike Trains of Neurons That Generate Rhythmic Motor Patterns.
AD-A208 625

*NERVE TRANSMISSION
Evidence for Chaos in Spike Trains of Neurons That Generate Rhythmic Motor Patterns.
AD-A208 625
Variability and Chaos: Neurointegrative Principles in Self Organization of Motor Patterns.
AD-A208 864

*NERVOUS SYSTEM
Levels of Processing of Speech and Non-Speech.
AD-A208 587
Connectionist Networks Learn to Transmit Chaos.
AD-A208 642

*NETWORKS
Parametric Analysis of Queueing Networks with Blocking.
AD-A206 840
Routing and Singular Control for Queueing Networks in Heavy Traffic,
AD-A208 568
Connectionist Networks Learn to Transmit Chaos.
AD-A208 642

*NEURAL NETS
Stereo Boundary Fusion by Cortical Complex Cells: A System of Maps, Filters, and Feedback Networks for Multiplexing Distributed Data,
AD A205 507
Long Term Synaptic Plasticity and Learning in Neuronal Networks.
AD-A205 993
Self-Organizing Neural Network Architectures for Real-Time Adaptive Pattern Recognition,
AD-A206 122
Neural Networks for Visual Perception in Variable Illumination,
AD-A208 151
Self-Organizing Neural Architectures for Eye Movements, Arm Movements, and Eye-Arm Coordination,
AD-A206 153
Sustained Oscillations in a Symmetric Cooperative-Competitive Neural Network: Disproof of a Conjecture About Content Addressable Memory,
AD-A206 154
Sustained Oscillations in a Symmetric Cooperative-Competitive Neural Network: Disproof of a Conjecture about Content Addressable Memory,
AD-A206 377
Neural Network Models of Vector Coding, Learning, and Trajectory Formation During Planned and Reactive Arm and Eye Movements.
AD-A206 737
A Neural Network Approach to Model-Based Recognition.
AD-A206 990
Variability and Chaos: Neurointegrative Principles in Self-Organization of Motor Patterns.
AD-A208 864

*NEUROLOGY
Components of High Level Vision: A Cognitive Neuroscience Analysis and Accounts of Neurological Syndromes.
AD-A207 848

*NEUROMUSCULAR TRANSMISSION
Description and Manipulation of Membrane Lipid Alterations Associated with Synaptic Functions

in Isolated Cerebellar Glomeruli.
AD-A206 732

*NICKEL
Growth Studies of Metal-Metal/Semiconductor Structures.
AD-A206 988
Kinetics of Ni(CO)4 Formation.
AD-A207 136

*NIOBIUM
Hydrogen Adsorption at Nb(100): Photoemission Evidence of Two-Stage Exchange Involving Subsurface States.
AD-A207 846

*NIOBIUM ALLOYS
Environmental Effects in Niobium Base Alloys and Other Selected Intermetallic Compounds.
AD-A206 072

*NITRIDES
Heterocycles Based on Group III, IV, and V Elements Precursors for Novel Glasses and Ceramics.
AD-A205 586
Highly Oriented Fiber Reinforced Ceramic Composites.
AD-A208 119

*NITROGEN
Computational Determination of the Structures and Some Properties of Tetrahedrane, Prismane, and Some of Their Aza Analogues.
AD-A205 603
Theoretical Investigations of Molecules Composed only of Fluorine, Oxygen and Nitrogen: Determination of the Equilibrium Structures of FOOF, (NO)2 and FNNF and the Transition State Structure for FNNF cis-transisomerization.
AD-A208 720

*NITROGEN OXIDES
Circular Dichroism in Photoelectron Angular Distributions from Two-Color (1+1) REMPI (resonantly Enhanced Multiphoton Ionization) of NO.
AD-A205 387
Multiresonant Spectroscopy and Dynamics of Molecular Extravalent States: State-Resolved Intramolecular Relaxation of NO2 Above 9 eV.
AD-A205 841
State to State Collision Induced Dissociation and Gas/Surface Interactions.
AD-A206 676
Fluorescence Probes of Spectroscopic and Dynamical Aspects of Molecular Photoionization.
AD-A207 185
A Perturbation-Trajectory Method for the Study of Gas-Surface Collision Dynamics.
AD-A207 816

*NOISE REDUCTION
Mathematical Techniques for System Realization and Identification.
AD-A207 927

*NONDESTRUCTIVE TESTING
Ultrasonic Nondestructive Evaluation of Damage in Continuous Fiber Composites.
AD-A205 713

*NONLINEAR ANALYSIS
Computation and Theory in Nonlinear Optimization.
AD-A207 610

*NONLINEAR SYSTEMS
Nonlinear Spectroscopy of Multicomponent Droplets and Two and Three-Dimensional Measurements in Flames.
AD-A205 449
Conductive and Optically Non Linear Polymeric Langmuir-Blodgett Films of Poly(3-Dodecylthiophene).
AD-A205 529
Nonlinear Systems of Conservation Laws.
AD-A205 837
Molecular Optics Nonlinear Optical Processes in Organic and Polymeric Crystals and Films.
AD-A206 372
Resonance in Weakly Nonlinear Systems.
AD-A207 115
Large Scale Function Minimization.
AD-A207 718
Regulation of Nonlinear and Generalized Linear Systems.
AD-A207 725
Nonlinear Behavior in Optical and Other Systems.
AD-A207 872
Nonlinear Dynamics and Control of Flexible Structures.
AD-A208 120

*NONNEWTONIAN FLUIDS
A Fast Algorithm for Non-Newtonian Flow. An Enhanced Particle-Tracking Finite Element Code for Solving Boundary-Valve Problems in Viscoelastic Flow.
AD-A206 997

*NONPARAMETRIC STATISTICS
Nonparametric Test of Independence for Censored Data.
AD-A207 121

*NUCLEAR MAGNETIC RESONANCE
Nuclear Magnetic Resonance and Laser Scattering Techniques at High Pressure.
AD-A206 654

*NUCLEAR RADIATION SPECTROSCOPY
Nuclear Magnetic Resonance and Laser Scattering Techniques at High Pressure.
AD-A206 654

*NUMERICAL ANALYSIS
Numerical Conformal Mapping and Applications.
AD-A205 602
Investigation of Three-

Dimensional Mesh Generation with Precise Controls.
AD A205 967
Numerical Analysis.
AD-A207 000
Special Year on Numerical Linear Algebra.
AD-A208 199
A Numerical Study of an Augmented Lagrangian Method for the Estimation of Parameters in Elliptic Systems.
AD-A208 658

•NUMERICAL METHODS AND PROCEDURES
Design Optimization of Systems Governed by Partial Differential Equations. Phase 1.
AD-A207 812
Numerical Solution of Ill Posed Problems in Partial Differential Equations.
AD-A207 852
Differential Equations, Related Problems of Pade Approximations and Computer Applications.
AD-A207 888
Computations of Optimal Controls and Designs for Distributed Systems in Optics and Elasticity.
AD-A207 924
Mathematical Techniques for System Realization and Identification.
AD-A207 927
An Averaging Method for Stochastic Approximations with Constant Parameters: Small Parameter Values.
AD-A208 622
Computational Methods for Nonlinear Dynamic Problems in Solid and Structural Mechanics: Progress in the Theory and Modeling of Friction and in the Control of Dynamical Systems with Frictional Forces.
AD-A208 763

•OPERATIONS RESEARCH
Regulation of Nonlinear and Generalized Linear Systems.
AD-A207 725

•OPTICAL CIRCUITS
Subpicosecond Optical Digital Computation Using Conjugate Parametric Generators.
AD-A207 908

•OPTICAL DETECTION
Recognizing 3 D Objects from 2D Images Using Structural Knowledge Base of Genetic Views.
AD-A207 875

•OPTICAL DETECTORS
Vibrational, Mechanical, and Thermal Properties of III-V semiconductors.
AD-A206 590

•OPTICAL IMAGES
Recognizing 3 D Objects from 2D Images Using Structural Knowledge Base of Genetic Views.
AD A207 875

•OPTICAL MATERIALS
Molecular Optics Nonlinear Optical Processes in Organic and Polymeric Crystals and Films.
AD A206 372
Poled Polymeric Second Harmonic Generation Materials. Chemical Manipulation of the Temporal Characteristics of Electric Field-Induced Noncentrosymmetry.
AD-A208 788

•OPTICAL PROPERTIES
Conductive and Optically Non-Linear Polymeric Langmuir-Blodgett Films of Poly(3-Dodecylthiophene).
AD-A205 529
Cooperative Phenomena for New Coherent Radiation Sources.
AD A206 368
Molecular Optics Nonlinear Optical Processes in Organic and Polymeric Crystals and Films.
AD A206 372

•OPTICS
Nonlinear Behavior in Optical and Other Systems.
AD-A207 872
Operation and Upgrading of the Beam Optics Test Stand.
AD-A208 626

•OPTIMIZATION
Computation and Theory in Nonlinear Optimization.
AD-A207 610
Rapidly Convergent Algorithms for Nonsmooth Optimization.
AD-A207 629

•ORGANIC COMPOUNDS
Organosilicon Compounds and Polymers and Silicon Ceramics.
AD-A206 589
Raman Study of Solid State Reactions.
AD-A207 140

•ORGANIC MATERIALS
Molecular Optics Nonlinear Optical Processes in Organic and Polymeric Crystals and Films.
AD-A206 372

•ORGANOBORANES
Novel Organoboranes as Intermediates for Ceramic Precursors and High-Energy Fuels.
AD-A206 101

•ORGANOMETALLIC COMPOUNDS
Organo-Metallic Elements for Associative Information Processing.
AD-A206 730

•OXIDATION
High Temperature Oxidation Studies on Alloys Containing Dispersed Phase Particles and Clarification of the Mechanism of Growth of SiO2.
AD A207 161
The Determination of Rate-Limiting Steps during Soot Formation.

AD-A208 866

*OXIDES
Fluids, Gels and Glasses Under Extreme Conditions of Pressure and Temperature.
AD-A205 292
Kinetics of Surface Reactions of CF3 Radicals.
AD-A205 533
Reactions of Laser-Generated CF2 (Free Radicals) on Silicon and Silicon Oxide Surfaces.
AD-A206 599

*OXYGEN COMPOUNDS
Theoretical Investigations of Molecules Composed only of Fluorine, Oxygen and Nitrogen: Determination of the Equilibrium Structures of FOOF, (NO)2 and FNNF and the Transition State Structure for FNNF cis-transisomerization.
AD-A208 720

*PARALLEL ORIENTATION
Large Scale Function Minimization.
AD-A207 718

*PARALLEL PROCESSING
Expert Systems for the Scheduling of Image Processing Tasks on a Parallel Processing System.
AD-A208 613
The Pasm Parallel Processing System: Design, Simulation, and Image Processing Applications. Volume 1.
AD-A208 739
The Mapping of Parallel Algorithms to Reconfigurable Parallel Architectures.
AD-A208 870

*PARALLEL PROCESSORS
The Pasm Parallel Processing System: Design, Simulation, and Image Processing Applications. Volume 1.
AD-A208 739

*PARAMETRIC ANALYSIS
Development and Analysis of Arma Parameter Estimation Schemes in the Presence of Noise.
AD-A205 598

*PARTIAL DIFFERENTIAL EQUATIONS
Fast Algorithms for Partial Differential Equations on Advanced Computers.
AD-A206 469
Numerical Analysis.
AD-A207 000
Qualitative Results for Distributed Systems.
AD-A207 005
Wavefront Propagation for Reaction-Diffusion Systems of PDE.
AD-A207 737
Design Optimization of Systems Governed by Partial Differential Equations. Phase 1.
AD-A207 812
Numerical Solution of Ill Posed Problems in Partial Differential Equations.
AD-A207 852
Computations of Optimal Controls and Designs for Distributed Systems in Optics and Elasticity.
AD-A207 924
Analysis and Numerical Analysis of Some Properly and Improperly Posed Problems in Applied Mathematics.
AD-A208 633

*PARTICLES
Optical Measurements of Soot Particles in Flames.
AD-A206 238

*PATTERN RECOGNITION
A Neural Network Approach to Model-Based Recognition.
AD-A206 990
Recognizing 3 D Objects from 2D Images Using Structural Knowledge Base of Genetic Views.
AD-A207 875

*PAVEMENTS
A New Perspective on Rutting in Flexible Pavements.
AD-A205 797

*PENTADIENES
Pressure Effect on the Product Distribution in Competing Reactions: Formation of a Bis Diels-Alder Adduct Via an Aromatizable Intermediate.
AD-A207 867

*PERCEPTION
Perceptual Constraints on Understanding Physical Dynamics.
AD-A207 129

*PERMAFROST
Cloud/Cryosphere Interactions.
AD-A208 377

*PERTURBATION THEORY
Numerical Methods for Singularly Perturbed Differential Equations with Applications.
AD-A207 187

*PHARMACOKINETICS
A Characterization of Chlordecone Pretreatment - Altered Pharmacokinetics in Mice.
AD-A208 738

*PHARMACOLOGICAL ANTAGONISTS
Muscarinic Antagonist Enhances One-Trial Food-Aversion Learning in the Mollusc Pleurobranchaea.
AD-A208 636
Evidence for Heterogeneity of Muscarinic Receptors in the Mollusc Pleurobranchaea.
AD-A208 656

*PHARMACOLOGY
Annual Review of Chronopharmacology. Volume 5.
AD-A206 148

•PHASE TRANSFORMATIONS
Observation of Adsorbate Vibrational Amplitude Modification during a Phase Transformation in the Overlayer,
AD A206 338

•PHENYL RADICALS
Physical-Chemical Studies of Solutions Processing of Nematic Polymers.
AD-A205 921

•PHOSPHAZENE
Polyphosphazenes and their Relationship to Ceramics and Metals,
AD-A205 564

•PHOSPHONATES
The Structures of Three Strained Cage Molecules,
AD-A207 868

•PHOSPHORIC ACIDS
Reaction Kinetics and Chemo-Rheology of Poly(p-phenylenebenzobisthiazole) Polymerization in the Ordered Phase,
AD-A206 591

•PHOTOCHEMICAL REACTIONS
Metastable Negative Ions and Ion Pair Formation.
AD-A207 886

•PHOTOCHROMIC MATERIALS
Organo-Metallic Elements for Associative Information Processing.
AD A206 730

•PHOTODISSOCIATION
Report of the Gordon Research Conference on Multiphoton Processes Held in New London, New Hampshire on 13 17 June 1988
AD A205 414
Collaborative Experimental and Theoretical Study of the Photodissociation and Reactions of the Azide Radical.
AD-A205 597
State to State Collision Induced Dissociation and Gas/Surface Interactions.
AD-A206 676
Femtosecond Real-Time Probing of Reactions. 3. Inversion to the Potential from Femtosecond Transition-State Spectroscopy Experiments,
AD-A206 680

•PHOTOIONIZATION
Circular Dichroism in Photoelectron Angular Distributions from Two-Color (1+1) REMPI (resonantly Enhanced Multiphoton Ionization) of NO.
AD-A205 387
Report of the Gordon Research Conference on Multiphoton Processes Held in New London, New Hampshire on 13-17 June 1988.
AD-A205 414
In situ Radical Detection under Very Low Pressure Photolysis Conditions Using Resonance-Enhanced Multiphoton Ionization. Kinetics of CF3 Radicals Produced from IR multiphoton Dissociation of Hexafluoroacetone,
AD A205 536
(3 + 2) Resonance Enhanced Multiphoton Ionization of I and Br Formed from the Infrared Multiphoton Decomposit'on of CF3I and CF3Br,
AD-A205 537
Autoionization of H2 Induced by a Doubly Excited Triplet State.
AD A205 565
Free Radical-Surface Interactions Using Multiphoton Ionization of Free Radicals.
AD-A206 257
Femtosecond Studies of Electron-Cation Geminate Recombination in Water,
AD-A206 411
Fluorescence Probes of Spectroscopic and Dynamical Aspects of Molecular Photoionization.
AD-A207 185
Photoionization Phenomena Near Threshold,
AD-A208 676

•PHOTOLYSIS
Sticking Coefficient of the SiH2 Free Radical on a Hydrogenated Silicon-Carbon Surface,
AD-A205 532
Kinetics of Surface Reactions of CF3 Radicals,
AD-A205 533
Reaction Probability for the Spontaneous Etching of Silicon by CF3 Free Radicals,
AD-A205 534
Summary Abstract: Spontaneous Thermal Etching of Silicon by CF3 Radicals,
AD-A205 535
In situ Radical Detection under Very Low Pressure Photolysis Conditions Using Resonance-Enhanced Multiphoton Ionization. Kinetics of CF3 Radicals Produced from IR multiphoton Dissociation of Hexafluoroacetone,
AD-A205 536
Reactions of Laser-Generated CF2 (Free Radicals) on Silicon and Silicon Oxide Surfaces.
AD-A206 599

•PHYSICS
Perceptual Constraints on Understanding Physical Dynamics.
AD-A207 129

•PHYSIOLOGICAL EFFECTS
Effect of Chemical Mutagens on Herpes Virus - Induced Cellular Transformation and Testing for Mutagenesis in Mouse Cells.
AD-A207 137

•PLASMA DEVICES
Efficient Energy Storage and Conversion Using Adiabatic

Compression of Relativistic-Electron Plasmas.
AD-A208 657

*PLASMA JETS
Dense Plasma Jet Propagation for Endoatmospheric Ballistic Missile Defense.
AD-A208 655

*PLASMA WAVES
Plasma Simulation of Ion Acceleration by Lower Hybrid Waves in the Suprauroral Region.
AD-A206 062
Problems in Dynamic Phase Transition.
AD-A207 027

*PLASMAS(PHYSICS)
Population Inversions in Ablation Plasmas Generated by Intense Electron Beams.
AD-A205 716
Spectroscopic Diagnostics of Electron Temperature and Energy Conversion Efficiency of Laser-Sustained Plasma in Flowing Argon.
AD-A207 054
Fundamental Processes in Partially Ionized Plasmas.
AD-A207 910
Experimental and Numerical Studies of Laser Sustained Gas Plasmas.
AD-A208 129

*PLASMONS
Surface Plasmon Study of Monolayer-Bilayer Transition in Poly-4 BCMU and Poly-3-BCMU polydiacetylene Langmuir-Blodgett Films.
AD-A207 404

*PLASTIC DEFORMATION
Plastic Deformation of Granular Materials.
AD A208 589

*PLASTIC FLOW
Nonlinear Systems of Conservation Laws.
AD-A205 837

*PLATES
Dynamic Response of Embedded . Structures.
AD-A206 682
Interactions of Ultrasonic Waves with Composite Plates.
AD-A206 991

*PLATINUM
Internal Energy Distribution of OCS Desorbing from a Hot Platinum Surface,
AD-A205 794
Observation of Adsorbate Vibrational Amplitude Modification during a Phase Transformation in the Overlayer,
AD-A206 338

*POISSON DENSITY FUNCTIONS
Development of Adaptive Grid Schemes Based on Poisson Grid Generators.
AD-A206 922

*POISSON EQUATION
Development of Adaptive Grid Schemes Based on Poisson Grid Generators.
AD-A206 922

*POLYATOMIC MOLECULES
Alkali-Rare Gas and Metal Halide Molecules as Potential Visible Lasers.
AD A207 114

*POLYETHYLENE TEREPHTHALATE
X-Ray Absorption Spectroscopy of Electrochemically Generated Species.
AD A205 572

*POLYMERIC FILMS
Conductive and Optically Non Linear Polymeric Langmuir Blodgett Films of Poly(3-Dodecylthiophene).
AD-A205 529
Persistent, Efficient Frequency Doubling by Poled Annealed Films of a Chromophore-Functionalized Poly(p-hydroxystyrene),
AD-A208 790
Approaches to Polymeric Nonlinear Optical Materials. Theoretical and Synthetic Design Strategies,
AD-A208 792

*POLYMERIZATION
Physical-Chemical Studies of Solutions Processing of Nematic Polymers.
AD-A205 921

*POLYMERS
Polyphosphazenes and their Relationship to Ceramics and Metals,
AD-A205 564
Report to the Air Force Office of Scientific Research on Grant Number AFOSR-88-0108 for the Partial Support of the 1988 Gordon Conference on Polymers (West).
AD-A205 834
Physical-Chemical Studies of Solutions Processing of Nematic Polymers.
AD-A205 921
Molecular Optics Nonlinear Optical Processes in Organic and Polymeric Crystals and Films.
AD-A206 372
Reaction Kinetics and Chemo-Rheology of Poly(p-phenylenebenzobisthiazole) Polymerization in the Ordered Phase,
AD-A206 591
Synthesis of Primary-Alcohol-Terminated Polyepichlorohydrin with Molecular Weight of 4000 to 12000.
AD-A207 624
Differential Equations and Continuum Mechanics.
AD-A208 637
Poled Polymeric Second Harmonic

Generation Materials. Chemical Manipulation of the Temporal Characteristics of Electric Field-Induced Noncentrosymmetry,
AD-A208 788
Conductive Polymers Based upon Rigid-Rod Ultrahigh-Modulus Macromolecules. Electrochemical Doping of Poly(p-phenylenebenzobisthiazole-2,6-diyl) (PBT),
AD-A208 789
Poled Polymeric Nonlinear Optical Materials. Enhanced Second Harmonic Generation Stability of Cross-Linkable Matrix/Chromophore Ensembles,
AD-A208 791
Synthesis and Photodegradation of Poly(2,5,-bis(dimethylsilyl)thiophene),
AD-A208 802

•POLYNOMIALS
Investigations in Improved Iterative Methods for Solving Sparse Systems of Linear Equations.
AD-A207 266

•POLYSILANES
Orgarosilicon Compounds and Polymers and Silicon Ceramics.
AD-A206 589

•POTASSIUM
A Source for Producing Alkali Ion Beams for Low-Energy Surface Scattering Spectroscopies,
AD-A208 022

•POWDER METALLURGY
Al and Mg Alloys for Aerospace Applications Using Rapid Solidification and Powder Metallurgy Processing.
AD-A207 085

•PRIMARY WAVES(SEISMIC WAVES)
Yield Estimation from Spectral Amplitudes of Direct P and P Coda Recorded by the Wake Island Deep Ocean Hydrophone Array,
AD-A208 784

•PROBABILITY
On Selecting the Largest Success Probability under Unequal Sample Sizes,
AD-A207 878

•PROCUREMENT
Instrumentation Requirements for the Princeton University Electric Propulsion Laboratory Research Program.
AD-A207 840

•PSYCHOPHYSIOLOGY
Components of High-Level Vision: A Cognitive Neuroscience Analysis and Accounts of Neurological Syndromes.
AD-A207 848

•PUMPING(ELECTRONICS)
Population Inversions in Ablation Plasmas Generated by Intense Electron Beams.
AD-A205 716

•PYROLYSIS
The Pyrolysis of Acetylene Initiated by Acetone.
AD-A206 879
The Determination of Rate-Limiting Steps during Soot Formation.
AD-A208 866

•QUADRUPOLE MOMENT
Thermotropic Ionic Liquid Crystals. 7. Calculation of Sodium 23 Quadrupole Coupling Constants in Lamellar Phases of Sodium Alkanoates,
AD-A205 293

•QUANTUM CHEMISTRY
Relative Energies of Silaethylene and Methylsilylene.
AD-A205 368
Extension of AM1 to the Halogens,
AD-A205 530
Ab Initio Studies of Molecular Structures and Energies. 2. Energies and Stabilities of PH(n), SH(n), and ClH(n) Compounds,
AD-A206 594
Theoretical Investigations of Molecules Composed only of Fluorine, Oxygen and Nitrogen: Determination of the Equilibrium Structures of FOOF, (NO)2 and FNNF and the Transition State Structure for FNNF cis-transisomerization,
AD-A208 720

•QUANTUM ELECTRONICS
Effect of Finite Size on Magnetoresistance,
AD-A206 234

•QUANTUM STATISTICS
Molecular State Evolution after Excitation with an Ultra-Short Laser Pulse: A Quantum Analysis of NaI and NaBr Dissociation,
AD-A205 423

•QUANTUM THEORY
Autoionization of H2 Induced by a Doubly Excited Triplet State.
AD-A205 565
Femtosecond Real-Time Probing of Reactions. 2. The Dissociation Reaction of ICN,
AD-A205 567
Numerical Modeling of Two-Terminal Quantum Well Devices.
AD-A208 238

•QUEUEING THEORY
Parametric Analysis of Queueing Networks with Blocking.
AD-A206 840
Routing and Singular Control for Queueing Networks in Heavy Traffic,
AD-A208 568
Applications of Functional Analytical Methods to Problems in Queueing Network Theory and Reliability Theory.

AD-A208 736

*QUINOLINES
2,3:6,7-Bis(2'3'-quinolino)pentacyclo(6.5.0.0(4,12).0(5,10).0(9,13)tridecane,
AD-A207 859

*RADAR
Gravity Wave and Turbulence Studies Using a High-Resolution ST Radar.
AD-A205 592

*RADAR ANTENNAS
Mesospheric Wind Measurement.
AD-A205 593

*RADAR REFLECTIONS
Studies of Frontal Zone Dynamics with a High-Resolution Wind Profiling System.
AD-A205 988

*RADIATION
Spectrometric Studies of Gas Phase Collision Processes.
AD-A205 570

*RADIATION EFFECTS
Investigation of Radio Frequency/Microwave Effects Upon the Central Nervous System.
AD-A207 188

*RADIATIVE TRANSFER
On the Fundamental Solution of the Radiative Transfer Equation,
AD-A205 361
Spin-Forbidden Radiative Decay Involving Quasidegenerate States. Application to the Beta 1 Sigma+ Yields a 3 Pi Transition in MgO,
AD-A205 836

*RADIO INTERFEROMETERS
Mesospheric Wind Measurement.
AD-A205 593

*RAINFALL INTENSITY
Numerical Simulation of the Meso Beta Scale Structure and Evolution of the 1977 Johnstown Flood. Part 3. Internal Gravity Waves and Squall Line,
AD-A208 574

*RAMAN SPECTROSCOPY
Excited-State Resonance Raman Spectroscopy as a Probe of Alumina-Sodium Dodecyl Sulfate Hemimicelles.
AD-A205 359
Nuclear Magnetic Resonance and Laser Scattering Techniques at High Pressure,
AD-A206 654

*RARE EARTH ELEMENTS
Cooperative Phenomena for New Coherent Radiation Sources.
AD-A206 368

*RARE GASES
Alkali-Rare Gas and Metal Halide Molecules as Potential Visible Lasers.
AD-A207 114

*REACTANTS(CHEMISTRY)
A New Catalyst for the Efficient and Selective Beta-Hydrosilylation of Acrylonitrile. Effect of Ultrasound,
AD-A206 384

*REACTION KINETICS
Reaction Kinetics and Chemo-Rheology of Poly(p-phenylenebenzobisthiazole) Polymerization in the Ordered Phase,
AD-A206 591
Lumped Model Generation and Evaluation: Sensitivity and Lie Algebraic Techniques with Applications to Combustion.
AD A206 683
Femtochemistry of the Reaction: IHgI* Yields (IHg...I)* Yields HgI + I,
AD A208 648
The Determination of Rate-Limiting Steps during Soot Formation.
AD-A208 866

*READING
Working Memory Capacity: An Individual Differences Approach.
AD-A207 127

*RECOMBINATION REACTIONS
Femtosecond Studies of Electron-Cation Geminate Recombination in Water,
AD-A206 411

*REINFORCED CONCRETE
Dynamic Response of Embedded Structures.
AD-A206 682

*RELAXATION
Nonlocal and Quasilocal Potentials in the Spontaneous Emission of Molecular Exciplexes Coupled to the Phonon Bath of a Solid Matrix,
AD-A206 883

*RELIABILITY
International Research Conference on Reliability.
AD-A207 001
Design of Experiments and Reliability Models.
AD-A207 108
Applications of Functional Analytical Methods to Problems in Queueing Network Theory and Reliability Theory.
AD-A208 736

*RESEARCH MANAGEMENT
Research Proposal Quarterly Status Report for July-September 1988,
AD-A206 810

*RESONANCE
Resonance in Weakly Nonlinear Systems.

AD-A207 115

*RHEOLOGY
Reaction Kinetics and Chemo-Rheology of Poly(p-phenylenebenzobisthiazole) Polymerization in the Ordered Phase.
AD-A206 591

*ROBOTICS
Neural Network Models of Vector Coding, Learning, and Trajectory Formation During Planned and Reactive Arm and Eye Movements.
AD-A206 737

*ROCKET EXHAUST
Calculation of Kinetic Data for Processes Leading to UV Signatures.
AD-A206 656

*ROTATION
Nonlinear Stability in Fluid and Plasma Dynamics.
AD-A207 715

*ROUTING
Routing and Singular Control for Queueing Networks in Heavy Traffic.
AD-A208 568

*SCALING FACTORS
Reduced Potential-Energy Curves for Diatomic Molecules.
AD-A206 206

*SCATTERING
Versatile Apparatus for Low-Energy and Hyperthermal Energy Ion Scattering Spectroscopies.
AD A205 832

*SCHEDULING
The Mapping of Parallel Algorithms to Reconfigurable Parallel Architectures.
AD A208 870

*SEISMIC WAVES
Po/So Phases: Propagation Velocity Across a 1,500-km-Long, Deep Ocean Hydrophone Array.
AD-A208 783
Yield Estimation from Spectral Amplitudes of Direct P and P Coda Recorded by the Wake Island Deep Ocean Hydrophone Array.
AD-A208 784

*SELECTION
On Selecting the Largest Success Probability under Unequal Sample Sizes.
AD-A207 878

*SELENIUM
Observation of Adsorbate Vibrational Amplitude Modification during a Phase Transformation in the Overlayer.
AD-A206 338

*SELF ORGANIZING SYSTEMS
Self-Organizing Neural Network Architectures for Real-Time Adaptive Pattern Recognition.
AD-A206 122

*SEMICONDUCTING FILMS
Multilayered Electronic Materials and Devices Based on III-V Compounds.
AD-A208 861

*SEMICONDUCTOR DEVICES
III-V Heterojunction Structures and High Speed Devices.
AD-A205 946
Vibrational, Mechanical, and Thermal Properties of III-V semiconductors.
AD-A206 590

*SEMICONDUCTOR LASERS
Vibrational, Mechanical, and Thermal Properties of III-V semiconductors.
AD-A206 590

*SEMICONDUCTORS
Point Defects in Semiconductors: Microscopic Identification, Metastable Properties, Defect Migration, and Diffusion.
AD-A206 947
Growth Studies of Metal-Metal/Semiconductor Structures.
AD-A206 988

*SHEAR STRESSES
The Heat Transfer and Fluid Dynamics of Concave Surface Curvature.
AD-A207 811

*SHOCK WAVES
The Structure and Control of Three-Dimensional Shock Wave Turbulent Boundary Layer Interactions.
AD-A205 923
Problems in Dynamic Phase Transition.
AD-A207 027
The Structure of Normal-Shock/Turbulent-Boundary-Layer Interactions Modified by Mass Removal.
AD-A208 402

*SIGNAL PROCESSING
Development and Analysis of Arma Parameter Estimation Schemes in the Presence of Noise.
AD-A205 598
Signal Processing.
AD-A206 662
Optically Controlled Devices and Ultrafast Laser Sources for Signal Processing.
AD-A208 432
Acoustooptic Processing of Two Dimensional Signals Using Temporal and Spatial Integration.
AD-A208 686

*SILANES
Carbonylation Chemistry of the Tantalum Silyl (Eta5-C5Me5)Cl3TaSiMe3. Synthesis, Characterization, and Reaction Chemistry of (Eta5-C5Me5)Cl3Ta(Eta2

COSiMe3) and Derivatives.
AD-A205 358
Relative Energies of Silaethylene and Methylsilylene.
AD-A205 368
Reductive Coupling of Carbonyl Compounds with Zinc and Trimethylchlorosilane to Produce O-Silylated Pinacols. Effect of Ultrasonic Waves,
AD-A206 289
Convenient Routes to Di-tert-butylsilanediyl: Chemical, Thermal and Photochemical Generation,
AD-A206 643
Addition of Dichlorocarbene to Poly(1,1-dimethyl-1-sila-cis-pent-3-ene) and Poly(1,1-dimethyl-1-silia-cis (and trans)-pent-3-ene. Characterization of Microstructures by 13C and 29Si NMR,
AD-A207 847
Birch Reduction of the Dichlorocarbene Adduct of poly(1,1-dimethyl-1-sila-cis-pent-3-ENE)(C12C-1): Synthesis and Characterization of poly(1,1-dimethyl-3,4-methylene-1-sila-cis-pent-3-ene) (CH2-1),
AD-A208 023

*SILICATES
Solid State 29Si and 11B NMR (nuclear Magnetic Resonance) Studies of Sol-Gel Derived Borosilicates,
AD-A205 295
27Al and 29Si NMR (Nuclear Magnetic Resonance) Study of Sol-Gel Derived Aluminosilicates and Sodium Aluminosilicates,
AD-A208 262

*SILICIDES
Environmental Effects in Niobium Base Alloys and Other Selected Intermetallic Compounds.
AD-A206 072

*SILICON
Summary Abstract: Spontaneous Thermal Etching of Silicon by CF3 Radicals,
AD-A205 535
Dynamics of Gas-Surface Interactions.
AD-A206 210
Free Radical-Surface Interactions Using Multiphoton Ionization of Free Radicals.
AD-A206 257
Reactions of (eta 5-C5H5)(eta 5 C5Me5)Zr(Si(SiMe3)3)X (X = Cl, M Complexes with Carbon Monoxide and the Isocyanide 2,6-Me2C6H3NC. Crystal Structure of (eta 5-C5H5)-(eta 5 -C5Me5)Zr(eta 2-C(N-2,6-Me2C6H3)Si(SiMe3)3)Cl,
AD-A206 494
Reactions of Laser-Generated CF2 (Free Radicals) on Silicon and Silicon Oxide Surfaces.
AD-A206 599
Non-Linear Optical Techniques for Thin Film Growth and Visible Ultraviolet Lasers.
AD-A206 811
A Perturbation-Trajectory Method for the Study of Gas-Surface Collision Dynamics,
AD-A207 816

*SILICON CARBIDES
Highly Oriented Fiber Reinforced Ceramic Composites.
AD-A208 119

*SILICON COMPOUNDS
Sticking Coefficient of the SiH2 Free Radical on a Hydrogenated Silicon-Carbon Surface,
AD-A205 532
Organosilicon Compounds and Polymers and Silicon Ceramics.
AD-A206 589
Reactions of Laser-Generated CF2 (Free Radicals) on Silicon and Silicon Oxide Surfaces.
AD-A206 599
The Silanoic Acid Dimer (HSiOOH)2: A Simple Molecular System Incorporating Two Very Strong Hydrogen Bonds,
AD-A208 774
The Anharmonic Force Fields of Silyl Fluoride and Silyl Chloride,
AD-A208 779

*SILICON DIOXIDE
Fluids, Gels and Glasses Under Extreme Conditions of Pressure and Temperature.
AD-A205 292
Kinetics of Surface Reactions of CF3 Radicals,
AD-A205 533
Free Radical-Surface Interactions Using Multiphoton Ionization of Free Radicals.
AD-A206 257

*SILVER
Dynamics of Gas-Surface Interactions.
AD-A206 210
A Perturbation-Trajectory Method for the Study of Gas-Surface Collision Dynamics,
AD-A207 816

*SIMULATION
Three-Dimensional Modelling for Contact Resistance of Current Flow into a Source/Drain Region.
AD-A206 694
The Pasm Parallel Processing System: Design, Simulation, and Image Processing Applications. Volume 1.
AD-A208 739

*SIMULTANEOUS EQUATIONS
Convergence and Performance of Synchronous and Asynchronous Parallel and Conventional Iterative Methods.
AD-A207 093

*SINGLE CRYSTALS
Reactions of Laser-Generated CF2 (Free Radicals) on Silicon and Silicon Oxide Surfaces.
AD-A206 599

•SLEEP
Role of Adenosine Analogs and Growth Hormone in Waking and Sleep.
AD-A205 605

•SLURRIES
Charged Slurry Droplet Research.
AD-A206 946

•SNOW
Cloud/Cryosphere Interactions.
AD-A208 377

•SODIUM
Fluids, Gels and Glasses Under Extreme Conditions of Pressure and Temperature.
AD-A205 292
Molecular State Evolution after Excitation with an Ultra-Short Laser Pulse: A Quantum Analysis of NaI and NaBr Dissociation.
AD-A205 423

•SODIUM COMPOUNDS
Thermotropic Ionic Liquid Crystals. 7. Calculation of Sodium-23 Quadrupole Coupling Constants in Lamellar Phases of Sodium Alkanoates.
AD-A205 293
Thermotropic Ionic Liquid Crystals. 6. Structural Parameters of Solid and Liquid Crystal Phases of Anhydrous Short-Chain Sodium Alkanoates.
AD-A206 832
27Al and 29Si NMR (Nuclear Magnetic Resonance) Study of Sol-Gel Derived Aluminosilicates and Sodium Aluminosilicates.
AD-A208 262

•SODIUM SULFATES
Excited-State Resonance Raman Spectroscopy as a Probe of Alumina-Sodium Dodecyl Sulfate Hemimicelles.
AD-A205 359

•SOIL DYNAMICS
Plastic Deformation of Granular Materials.
AD-A208 589

•SOIL MECHANICS
Uncertainties in Soil Constitutive Behavior. Revision.
AD-A205 924
Plastic Deformation of Granular Materials.
AD-A208 589

•SOIL MODELS
Uncertainties in Soil Constitutive Behavior. Revision.
AD-A205 924

•SOLID BODIES
Studies on Ions and Neutrals Desorbed from Solid Surfaces by Ion and Electron Bombardment.
AD-A206 734

•SOLID PHASE
Thermotropic Ionic Liquid Crystals. 8. Structural Parameters of Solid and Liquid Crystal Phases of Anhydrous Short-Chain Sodium Alkanoates.
AD-A206 832

•SOLID PROPELLANT ROCKET ENGINES
Combustion Instability in Solid Rocket Motors.
AD-A206 843
Investigation of the Flame-Acoustic Wave Interaction during Axial Solid Rocket Instabilities.
AD-A207 929

•SOLID PROPELLANTS
Investigation of the Flame-Acoustic Wave Interaction during Axial Solid Rocket Instabilities.
AD-A207 929

•SOLID STATE CHEMISTRY
Raman Study of Solid State Reactions.
AD-A207 140

•SOLID STATE LASERS
Cooperative Phenomena for New Coherent Radiation Sources.
AD-A206 368

•SOLIDIFICATION
Al and Mg Alloys for Aerospace Applications Using Rapid Solidification and Powder Metallurgy Processing.
AD-A207 085

•SOOT
Optical Measurements of Soot Particles in Flames.
AD-A206 238
Computer Modeling of Soot Formation Comparing Free Radical and Ionic Mechanisms.
AD-A206 693
The Determination of Rate-Limiting Steps during Soot Formation.
AD-A208 866

•SPACE PERCEPTION
Stereo Boundary Fusion by Cortical Complex Cells: A System of Maps, Filters, and Feedback Networks for Multiplexing Distributed Data.
AD-A205 507
Perception of Motion in Statistically-Defined Displays.
AD-A208 695

•SPACE SHUTTLES
An Instrument for the Simultaneous Measurement of Velocity, Temperature and Density in Unseeded Air Flows.
AD-A205 588

•SPACECRAFT
Increasing the Margin of Stability of Arbitrarily Finite Modes of Flexible Large Space Structures with Damping.
AD-A206 487

•SPATIAL DISTRIBUTION

Theoretical Analysis of Models for Texture.
AD-A208 486

*SPECTROSCOPY
Nonlinear Spectroscopy of Multicomponent Droplets and Two- and Three-Dimensional Measurements in Flames.
AD-A205 449
Femtosecond Real-Time Probing of Reactions. 3. Inversion to the Potential from Femtosecond Transition-State Spectroscopy Experiments,
AD-A206 680

*SPEECH
Coordinated Noninvasive Studies (CNS) Project.
AD-A205 413
Levels of Processing of Speech and Non-Speech.
AD-A208 587

*SPEECH RECOGNITION
Signal Processing.
AD-A206 662
Proceedings of the Connectionists Models Summer School Held in Pittsburgh, Pennsylvania on June 17-26, 1988.
AD-A207 014

*SPIN STATES
Theory and Implementation of the MBPT Density Matrix. An Application to One-Electron to One-Electron Properties,
AD-A205 833

*SPRAYS
Structure of the Near-Injector Region of Non-Evaporating Pressure Atomized Sprays,
AD-A206 237
Charged Slurry Droplet Research.
AD-A206 946

*STABILITY
Theory and Experimental and Chemical Instabilities.
AD-A205 571
Ab Initio Studies of Molecular Structures and Energies. 2. Energies and Stabilities of PH(n), SH(n), and ClH(n) Compounds,
AD-A206 594

*STAINLESS STEEL
Kinetics of Surface Reactions of CF3 Radicals,
AD-A205 533

*STALLING
An Experimental Investigation of High Lift/High Rate Aerodynamics of an Unsteady Airfoil.
AD-A206 964

*STATISTICAL ANALYSIS
Statistical Analysis of the LMS and Modified Stochastic Gradient Algorithms.
AD-A208 618

*STATISTICAL SAMPLES
On Selecting the Largest Success Probability under Unequal Sample Sizes,
AD-A207 878

*STOCHASTIC CONTROL
Solutions to a Class of Nonstandard Stochastic Control Problems with Active Learning,
AD-A207 803
Singular and Bang-Bang Stochastic Control.
AD-A208 627

*STOCHASTIC PROCESSES
Sieves, Signal Extraction, and Design.
AD-A205 840
Stochastic Systems with Multiple Decision Makers and Parametric Uncertainties.
AD-A206 655
Solutions to a Class of Nonstandard Stochastic Control Problems with Active Learning,
AD-A207 803
Functional Occupation Measures and Ergodic Cost Problems for Singularly Perturbed Stochastic Systems,
AD-A208 578
An Averaging Method for Stochastic Approximations with Constant Parameters: Small Parameter Values,
AD-A208 622

*STRESS STRAIN RELATIONS
A New Perspective on Rutting in Flexible Pavements.
AD-A205 797

*STRESSES
Fundamental Studies of the Mechanical Behavior of Microelectronic Thin Film Materials.
AD-A208 057

*STRUCTURAL MECHANICS
Computational Methods for Nonlinear Dynamic Problems in Solid and Structural Mechanics: Progress in the Theory and Modeling of Friction and in the Control of Dynamical Systems with Frictional Forces.
AD-A208 763

*STRUCTURAL MEMBERS
Experimental and Theoretical Determination of the Thermomechanical Response of Inelastic Structural Materials to High Energy Thermal Inputs.
AD-A206 100

*STRUCTURAL RESPONSE
Impulsive Loading of Fiber-Reinforced Structures.
AD-A206 989

*SUBSONIC FLOW
Basic Instability Mechanisms in Chemically Reacting Subsonic and Supersonic Flows.

AD-A206 669

*SUBSTRATES
Fundamental Studies of the Mechanical Behavior of Microelectronic Thin Film Materials.
AD-A206 057

*SULFIDES
Internal Energy Distribution of OCS Desorbing from a Hot Platinum Surface,
AD-A205 794

*SUPERCONDUCTIVITY
Superconducting Oxide Films for Multispectral Infrared Sensors.
AD-A206 685
Development of Practical MO techniques for Prediction of the properties and Behaviour of Materials.
AD-A206 831

*SUPERCONDUCTORS
Vortices in Long Josephson Junctions.
AD-A207 936
Superconductivity and Magnetism in Layered Materials.
AD-A208 487

*SUPERSONIC COMBUSTION RAMJET ENGINES
Demonstration of Oblique Detonation Wave for Hypersonic Propulsion.
AD-A208 268

*SUPERSONIC FLOW
Basic Instability Mechanisms in Chemically Reacting Subsonic and Supersonic Flows.
AD-A206 669

*SUPERSONIC INLETS
The Structure of Normal-Shock/Turbulent-Boundary Layer Interactions Modified by Mass Removal.
AD-A208 402

*SURFACE CHEMISTRY
Internal Energy Distribution of OCS Desorbing from a Hot Platinum Surface,
AD-A205 794
Hydrogen Adsorption at Nb(100): Photoemission Evidence of Two-Stage Exchange Involving Subsurface States,
AD-A207 846

*SURFACE REACTIONS
Reaction Probability for the Spontaneous Etching of Silicon by CF3 Free Radicals,
AD-A205 534
Summary Abstract: Spontaneous Thermal Etching of Silicon by CF3 Radicals,
AD-A205 535

*SURFACES
Studies on Ions and Neutrals Desorbed from Solid Surfaces by Ion and Electron Bombardment.
AD-A206 734

*SURVEYS
A Deep Optical Infrared Survey.
AD-A207 930

*SYMPOSIA
Partial Support of the International Laser Science Conference (3rd) Held in Atlantic City, New Jersey on 1-4 November 1987.
AD-A206 812
International Symposium on Multivariate Analysis (5th) Held in Pittsburgh, Pennsylvania on June 19 24, 1978.
AD-A208 680

*SYNAPSE
Description and Manipulation of Membrane Lipid Alterations Associated with Synaptic Functions in Isolated Cerebellar Glomeruli.
AD-A206 732
Connectionist Networks Learn to Transmit Chaos.
AD-A208 642

*SYNAPSIS
Long Term Synaptic Plasticity and Learning in Neuronal Networks.
AD-A205 993

*SYNTHESIS(CHEMISTRY)
Novel Organoboranes as Intermediates for Ceramic Precursors and High-Energy Fuels.
AD-A206 101
Synthesis of 4,4,8,8,11,11-Hexanitropentacyclo(5.4.0.0(2,6).0(3,10).0(5,9)-undecane,
AD-A207 869

*SYNTHETIC APERTURE RADAR
Acoustooptic Processing of Two Dimensional Signals Using Temporal and Spatial Integration.
AD-A208 686

*SYSTEMS ANALYSIS
Applications of Graph Theory and System Theory to Large Scale Systems.
AD-A207 110

*SYSTEMS ENGINEERING
The Pasm Parallel Processing System: Design, Simulation, and Image Processing Applications. Volume 1.
AD-A208 739

*SYSTEMS MANAGEMENT
International Research Conference on Reliability.
AD-A207 001

*TANTALUM COMPOUNDS
Carbonylation Chemistry of the Tantalum Silyl (Eta5-C5Me5)Cl3TaSiMe3. Synthesis, Characterization, and Reaction Chemistry of (Eta5-C5Me5)Cl3Ta(Eta2 COSiMe3) and Derivatives.
AD-A205 358

*TARGET DETECTION
Acoustooptic Processing of Two Dimensional Signals Using Temporal and Spatial Integration.
AD-A208 686

*TERATOGENIC COMPOUNDS
Chemical and Oncogene Modulation of Gap Junctional Intercellular Communication,
AD-A206 876

*TEST EQUIPMENT
Antiproton and Millimeter Wave Research.
AD-A208 363

*TEST STANDS
Operation and Upgrading of the Beam Optics Test Stand.
AD-A208 626

*TEXT PROCESSING
Research in Knowledge Delivery.
AD-A208 327

*TEXTURE
Theoretical Analysis of Models for Texture.
AD-A208 486

*THEOREMS
A Dilogarithmic Extension of Liouville's Theorem on Integration in Finite Terms.
AD-A206 681

*THEORY
Applications of Graph Theory and System Theory to Large Scale Systems.
AD-A207 110

*THERMAL CONDUCTIVITY
Superconducting Oxide Films for Multispectral Infrared Sensors.
AD-A206 685

*THERMOCHEMISTRY
Thermodynamics of Organic Compounds.
AD-A207 120

*THERMODYNAMIC PROPERTIES
Thermodynamics of Organic Compounds.
AD-A207 120

*THERMODYNAMICS
Thermodynamics of High Temperature Materials.
AD-A207 139

*THERMOELASTICITY
Geometrical Foundations of Mesomechanics and Lagrangian Formalism.
AD-A205 589
Some Mathematical Problems in Continuum Mechanics.
AD-A207 923

*THERMOMECHANICS
Experimental and Theoretical Determination of the Thermomechanical Response of Inelastic Structural Materials to High Energy Thermal Inputs.
AD-A206 100

*THERMOSPHERE
Magnetosphere - Thermosphere Coupling: An Experiment in Interactive Modeling,
AD-A206 881

*THIAZOLES
Physical-Chemical Studies of Solutions Processing of Nematic Polymers.
AD-A205 921

*THIN FILMS
Fundamental Studies of the Mechanical Behavior of Microelectronic Thin Film Materials.
AD-A206 057
Non-Linear Optical Techniques for Thin Film Growth and Visible Ultraviolet Lasers.
AD-A206 811

*THIOPHENES
Conductive and Optically Non-Linear Polymeric Langmuir-Blodgett Films of Poly(3-Dodecylthiophene),
AD-A205 529
Synthesis and Photodegradation of Poly(2,5,-bis(dimethylsilyl)thiophene),
AD-A208 802

*THREE DIMENSIONAL FLOW
Three Dimensional Flow and Temperature Profile Attenuation in an Axial Flow Turbine.
AD-A206 736
Three-Dimensional Vortex Interactions in Turbulent Boundary Layers.
AD-A208 624

*THREE PHASE FLOW
Nonlinear Systems of Conservation Laws.
AD-A205 837

*THRESHOLD EFFECTS
Photoionization Phenomena Near Threshold,
AD-A208 676

*THRUSTERS
MPD Thruster Erosion Research.
AD-A205 644

*THUNDERSTORMS
Numerical Simulation of the Meso-Beta Scale Structure and Evolution of the 1977 Johnstown Flood. Part 3. Internal Gravity Waves and Squall Line,
AD-A208 574
A Numerical Investigation of a Convectively Generated, Inertially Stable, Extratropical Warm-Core Mesovortex Over Land. Part 1. Structure and Evolution,
AD-A208 575

*TIME SERIES ANALYSIS
Binary Time Series.
AD-A208 679

•TITANIUM ALLOYS
Fundamental Studies of Beta Phase Decomposition Modes in Titanium Alloys.
AD-A205 296
Probabilistic Description of Fatigue Crack Growth Under Constant- and Variable-Amplitude Loading.
AD-A208 717

•TOLUENES
The Determination of Rate-Limiting Steps during Soot Formation.
AD-A208 866

•TOXIC AGENTS
The Role of Chemical Inhibition of Gap-Junctional Intercellular Communication in Toxicology.
AD-A207 130

•TOXIC TOLERANCES
A Characterization of Chlordecone Pretreatment - Altered Pharmacokinetics in Mice,
AD A208 738

•TOXICITY
Chemical and Oncogene Modulation of Gap Junctional Intercellular Communication,
AD-A206 876
Dieldrin Inhibition of Gap Junctional Intercellular Communication in Rat Glial Cells as Measured by the Fluorescence Photobleaching and Scrape Loading/Dye Transfer Assays,
AD-A206 878
The Role of Chemical Inhibition of Gap-Junctional Intercellular Communication in Toxicology.
AD-A207 130

•TRACKING
An Algorithm for Tracking Fluid Particles in Numerical Simulations of Homogeneous Turbulence.
AD A206 239
Application of Multi-Channel Hough Transform to Stereo Vision.
AD-A207 937

•TRAJECTORIES
Projection Methods for Obtaining Intramodular Energy Transfer Rates from Classical Trajectory Results: Application to 1,2-Difluoroethane,
AD-A205 566

•TRANSITION METALS
High Temperature Oxidation Studies on Alloys Containing Dispersed Phase Particles and Clarification of the Mechanism of Growth of SiO2.
AD-A207 161

•TRANSITIONS
Femtosecond Real-Time Probing of Reactions. 3. Inversion to the Potential from Femtosecond Transition-State Spectroscopy Experiments,
AD-A206 680
Kinetics of Ni(CO)4 Formation.
AD-A207 136

•TRANSMISSION LINES
Three-Dimensional Modelling for Contact Resistance of Current Flow into a Source/Drain Region.
AD-A206 694

•TRANSONIC FLIGHT
Exploitation of Multiple Solutions of the Navier-Stokes Equations to Achieve Radically Improved Flight.
AD-A205 939

•TRANSONIC FLOW
Transonic Aerodynamics.
AD-A207 109
The Structure of Normal-Shock/Turbulent-Boundary-Layer Interactions Modified by Mass Removal.
AD A208 402

•TRAVELING WAVES
Non-Linear Dynamics and Chaotic Motions in Feedback Controlled Elastic System.
AD-A208 628

•TUNGSTEN
Chemistry of Polynuclear Metal Complexes with Bridging Carbene or Carbyne Ligands. Part 83. Molybdenum and Tungsten Complexes Containing the Alkylidyne Group C(eta6-C6H4(OMe-2)Cr(CO)3),
AD-A206 495

•TUNNELONG(ELECTRONICS)
Numerical Modeling of Two-Terminal Quantum Well Devices.
AD-A208 238

•TURBULENCE
An Algorithm for Tracking Fluid Particles in Numerical Simulations of Homogeneous Turbulence,
AD-A206 239
Basic Instability Mechanisms in Chemically Reacting Subsonic and Supersonic Flows.
AD-A206 669

•TURBULENT BOUNDARY LAYER
An Experimental Study of the Effect of Streamwise Vortices on Unsteady Turbulent Boundary-Layer Separation.
AD-A205 462
The Structure and Control of Three-Dimensional Shock Wave Turbulent Boundary Layer Interactions.
AD-A205 923
Three Dimensional High Speed Boundary Layer Flows.
AD-A206 145
The Heat Transfer and Fluid Dynamics of Concave Surface Curvature.
AD-A207 811
The Structure of Normal-Shock/Turbulent-Boundary Layer Interactions Modified by Mass Removal.

AD-A208 402
Three-Dimensional Vortex Interactions in Turbulent Boundary Layers.
AD-A208 624

*TURBULENT FLOW
Flow Control for Unsteady and Separated Flows and Turbulent Mixing.
AD-A205 989
Fundamental Studies on Spray Combustion and Turbulent Combustion.
AD-A206 438
The Heat Transfer and Fluid Dynamics of Concave Surface Curvature.
AD-A207 811
Experimental and Numerical Investigation of Coherent Structures in Turbulent Wake Flows.
AD-A207 866
Lagrangian Turbulence Near Walls: Structures and Mixing in Admissible Model Flows.
AD-A208 466

*TWO PHOTON ABSORPTION
Multiphoton Detection Techniques for F and F2.
AD-A208 576

*ULTRASONIC TESTS
Interactions of Ultrasonic Waves with Composite Plates.
AD-A206 991

*ULTRAVIOLET DETECTORS
Vibrational, Mechanical, and Thermal Properties of III-V semiconductors.
AD-A206 590

*ULTRAVIOLET SIGNATURES
Calculation of Kinetic Data for Processes Leading to UV Signatures.
AD-A206 656

*UNDERGROUND STRUCTURES
Dynamic Response of Embedded Structures.
AD-A206 682

*UNMANNED SPACECRAFT
Admittance Modeling of Structures with Active Controls.
AD-A207 874

*UNSTEADY FLOW
Flow Control for Unsteady and Separated Flows and Turbulent Mixing.
AD-A205 989
Unsteady Flows Around Three-Dimensional Lifting Surfaces.
AD-A206 331
Unsteady and Separated Flows.
AD-A206 539

*VACUUM ULTRAVIOLET RADIATION
Population Inversions in Ablation Plasmas Generated by Intense Electron Beams.
AD-A205 716

*VANADIUM
Probabilistic Description of Fatigue Crack Growth Under Constant and Variable-Amplitude Loading.
AD-A208 717

*VAPOR DEPOSITION
Multilayered Electronic Materials and Devices Based on III V Compounds.
AD-A208 861

*VAPOR PHASES
Spectrometric Studies of Gas Phase Collision Processes.
AD-A205 570

*VIBRATION
Multiresonant Spectroscopy and Dynamics of Molecular Extravalent States: State-Resolved Intramolecular Relaxation of NO2 Above 9 eV.
AD-A205 841
Active Control of Flexible Space Structures Using the Nitinol Shape Memory Actuators.
AD-A205 948
Nonlinear Dynamics and Control of Flexible Structures.
AD-A208 120

*VIBRATIONAL SPECTRA
Raman Study of Solid State Reactions.
AD-A207 140

*VINYL RADICALS
Mechanism of the Claisen Rearrangement of Allyl Vinyl Ethers.
AD-A205 531

*VISCOELASTICITY
A Fast Algorithm for Non-Newtonian Flow. An Enhanced Particle-Tracking Finite Element Code for Solving Boundary-Valve Problems in Viscoelastic Flow.
AD-A206 997
State Space Models for Aeroelastic and Viscoelastic Systems.
AD-A207 092

*VISCOSITY
Self-Diffusion in the Compressed, Highly Viscous Liquid 2-Ethylhexyl Benzoate.
AD-A205 294

*VISCOUS FLOW
Numerical Methods for Singularly Perturbed Differential Equations with Applications.
AD-A207 187

*VISION
Neural Networks for Visual Perception in Variable Illumination.
AD-A206 151
Components of High-Level Vision: A Cognitive Neuroscience Analysis and Accounts of Neurological Syndromes.
AD-A207 848

Application of Multi-Channel Hough Transform to Stereo Vision.
AD-A207 937
Expert Systems for the Scheduling of Image Processing Tasks on a Parallel Processing System.
AD-A208 613

*VISUAL CORTEX
Stereo Boundary Fusion by Cortical Complex Cells: A System of Maps, Filters, and Feedback Networks for Multiplexing Distributed Data,
AD-A205 507

*VISUAL PERCEPTION
Neural Networks for Visual Perception in Variable Illumination,
AD-A206 151
Solving the Brightness-from-Luminance Problem: A Neural Architecture for Invariant Brightness Perception.
AD-A206 890
Visual Information-Processing in the Perception of Features and Objects.
AD-A206 948
Is There a Constancy for Velocity?
AD-A208 675

*VORTICES
Three-Dimensional Structure of Boundary Layers in Transition to Turbulence.
AD-A205 587
Bifurcating Jets at High Reynolds Numbers.
AD-A205 718
T. ee Dimensional High Speed Boundary Layer Flows.
AD-A206 145
Fundamental Studies on Spray Combustion and Turbulent Combustion.
AD-A206 438
Vortex Dynamics and Vortex Breakdown.
AD-A206 470
Ideal Jet Flow in Two Dimensions.
AD-A208 275
A Numerical Investigation of a Convectively Generated, Inertially Stable, Extratropical Warm-Core Mesovortex Over Land. Part 1. Structure and Evolution,
AD-A208 575
Three-Dimensional Vortex Interactions in Turbulent Boundary Layers.
AD-A208 624

*WAFERS
Fundamental Studies of the Mechanical Behavior of Microelectronic Thin Film Materials.
AD-A206 057

*WAKE
Experimental and Numerical Investigation of Coherent Structures in Turbulent Wake Flows
AD-A207 868

*WATER
Femtosecond Studies of Electron Cation Geminate Recombination in Water,
AD-A206 411

*WATER JETS
Structure of the Near-Injector Region of Non-Evaporating Pressure Atomized Sprays,
AD-A206 237

*WAVE PROPAGATION
Wavefront Propagation for Reaction-Diffusion Systems of PDE,
AD-A207 737

*WAVEFRONTS
Wavefront Propagation for Reaction-Diffusion Systems of PDE
AD A207 737

*WAVEGUIDE COUPLERS
MM - Wave Components - SIS (superconductor-Insulator-Superconductor) Mixers.
AD-A208 632

*WEATHER FORECASTING
On the Use of Multiprocessing Computers for Global Numerical Weather Prediction.
AD-A206 102
Use of Four-Dimensional Data Assimilation by Newtonian Relaxation and Latent-Heat Forcing to Improve a Mesoscale-Model Precipitation Forecast: A Case Study,
AD-A208 573
Numerical Simulation of the Meso-Beta Scale Structure and Evolution of the 1977 Johnstown Flood. Part 3. Internal Gravity Waves and Squall Line,
AD-A208 574

*WHISTLERS
Efficient Energy Storage and Conversion Using Adiabatic Compression of Relativistic-Electron Plasmas.
AD-A208 657

*WIND
Mesospheric Wind Measurement.
AD-A205 593

*WINGS
Optimum Aeroelastic Characteristics for Composite Supermaneuverable Aircraft.
AD-A205 503
Transonic Aerodynamics.
AD-A207 109

*X RAY APPARATUS
Laboratory for X-Ray Optics.
AD-A206 468
Low Energy X-Ray and Electron Physics and Technology for High-Temperature Plasma Diagnostics.
AD-A206 486

Ultrasmall Holographic X-Ray Gratings Using Synchrotron Radiation and X-Ray Lithographic Techniques.
AD-A206 731

*X RAY DIAGNOSTICS
Low Energy X-Ray and Electron Physics and Technology for High-Temperature Plasma Diagnostics.
AD-A206 486

*XENON
Low-Energy Atomic Collisions.
AD-A207 216

PERSONAL AUTHOR INDEX

*AARONSON, H. I
* * *
Fundamental Studies of Beta Phase Decomposition Modes in Titanium Alloys.
AD-A205 296

ABEL, JOHN F.@@@@
* * *
Nonlinear Dynamics and Control of Flexible Structures.
AD-A208 120

*ABRAMOWITZ, STANLEY@
* * *
Thermodynamics of High Temperature Materials.
AD-A207 139

*ABUGHALOUS, MANSOUR M
* * *
On Selecting the Largest Success Probability under Unequal Sample Sizes,
AD-A207 878

ADAMY, S. T
* * *
Self-Diffusion in the Compressed, Highly Viscous Liquid 2-Ethylhexyl Benzoate,
AD-A205 294

ADLER, D. L
* * *
Versatile Apparatus for Low-Energy and Hyperthermal Energy Ion Scattering Spectroscopies,
AD-A205 832
* * *
A Source for Producing Alkali Ion Beams for Low-Energy Surface Scattering Spectroscopies,
AD-A208 022

AGRAWAL, PARAS M
* * *
A Perturbation Trajectory Method for the Study of Gas-Surface Collision Dynamics,
AD-A207 816

*AHUJA, NARENDRA@@@@@
* * *
Perceptual Structure and Shape from Texture.
AD-A207 873

*AKYILDIZ, I. F.@@@
* * *
Parametric Analysis of Queueing Networks with Blocking.
AD-A206 840

ALEX, MICHAEL
* * *
High Density Ion Implanted Contiguous Disk Bubble Technology.
AD-A207 018

ALEXANDER, MILLARD H.@
* * *
Collaborative Experimental and Theoretical Study of the Photodissociation and Reactions of the Azide Radical.
AD-A205 597

*ALFANO, ROBERT
* * *
Subpicosecond Optical Digital Computation Using Conjugate Parametric Generators.
AD-A207 908

*ALLCOCK, HARRY R.@
* * *
Polyphosphazenes and their Relationship to Ceramics and Metals,
AD-A205 564

*ALLEN, D. H
* * *
Experimental and Theoretical Determination of the Thermomechanical Response of Inelastic Structural Materials to High Energy Thermal Inputs.
AD-A206 100

ALMEIDA, RAPHAEL
* * *
Molecular State Evolution after Excitation with an Ultra-Short Laser Pulse: A Quantum Analysis of NaI and NaBr Dissociation,
AD-A205 423

*ALVEY, MARK D
* * *
Investigation of the Feasibility of Engel-Brewer Compounds as High Temperature Oxidation-Resistand Coatings for Carbon-Carbon Composite Materials.
AD-B130 800

*ANDERSON, DALE A.@
* * *
Development of Adaptive Grid Schemes Based on Poisson Grid Generators.
AD-A206 922

*ANDERSON, DAVID N
* * *
A Fully Analytic, Low- and Middle-Latitude Ionospheric Model,
AD-A206 880

ANDERSON, KEVIN R.@@
* * *
Convenient Routes to Di-tert-butylsilanediyl: Chemical, Thermal and Photochemical Generation,
AD-A206 643

ANNAPURNA, PENDRI
* * *
Lewis Acid Promoted Reactions of Substituted Pentacyclo(5.4.0.0(2,6).0(3,10).0(5,9)undecane-8,11-diones with Ethyl Diazoacetate,
AD-A207 858
* * *
2,3:6,7-Bis(2'3'-quinolino)pentacyclo(6.5.0.0(4,12).0(5,10).0(9,13)tridecane,
AD-A207 859
* * *
Cycloaddition of Anion Derived Homophthalic Anhydride to

cis,cisoid,cis-
Tricyclo(6.3.0.0(2,6))undeca-4,9-diene-3,11-dione. Aromatization as a Driving Force for Intramolecular Sigmatropic Hydrogen Transfer,
AD-A207 860

*APPLING, J. R
* * *
Circular Dichroism in Photoelectron Angular Distributions from Two-Color (1+1) REMPI (Resonantly Enhanced Multiphoton Ionization) of NO.
AD-A205 387

ARNEY, BENNY E., JR
* * *
Synthesis of 4,4,8,8,11,11-Hexanitropentacyclo(5.4.0.0(2,6).0(3,10).0(5,9)-undecane,
AD-A207 869

AUSTIN, DEREK
* * *
Reduced Potential-Energy Curves for Diatomic Molecules,
AD-A206 206

BACALIS, N. C.@
* * *
Excited Molecules and Clusters in Solid Media Hydrogen and Tetrahydrogen in Ionic Crystals,
AD-A208 024

BADDOURA, JAMIL
* * *
A Dilogarithmic Extension of Liouville's Theorem on Integration in Finite Terms.
AD-A206 681

BAKIS, C. E
* * *
Investigation and Modeling of Damage Growth in Composite Laminates.
AD-A207 623

BALLENTINE, C. A
* * *
Hydrogen Adsorption at Nb(100): Photoemission Evidence of Two-Stage Exchange Involving Subsurface States,
AD-A207 846

*BALLINGALL, JAMES M
* * *
Pseudomorphic In(x).
AD-A207 037

BARKER, DAVID L.@@
* * *
Muscarinic Antagonist Enhances One-Trial Food-Aversion Learning in the Mollusc Pleurobranchaea.
AD-A208 636

BARLES, G.@@
* * *
Wavefront Propagation for Reaction-Diffusion Systems of PDE,
AD-A207 737

BARTLETT, RODNEY J.@@@
* * *
Theory and Implementation of the MBPT Density Matrix. An Application to One-Electron to One-Electron Properties,
AD-A205 833

BARTON, JACQUELINE K.@@@
* * *
Excited-State Resonance Raman Spectroscopy as a Probe of Alumina Sodium Dodecyl Sulfate Hemimicelles.
AD-A205 359

*BASAR, TAMER@@
* * *
Stochastic Systems with Multiple Decision Makers and Parametric Uncertainties.
AD-A206 655
* * *
Solutions to a Class of Nonstandard Stochastic Control Problems with Active Learning,
AD-A207 803

*BASU, ASIT P.@?@@@
* * *
International Research Conference on Reliability.
AD-A207 001

*BAZ, AMR M
* * *
Active Control of Flexible Space Structures Using the Nitinol Shape Memory Actuators.
AD-A205 948

*BEDER, JAY H.@@@@@
* * *
Sieves, Signal Extraction, and Design.
AD-A205 840

*BENAROYA, H.@@
* * *
Uncertainties in Soil Constitutive Behavior. Revision.
AD-A205 924

*BENTLEY, ALAN F.@@
* * *
Study of the Infrared Celestial Background.
AD-A205 649

BENTSON, JAMES
* * *
Optimum Aeroelastic Characteristics for Composite Supermaneuverable Aircraft.
AD-A205 503

*BERGER, MARC A.@@@
* * *
Radon Transform Analysis of a Probabilistic Method for Image Generation.
AD-A207 814

*BERGER, MELVYN S.@
* * *
Vortex Dynamics and Vortex Breakdown.

AD-A206 470

BERNAL, L
* * *
Structure of the Near-Injector Region of Non-Evaporating Pressure-Atomized Sprays,
AD-A206 237

*BERNSTEIN, RICHARD B
* * *
Femtosecond Real-Time Probing of Reactions. 3. Inversion to the Potential from Femtosecond Transition-State Spectroscopy Experiments,
AD-A206 680

*BERRY, GUY C.@@@@@
* * *
Physical-Chemical Studies of Solutions Processing of Nematic Polymers.
AD-A205 921

*BERSHAD, NEIL J.@@
* * *
Statistical Analysis of the LMS and Modified Stochastic Gradient Algorithms.
AD-A208 618

BEYER, JAMES B.@@
* * *
Vortices in Long Josephson Junctions.
AD-A207 936

BISHOP, B. A.@@@@@@
* * *
Basic Research on Processing of Ceramics for Space Structures.
AD-A205 954

*BJERRE, N
* * *
Autoionization of H2 Induced by a Doubly Excited Triplet State.
AD A205 565

BOGAR, T. J.@
* * *
The Structure of Normal-Shock/Turbulent-Boundary-Layer Interactions Modified by Mass Removal.
AD-A208 402

*BOGDONOFF, SEYMOUR M.@@@
* * *
The Structure and Control of Three Dimensional Shock Wave Turbulent Boundary Layer Interactions.
AD-A205 923

BOUDJOUK, PHILIP@@@@
* * *
A New Catalyst for the Efficient and Selective Beta-Hydrosilylation of Acrylonitrile. Effect of Ultrasound,
AD-A206 384

BOUDJOUK, PHILIP@@@
* * *
Reductive Coupling of Carbonyl Compounds with Zinc and Trimethylchlorosilane to Produce O-Silylated Pinacols. Effect of Ultrasonic Waves,
AD-A206 289

*BOUDJOUK, PHILIP
* * *
Convenient Routes to Di-tert-butylsilanediyl: Chemical, Thermal and Photochemical Generation,
AD-A206 643

*BOWEN, H. R
* * *
Basic Research on Processing of Ceramics for Space Structures.
AD-A205 954

BOWERS, MICHAEL T
* * *
Energy Disposal in Ion Molecule Reactions.
AD A205 987

*BOWMAN, R. M
* * *
Femtochemistry of the Reaction: IHgI* Yields (IHg...I)* Yields HgI + I,
AD-A208 648

BOWMAN, ROBERT M
* * *
Femtosecond Studies of Electron-Cation Geminate Recombination in Water,
AD-A206 411

*BRADLEY, JOHN S.@@
* * *
Special Year on Numerical Linear Algebra.
AD-A208 199

*BRADSHAW, P
* * *
The Heat Transfer and Fluid Dynamics of Concave Surface Curvature.
AD-A207 811

*BRAGINSKI, A. I
* * *
Superconducting Oxide Films for Multispectral Infrared Sensors.
AD-A206 685

BRAKE, M. L
* * *
Population Inversions in Ablation Plasmas Generated by Intense Electron Beams.
AD-A205 716

*BRINKER, C. J
* * *
Symposium: Better Ceramics Through Chemistry III. Volume 121.
AD-A207 128

*BROWN, THOMAS H.@@
* * *
Long Term Synaptic Plasticity and Learning in Neuronal Networks.
AD A205 993

BULLOCK, DANIEL@@@@@
* * *
Self-Organizing Neural Architectures for Eye Movements, Arm Movements, and Eye-Arm Coordination.
AD-A206 153

*BURNS, J. A
* * *
Modeling and Computational Algorithms for Parameter Estimation and Optimal Control of Aeroelastic Systems and Large Flexible Structures.
AD-A208 274

BURTON, ROBERT M., JR
* * *
Evidence for Chaos in Spike Trains of Neurons That Generate Rhythmic Motor Patterns.
AD-A208 625
* * *
Connectionist Networks Learn to Transmit Chaos.
AD-A208 642

BURZYNSKI, R
* * *
Surface Plasmon Study of Monolayer-Bilayer Transition in Poly-4-BCMU and Poly-3-BCMU Polydiacetylene Langmuir-Blodgett Films.
AD-A207 404

CAHAY, M. M.@@
* * *
Numerical Modeling of Two-Terminal Quantum Well Devices.
AD-A208 238

*CALCOTE, H. F
* * *
Ion-Molecule Reactions in Sooting Acetylene-Oxygen Flames.
AD-A205 792
* * *
Computer Modeling of Soot Formation Comparing Free Radical and Ionic Mechanisms
AD-A206 693

CALLAS, JOHN L.@@@@@
* * *
MPD Thruster Erosion Research.
AD-A205 644

CAMPOS, FRANCIS X
* * *
Multiresonant Spectroscopy and Dynamics of Molecular Extravalent States: State-Resolved Intramolecular Relaxation of NO2 Above 9 eV.
AD-A205 841

*CARPENTER, GAIL A
* * *
Self-Organizing Neural Network Architectures for Real-Time Adaptive Pattern Recognition.
AD-A206 122

*CARPENTER, HILLARY M
* * *
A Characterization of Chlordecone Pretreatment - Altered Pharmacokinetics in Mice.
AD-A208 738

CARUSO, S. C
* * *
Exploitation of Multiple Solutions of the Navier-Stokes Equations to Achieve Radically Improved Flight
AD-A205 939

*CASASENT, DAVID@@@@@
* * *
Associative Processors and Directed Graphs for Optical Processing.
AD-A206 739

*CEREMADE, G. B
* * *
Wavefront Propagation for Reaction Diffusion Systems of PDE.
AD-A207 737

*CHAMPAGNE, FRANK H.@@@@@
* * *
Experimental and Numerical Investigation of Coherent Structures in Turbulent Wake Flows.
AD-A207 866

CHAN, KWAI S
* * *
Study of the Influence of Metallurgical Factors on Fatigue and Fracture of Aerospace Structural Materials.
AD-A206 605

CHANG, CHIA-CHENG@
* * *
Chemical and Oncogene Modulation of Gap Junctional Intercellular Communication.
AD-A206 876

CHANG, CHIA-CHENG
* * *
Altered Regulation of Intercellular Communication by Epidermal Growth Factor, Transforming Growth Factor-Beta and Peptide Hormones in Normal Human Keratinocytes.
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CHANG, TOM
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AD-A206 062

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Computations of Optimal Controls and Designs for Distributed Systems in Optics and Elasticity.
AD-A207 924

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AD-A207 054

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AD-A208 129

CHIANG, C.-H

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AD-A206 438

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AD-A206 591

CHRUSCIEL, JERZY

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AD-A206 643

*CHUDNOVSKY, A

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AD-A205 589

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AD-A208 274

CODRESCU, MIHAIL

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AD-A206 880

COHAN, C. S

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AD-A208 864

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AD-A206 154

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AD-A206 377

*COLE, JULIAN

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Transonic Aerodynamics
AD-A207 109

*COLKET, M. B

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AD-A208 866

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COOK, L. P

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COOPER, B. H
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AD-A208 022

COWEN, ALLEN B
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CURB, PHIL
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Synthesis of Primary-Alcohol-Terminated Polyepichlorohydrin with Molecular Weight of 4000 to 12000.
AD-A207 624

CURTIS, LAWRENCE R
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AD-A205 597

DAHM, THOMAS J
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Demonstration of Oblique Detonation Wave for Hypersonic Propulsion.
AD-A208 268

DANDL, RAPHAEL A
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Efficient Energy Storage and Conversion Using Adiabatic Compression of Relativistic-Electron Plasmas.
AD-A208 657

DANIEL, B. R.@@@@@
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AD-A205 567

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AD-A205 294

DAVE, PARITOSH R
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DAVIDSON, DAVID L
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AD-A206 605

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DELP, EDWARD J
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AD-A208 870

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AD-A205 530
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Mechanism of the Claisen Rearrangement of Allyl Vinyl Ethers.
AD-A205 531

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AD-A206 831

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AD-A206 539

DIXIT, S. N
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AD-A205 387

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AD-A208 025

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AD-A206 206

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AD-A206 732

DORSINVILLE, ROGER
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AD-A206 590

DRESSELHAUS, G.@@@
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AD-A208 487

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DYER, M. J
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AD-A208 576

EATON, J. K
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AD-A207 114

EICHMANN, GEORGE

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AD-A206 101

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AD-A205 967

EISENTHAL, KENNETH B.@@@@

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AD-A206 411

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Ultrafast Chemical Reactions in the Liquid State,
AD-A206 155

*ELCRAT, A.@@@@

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Ideal Jet Flow in Two Dimensions.
AD-A208 275

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EL-FOULY, MOHAMED H

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AD-A206 878

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AD-A207 127

ERSKINE, J. L.@@

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AD-A207 846

EVANS, L. C

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AD-A207 737

EVANS, MARK G

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AD-A206 593

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AD-A206 594

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AD-A205 839

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AD-A205 415

FAETH, G.@@@@@

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AD-A206 237

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AD-A206 468

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AD-A206 694

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AD-A208 576

FARSHCHI, M.@@@@@
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AD-A205 939

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Spectrometric Studies of Gas Phase Collision Processes.
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FENN, JOHN B
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Microjet Burners for Molecular-Beam Sources and Combustion Studies,
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AD-A206 495

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Demodulation Processes in Auditory Perception.
AD-A207 131

FISH, RICHARD
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Synthesis of Primary-Alcohol-Terminated Polyepichlorohydrin with Molecular Weight of 4000 to 12000.
AD-A207 624

*FLAHERTY, JOSEPH E.@@@@@
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Numerical Methods for Singularly Perturbed Differential Equations with Applications.
AD-A207 187

FLANDRO, G. A.@@
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Combustion Instability in Solid Rocket Motors.
AD-A206 843

*FLATAU, PIOTR J
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On the Fundamental Solution of the Radiative Transfer Equation,
AD-A205 361

FLIPPEN-ANDERSON, J. L
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AD-A207 867

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AD-A207 869

FORBES, JEFFREY M
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A Fully Analytic, Low- and Middle-Latitude Ionospheric Model,
AD-A206 880
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Magnetosphere - Thermosphere Coupling: An Experiment in Interactive Modeling,
AD-A206 881

FORRESTER, M. G.@@
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AD-A206 685

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AD-A206 733

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AD-A207 085

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AD-A208 574

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AD-A208 575

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AD-A205 592

FURUHARA, T
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Fundamental Studies of Beta Phase Decomposition Modes in Titanium Alloys.
AD-A205 296

*GABRIELSE, GERALD@@@
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Antiproton and Millimeter Wave Research.
AD-A208 363

*GAD-EL-HAL, MOHAMED@@@@@
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Unsteady Flows Around Three-Dimensional Lifting Surfaces.
AD-A206 331

*GAL-OR, L
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Coating and Impregnation of Carbon-Carbon Composites with Ceramics by Electrophoretic Deposition.
AD-A208 873

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AD-A206 372

GARRETT, B. C
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AD-A206 656

GAUDIELLO, JOHN G
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AD-B130 800

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Effect of Finite Size on Magnetoresistance.
AD A206 234

GEORGE, THOMAS F.@@@@
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AD-A206 883

GERGELY, PETER
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AD-A208 120

*GHONEM, H
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AD-A208 717

GILARDI, R.@@@
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Perceptual Constraints on Understanding Physical Dynamics.
AD-A207 129

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AD-A205 716

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Comparing Free Radical and Ionic Mechanisms.
AD-A206 693

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AD-A205 533

GOLDHAR, JULIUS
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AD-A208 432

*GOOD, W. D.@
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AD-A207 120

GOODSTEIN, D. M
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Versatile Apparatus for Low-Energy and Hyperthermal Energy Ion Scattering Spectroscopies,
AD-A205 832

GORDON, MARK S.@@@@@
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Relative Energies of Silaethylene and Methylsilylene.
AD-A205 368

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An Experimental Investigation of High Lift/High Rate Aerodynamics of an Unsteady Airfoil.
AD-A206 964

GRANT, EDWARD R
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AD-A205 841

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GREVE, DAVID W
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AD-A207 018

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Microjet Burners for Molecular-Beam Sources and Combustion Studies,
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Internal Energy Distribution of OCS Desorbing from a Hot Platinum Surface,
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Neural Networks for Visual Perception in Variable Illumination,
AD-A206 151
* * *
Neural Network Models of Vector Coding, Learning, and Trajectory Formation During Planned and Reactive Arm and Eye Movements.
AD-A206 737

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Stereo Boundary Fusion by Cortical Complex Cells: A System of Maps, Filters, and Feedback Networks for Multiplexing Distributed Data,
AD-A205 507
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Self-Organizing Neural Network Architectures for Real-Time Adaptive Pattern Recognition,
AD-A206 122
* * *
Self-Organizing Neural Architectures for Eye Movements, Arm Movements, and Eye-Arm Coordination,
AD-A206 153
* * *
Solving the Brightness-from-Luminance Problem: A Neural Architecture for Invariant Brightness Perception.
AD-A206 890

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AD-A208 238

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Efficient Energy Storage and Conversion Using Adiabatic Compression of Relativistic-Electron Plasmas.
AD-A208 657

GUZMAN, A
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HALL, R. J
* * *
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AD-A208 866

HALLORAN, JOHN
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Highly Oriented Fiber Reinforced Ceramic Composites.
AD-A208 19

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Geometric Methods with Application to Robust Detection and Estimation.
AD-A206 999

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A RUTCOR Project on Discrete Applied Mathematics.
AD-A208 572

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Recognizing 3 D Objects from 2D images Using Structural Knowledge Base of Genetic Views.
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An Investigation of Estimation Techniques in Optimally Guided Air-to-Air Missiles.
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Magnetosphere - Thermosphere Coupling: An Experiment in Interactive Modeling.
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AD-A207 804

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AD-A205 797

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Problems in Dynamic Phase Transition.
AD-A207 027

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AD-A208 433

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HEGDE, U. G
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AD-A208 286

HEINEMAN, WILLIAM R.@@@
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AD-A205 572

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Autoionization of H2 Induced by a Doubly Excited Triplet State.
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HO, P
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HODGE, JAMES D
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Highly Oriented Fiber Reinforced Ceramic Composites.
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AD-A206 102

HOLMGREN, J. S
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AD-A205 295
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AD-A208 262

HONG, JOHN
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AD-A207 404

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AD-A205 292
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Nuclear Magnetic Resonance and Laser Scattering Techniques at High Pressure,
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AD-A207 115

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AD-A207 624

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AD-A206 595

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AD-A205 360

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KOESTNER, A
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AD-A208 238

KRESS, R
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AD-A205 353

KUNIN, B.@@@

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AD A205 589

KUNISCH, K.@@@

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KUSHNER, HAROLD J

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LAMB, D. M

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AD-A208 433

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AD-A205 413

LAWLEY, KENNETH P

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LEE, L. C.@
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Highly Oriented Fiber Reinforced Ceramic Composites.
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AD-A206 215

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LEMBO, L. J
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AD-A206 980

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Cooperative Phenomena for New Coherent Radiation Sources.
AD-A206 368

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AD-A208 675

MCKOY, V
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AD-A205 387

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AD-A208 129

METIU, HORIA
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AD-A205 423

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AD-A207 817

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AD-A207 878

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AD-A207 629

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AD-A208 657

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AD A208 788
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AD A205 360

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AD-A208 120

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AD-A208 656

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AD-A208 636
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MUNN, B
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AD-A205 598

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AD-A206 102

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AD-A207 093

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AD-A206 234

OH, SAW Y
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AD-A206 871
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AD-A207 111

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AD-A207 113

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AD-A205 718

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AD-A206 289

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AD-A206 730

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AD-A207 185

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AD-A205 603

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AD-A206 239

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Raman Study of Solid State Reactions.
AD-A207 140

PRATT, DAVID T.@@
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AD-A205 605

RAFF, LIONEL M

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AD-A206 384

RANDALL, DONALD S

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RATNER, M. A

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AD-A208 792

READY, DENNIS

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AD-A205 415

REDDY, G. M

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AD-A207 405

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AD-A207 136

REDMON, M. J

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AD-A208 623

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REISLER, HANNA

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AD-A206 676

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AD-A206 062

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REYNOLDS, W. C.@

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AD-A208 720

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AD-A207 812

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AD-A207 110

ROBERTS, FRED S.@@

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AD-A208 572

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AD-A205 532

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AD-A208 377

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AD-A205 567

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RUSK, EDWIN T
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SALTER, E. A
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AD-A205 833

SAMARAWEERA, UPASIRI
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AD-A206 643

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AD-A208 587

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AD-A206 591

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AD-A208 866

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AD-A206 238
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AD-A208 119

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*SERVE, M. P
* * *
A Study of the Nephrotoxicity and Metabolism of Tetralin and Indan in Fischer 344 Rats.
AD-A208 588

*SEYFERTH, DIETMAR@@@
* * *
Organosilicon Compounds and Polymers and Silicon Ceramics.
AD-A206 589

SHAH, SURENDRA P.@@@@
* * *
Dynamic Response of Embedded Structures.
AD-A206 682

SHALEV, DORON@@@
* * *
Investigation and Modeling of Damage Growth in Composite Laminates.
AD-A207 623

SHAMROTH, S. J
* * *
Reciprocal Interactions of Hairpin-Shaped Vortices and a Boundary Layer.
AD-A206 980

*SHEARER, MICHAEL@@@@
* * *
Nonlinear Systems of Conservation Laws.
AD-A205 837

*SHELTON, W. W.@@@@
* * *
Investigation of Radio Frequency/Microwave Effects Upon the Central Nervous System.
AD-A207 188

SHORTER, J. A
* * *
Reactions of Laser-Generated CF2 (Free Radicals) on Silicon and Silicon Oxide Surfaces.
AD-A206 599

*SHREVE, STEVEN E.@
* * *
Singular and Bang Bang Stochastic Control.
AD-A208 627

*SIBENER, S. J.@@@@
* * *
Dynamics of Gas-Surface Interactions.
AD-A206 210

SIEGEL, HOWARD J
* * *
The Mapping of Parallel Algorithms to Reconfigurable Parallel Architectures.
AD-A208 870

SIMKOVICH, G.@@@@
* * *
High Temperature Oxidation Studies on Alloys Containing Dispersed Phase Particles and Clarification of the Mechanism of Growth of SiO2.
AD-A207 161

*SIMO, J. C.@
* * *
Mathematical Modeling and Numerical Simulation of the Dynamics of Flexible Structures Subject to Large Overall Motions.
AD-A207 004

SIMONSEN, LEIF
* * *
Metal/Metallion System in Low Temperature Molten Salts.
AD-A208 025

*SIRIGNANO, W. A
* * *
Fundamental Studies on Spray Combustion and Turbulent Combustion.
AD-A206 438

SLEIGHT, STUART D.@@
* * *
Anchored Cell Analysis/Sorting Coupled with the Scrape-Loading/Dye Transfer Technique to Quantify Inhibition of Gap-Junctional Intercellular Communication in WB-F344 Cells by 2,2',4,4',5,5'-Hexabromobiphenyl.
AD-A206 873
* * *
Effects of Hepatic Tumor Promoters Phenobarbital and Polybrominated Biphenyls on Intercellular Communication between Rat Liver Epithelial Cells.
AD-A206 875

SLUD, E.@@@
* * *
Binary Time Series.
AD-A208 679

SMENTEK-MIELCZAREK, LIDIA
* * *
Perturbative Corrections to Basis Incompleteness in Molecular SCF Calculations.
AD-A206 593

*SMITH, C. R
* * *
Three-Dimensional Vortex Interactions in Turbulent Boundary Layers.
AD-A208 624

*SMITH, KEVIN E.@@@
* * *
Admittance Modeling of Structures with Active Controls.
AD-A207 874

SMOLENSKY, M
* * *
Annual Review of Chronopharmacology. Volume 5.
AD-A206 148

*SO, JEUNG-HO
* * *
Reductive Coupling of Carbonyl Compounds with Zinc and Trimethylchlorosilane to Produce O Silylated Pinacols. Effect of Ultrasonic Waves.
AD-A206 289

SOINILA, SEPPO O.@@@@@
* * *
Evidence for Chaos in Spike Trains of Neurons That Generate Rhythmic Motor Patterns.
AD-A208 625

*SOMASUNDARAN, P
* * *
Excited-State Resonance Raman Spectroscopy as a Probe of Alumina-Sodium Dodecyl Sulfate Hemimicelles.
AD-A205 359

SONTAG, EDUARDO D
* * *
Applications of Graph Theory and System Theory to Large Scale Systems.
AD-A207 110
* * *
Regulation of Nonlinear and Generalized Linear Systems.
AD-A207 725

*SOORIYAKUMARAN, RATNASABAPATHY
* * *
Convenient Routes to Di-tert-butylsilanediyl: Chemical, Thermal and Photochemical Generation.
AD-A206 643

SOSA, CARLOS
* * *
Theory and Implementation of the MBPT Density Matrix. An Application to One-Electron to One Electron Properties.
AD-A205 833

SOUGANIDIS, P. E
* * *
Wavefront Propagation for Reaction-Diffusion Systems of PDE.
AD-A207 737

*SPILLAR, E. J.@@@@
* * *
Ground-Based Infrared Observations of Sources Discovered by the AFGL, FIRRSE and IRAS Infrared Surveys.
AD-A206 335

*SRIVASTAVE, S
* *
Pressure Effect on the Product Distribution in Competing Reactions: Formation of a Bis Diels Alder Adduct Via an Aromatizable Intermediate,
AD-A207 867

STEINFELD, J. I.@@@@
* * *
Reactions of Laser-Generated CF2 (Free Radicals) on Silicon and Silicon Oxide Surfaces.
AD-A206 599

STEPHENS, GRAEME L.@@@@@
* * *
On the Fundamental Solution of the Radiative Transfer Equation,
AD-A205 361

STINCHCOMB, W. W
* * *
Investigation and Modeling of Damage Growth in Composite Laminates.
AD-A207 623

STONE, F. G.@@@@
* * *
Chemistry of Polynuclear Metal Complexes with Bridging Carbene or Carbyne Ligands. Part 83. Molybdenum and Tungsten Complexes Containing the Alkylidyne Group C(eta6-C6H4(OMe-2)Cr(CO)3),
AD-A206 495

STRIFFLER, CHARLES D
* * *
Studies of the Propagation of Short Burst, High Power Microwave Radiation through Neutral and Ionized Media.
AD-A208 664

*STWALLEY, WILLIAM C.@@@@
* * *
Partial Support of the International Laser Science Conference (3rd) Held in Atlantic City, New Jersey on 1-4 November 1987.
AD-A206 812

SUTER, S
* * *
Dieldrin Inhibition of Gap Junctional Intercellular Communication in Rat Glial Cells as Measured by the Fluorescence Photobleaching and Scrape Loading/Dye Transfer Assays,
AD-A206 878

*SWAMINATHAN, P. K
* * *
Calculation of Kinetic Data for Processes Leading to UV Signatures
AD-A206 656

*SYMKO, OREST G.@@@
* * *
Fluxons and Order in Long Josephson Junctions.
AD-A207 925

SZABO, A
* * *
CO Adsorption on Pt(111) Modified with Sulfur,
AD-A205 838

SZABO, ANDRAS
* * *
Observation of Adsorbate Vibrational Amplitude Modification during a Phase Transformation in the Overlayer,
AD-A206 338

TANG, S. Y.@@
* * *
Low Energy Atomic Collisions.
AD-A207 216

TATCHYN, ROMAN O.@@
* * *
Ultrasmall Holographic X-Ray Gratings Using Synchrotron Radiation and X-Ray Lithographic Techniques.
AD-A206 731

*TAYLOR, GERALD D.@
* * *
Data Fitting.
AD-A207 086

TELLINGHUISEN, JOEL@@@@
* * *
Ab Initio Study of Excited States of CN- Stabilized in Point-Charge Lattices,
AD-A205 839

*TELLINGHUISEN, JOEL
* * *
Reduced Potential-Energy Curves for Diatomic Molecules,
AD-A206 206

THOMPSON, A. W.@
* * *
Environmental Effects in Niobium Base Alloys and Other Selected Intermetallic Compounds.
AD-A206 072

THOMPSON, DONALD L
* * *
A Perturbation-Trajectory Method for the Study of Gas-Surface Collision Dynamics,
AD-A207 816

*THORNWALD, HERBERT@@
* * *
Three-Dimensional Structure of Boundary Layers in Transition to Turbulence.
AD-A205 587

THORP, JAMES S
* * *

Nonlinear Dynamics and Control of Flexible Structures.
AD A208 120

THRALL, ROBERT M.@

* * *

Workshop on Decision Information for Tactical Command and Control.
AD A208 569

TILLEY, T D

* * *

Reactions of (eta 5-C5H5)(eta 5-C5Me5)Zr(Si(SiMe3)3)X (X = Cl, M Complexes with Carbon Monoxide and the Isocyanide 2,6-Me2C6H3NC. Crystal Structure of (eta 5-C5H5)-(eta 5 C5Me5)Zr(eta 2-C(N 2,6-Me2C6H3)Si(SiMe3)3)Cl,
AD A206 494

TODOROVIC, DEJAN@@@@

* * *

Solving the Brightness-from-Luminance Problem: A Neural Architecture for Invariant Brightness Perception.
AD A206 890

TOONG, TAU-YI@@@@@

* * *

Basic Instability Mechanisms in Chemically Reacting Subsonic and Supersonic Flows.
AD A206 669

TOURETZKY, DAVID

* * *

Proceedings of the Connectionists Models Summer School Held in Pittsburgh, Pennsylvania on June 17-26, 1988
AD A207 014

TREFETHEN, LLOYD N.@@@@@

* * *

Numerical Conformal Mapping and Applications
AD A205 602

TREISMAN, AN

* * *

Visual Information-Processing in the Perception of Features and Objects.
AD-A206 948

TRIGGIANI, R.@

* * *

Increasing the Margin of Stability of Arbitrarily Finite Modes of Flexible Large Space Structures with Damping.
AD-A206 487

TROSKO, JAMES E

* * *

Altered Regulation of Intercellular Communication by Epidermal Growth Factor, Transforming Growth Factor-Beta and Peptide Hormones in Normal Human Keratinocytes,
AD-A206 871

* * *

Inhibited of Gap Junctional Blockage by Palmitoyl Carnitine and *TMB-8 in a Rat Liver* Epithelial Cell Line,
AD-A206 872

* * *

Anchored Cell Analysis/Sorting Coupled with the Scrape-Loading/Dye Transfer Technique to Quantify Inhibition of Gap-Junctional Intercellular Communication in WB-F344 Cells by 2,2',4,4', 5,5'-Hexabromobiphenyl,
AD-A206 873

* * *

Effects of Hepatic *Tumor Promoters* Phenobarbital and Polybrominated Biphenyls on Intercellular Communication between Rat Liver Epithelial Cells,
AD-A206 875

* * *

Chemical and Oncogene Modulation of Gap Junctional Intercellular Communication,
AD A206 876

* * *

Nongenotoxic Mechanisms in Carcinogenesis: Role of Inhibited Intercellular Communication,
AD-A206 877

* * *

Dieldrin Inhibition of Gap *Junctional* Intercellular Communication in Rat Glial Cells as *Measured by the Fluorescence* Photobleaching and Scrape Loading/Dye Transfer Assays,
AD-A206 878

TROSKO, JAMES E.@@

* * *

A Failed Paradigm: Carcinogenesis Is More Than Mutagenesis,
AD-A206 874

* * *

The Role of Chemical Inhibition of Gap-Junctional Intercellular Communication in *Toxicology*.
AD-A207 130

TRUCKS, GARY W

* * *

Theory and Implementation of the MBPT Density Matrix. An Application to One-Electron to One-Electron Properties,
AD-A205 833

TURRO, NICHOLAS J

* * *

Excited-State Resonance Raman Spectroscopy as a Probe of Alumina-Sodium Dodecyl Sulfate Hemimicelles.
AD-A205 359

TWORZYDLO, W. W

* * *

Computational Methods for Nonlinear Dynamic Problems in Solid and Structural Mechanics: Progress in the Theory and Modeling of Friction and in the Control of Dynamical Systems with Frictional Forces.
AD-A208 763

TYRRELL, DEBRA

* * *

Research Proposal Quarterly Status Report for July September 1988,
AD-A206 810

ULRICH, DONALD R.@@@@
* * *
Symposium: Better Ceramics Through Chemistry III. Volume 121.
AD-A207 128

UM, C. I @@@
* * *
Effect of Finite Size on Magnetoresistance,
AD-A206 234

VALTAZANOS, P
* * *
Excited Molecules and Clusters in Solid Media. Hydrogen and Tetrahydrogen in Ionic Crystals,
AD-A208 024

*VAN VECHTEN, JAMES A
* * *
Point Defects in Semiconductors: Microscopic Identification, Metastable Properties, Defect Migration, and Diffusion.
AD-A206 947

VAN WAZER, JOHN R.@
* * *
Ab Initio Studies of Molecular Structures and Energies. 2. Energies and Stabilities of PH(n), SH(n), and ClH(n) Compounds,
AD-A206 594

*VARADHAN, S. R.@@@
* * *
Conference on Mathematical Frontiers and the Physical World.
AD A208 681

*VARGA, R. S
* * *
Investigations in Improved Iterative Methods for Solving Sparse Systems of Linear Equations
AD A207 266

VIDYASAGAR, V
* * *
Pressure Effect on the Product Distribution in Competing Reactions: Formation of a Bis Diels *Alder Adduct Via an Aromatizable* Intermediate,
AD-A207 867

WADE, M.@@@
* * *
Altered Regulation of Intercellular Communication by Epidermal Growth Factor, Transforming Growth Factor Beta and Peptide Hormones in Normal Human Keratinocytes,
AD-A206 871

WAGER, JOHN F.@@@
* * *
Point Defects in Semiconductors: Microscopic Identification, Metastable Properties, Defect Migration, and Diffusion.
AD-A206 947

*WALKER, DANIEL A
* * *
Po/So Phases: Propagation Velocity Across a 1,500-km-Long, Deep Ocean Hydrophone Array,
AD-A208 783

WALKER, J. D.@@@
* * *
Three-Dimensional Vortex Interactions in Turbulent Boundary Layers.
AD-A208 624

*WALKER, N. A
* * *
Self Diffusion in the Compressed, Highly Viscous Liquid 2-Ethylhexyl Benzoate,
AD-A205 294

*WAND, WEI
* * *
Use of Four-Dimensional Data Assimilation by Newtonian Relaxation and Latent-Heat Forcing to Improve a Mesoscale-Model Precipitation Forecast: A Case Study,
AD-A208 573

*WANG, W. C
* * *
Electron Attachment Rate Constants of HBr, CH3Br, and C2H5Br in N2 and Ar,
AD-A208 682

WARNER, THOMAS T.@@@@
* * *
Use of Four-Dimensional Data Assimilation by Newtonian Relaxation and Latent-Heat Forcing to Improve a Mesoscale-Model Precipitation Forecast: A Case Study,
AD-A208 573

WATSON, WILLIAM H
* * *
Lewis Acid Promoted Reactions of Substituted Pentacyclo(5.4.0.0(2,6).0(3,10).0(5,9)undecane-8,11-diones with Ethyl Diazoacetate,
AD-A207 858
* * *
Cycloaddition of Anion Derived Homophthalic Anhydride to cis,cisoid,cis-Tricyclo(6.3.0.0(2,6))undeca-4,9-diene-3,11-dione. Aromatization as a Driving Force for Intramolecular Sigmatropic Hydrogen Transfer,
AD-A207 860
* * *
The Structures of Three Strained Cage Molecules,
AD-A207 868
* * *
Boron Trifluoride Mediated Reaction of *1,9-Dihalopentacyclo*(5.4.0.0(2,6).0(3,10).0(5,9)undecane-8,11-diones with Ethyl Diazoacetate: A Novel Synthetic Entry into the Cyclopent(a)indene Ring System,

AD-A207 870

WEBER, WILLIAM P.@@@@@@
* * *
Birch Reduction of the Dichlorocarbene Adduct of poly(1,1-dimethyl-1-sila-cis-pent-3-ENE)(C12C-1): Synthesis and Characterization of poly(1,1-dimethyl-3,4-methylene-1-sila-cis-pent-3-ene) (CH2-1),
AD-A208 023

WEBER, WILLIAM P.@@@
* * *
Synthesis and Photodegradation of Poly(2,5, bis(dimethylsilyl)thiophene),
AD-A208 802

WEI, WEN-CHENG J
* * *
Highly Oriented Fiber Reinforced Ceramic Composites.
AD-A208 119

•WEIL, FRANCIS J.@@
* * *
Expert Systems for the Scheduling of Image Processing Tasks on a Parallel Processing System.
AD-A208 613

•WEISS, GEORGE@
* * *
Representation of Shift Invariant Operators on L2 by H at Infinity Transfer Functions. An Elementary Proof, a Generalization to L Rho and a Counterexample for L at Infinity,
AD-A207 736

WEISSHAAR, T. A.@@@@@@
* * *
Optimum Aeroelastic Characteristics for Composite Supermaneuverable Aircraft.
AD-A205 503

WELCH, LESLIE@@@@

* * *
Is There a Constancy for Velocity?
AD-A208 675

WHINSTON, ANDREW@@@
* * *
The Mapping of Parallel Algorithms to Reconfigurable Parallel Architectures.
AD-A208 870

WHITE, M. G
* * *
Circular Dichroism in Photoelectron Angular Distributions from Two-Color (1+1) REMPI (Resonantly Enhanced Multiphoton Ionization) of NO.
AD-A205 387

•WHITELEY, S. R.@@@
* * *
MM - Wave Components - SIS (superconductor-Insulator-Superconductor) Mixers.
AD-A208 632

WIEDMANN, RALPH T
* * *
Multiresonant Spectroscopy and Dynamics of Molecular Extravalent States: State-Resolved Intramolecular Relaxation of NO2 Above 9 eV,
AD-A205 841

•WILLIAMS, F. A.@@@
* * *
Fundamental Combustion Studies Related to Air-Breathing Propulsion.
AD-A207 186

•WINOGRAD, NICHOLAS@@
* * *
Studies on Ions and Neutrals Desorbed from Solid Surfaces by Ion and Electron Bombardment.
AD-A206 734

•WITTIG, CURT
* * *
State to State Collision Induced Dissociation and Gas/Surface Interactions.
AD-A206 676

WOLFE, JAMES F.@@@
* * *
Reaction Kinetics and Chemo-Rheology of Poly(p-phenylenebenzobisthiazole) Polymerization in the Ordered Phase,
AD-A206 591

WONG, G. K.@@@@@
* * *
Persistent, Efficient Frequency Doubling by Poled Annealed Films of a Chromophore-Functionalized Poly(p-hydroxystyrene),
AD-A208 790

WONG, GEORGE K.@@@
* * *
Poled Polymeric Nonlinear Optical Materials. Enhanced Second Harmonic Generation Stability of Cross-Linkable Matrix/Chromophore Ensembles,
AD-A208 791

XIN, XU
* * *
Reactions of Laser-Generated CF2 (Free Radicals) on Silicon and Silicon Oxide Surfaces.
AD-A206 599

•YAMAGUCHI, YUKIO
* * *
The Anharmonic Force Fields of Silyl Fluoride and Silyl Chloride,
AD-A208 779

•YAMAMOTO, YUTAKA@@@@
* * *
Some Remarks on Reachability of Infinite-Dimensional Linear Systems.
AD-A207 112

YAN, R
* * *
High Temperature Oxidation Studies on Alloys Containing Dispersed Phase Particles and Clarification of the Mechanism of Growth of SiO2
AD-A207 161

YANG, J
* * *
Persistent, Efficient Frequency Doubling by Poled Annealed Films of a Chromophore-Functionalized Poly(p hydroxystyrene),
AD-A208 790

YANG, J.@@
* * *
Poled Polymeric Second Harmonic Generation Materials. Chemical Manipulation of the Temporal Characteristics of Electric Field-Induced Noncentrosymmetry,
AD-A208 788

YANG, JIAN
* * *
Poled Polymeric Nonlinear Optical Materials. Enhanced Second Harmonic Generation Stability of Cross-Linkable Matrix/Chromophore Ensembles,
AD-A208 791

YARKONY, DAVID R.@@
* * *
On the Electronic Structure of the He + H2 System: Characterization of, and Nonadiabatic Interactions between, the 1 1A' and 2 1A' potential Energy Surfaces,
AD-A205 835

YARKONY, DAVID R.@
* * *
Spin-Forbidden Radiative Decay Involving Quasidegenerate States. Application to the Beta 1 Sigma+ Yields a 3 Pi Transition in MgO,
AD A205 836

YATES, J. T., JR@
* * *
CO Adsorption on Pt(111) Modified with Sulfur,
AD-A205 838

YATES, JOHN T., JR@@@@@
* * *
Observation of Adsorbate Vibrational Amplitude Modification during a Phase Transformation in the Overlayer,
AD-A206 338

YE, C
* * *
Poled Polymeric Second Harmonic Generation Materials. Chemical Manipulation of the Temporal Characteristics of Electric Field Induced Noncentrosymmetry,
AD-A208 788
* * *
Persistent, Efficient Frequency Doubling by Poled Annealed Films of a Chromophore-Functionalized Poly(p hydroxystyrene),
AD-A208 790
* * *
Approaches to Polymeric Nonlinear Optical Materials. Theoretical and Synthetic Design Strategies,
AD-A208 792

YETTER, R.@@@@
* * *
Lumped Model Generation and Evaluation: Sensitivity and Lie Algebraic Techniques with Applications to Combustion,
AD-A206 683

YEUNG, P. K
* * *
An Algorithm for Tracking Fluid Particles in Numerical Simulations of Homogeneous Turbulence,
AD A206 239

YIH, H. R
* * *
Investigation and Modeling of Damage Growth in Composite Laminates.
AD-A207 623

YORKE, JAMES@@
* * *
Theoretical Investigations of Chaotic Dynamics.
AD-A207 724

YOUN, CHUNG
* * *
Synthesis of Primary-Alcohol-Terminated Polyepichlorohydrin with Molecular Weight of 4000 to 12000.
AD-A207 624

YU, JEFF
* * *
Acoustooptic Processing of Two Dimensional Signals Using Temporal and Spatial Integration.
AD-A208 686

ZENG, M.@@
* * *
Probabilistic Description of Fatigue Crack Growth Under Constant- and Variable-Amplitude Loading.
AD-A208 717

ZEWAIL, A. H.@@@@
* * *
Femtochemistry of the Reaction: IHgI+ Yields (IHg...I)+ Yields HgI + I,
AD-A208 648

ZEWAIL, AHMED H
* * *
Molecular State Evolution after Excitation with an Ultra-Short Laser Pulse: A Quantum Analysis of NaI and NaBr Dissociation,
AD-A205 423

ZEWAIL, AHMED H.@@@
* * *
Femtosecond Real-Time Probing of Reactions. 3. Inversion to the

Potential from Femtosecond Transition-State Spectroscopy Experiments,
AD-A206 680

*ZEWAIL, AHMED H.@@
* * *
Laser Femtochemistry,
AD-A205 357

ZEWAIL, AHMED H.@
* * *
Femtosecond Real-Time Probing of Reactions. 2. The Dissociation Reaction of ICN,
AD-A205 567

*ZHANG, DA-LIN *
* * *
Numerical Simulation of the Meso-Beta Scale Structure and Evolution of the 1977 Johnstown Flood. Part 3. Internal Gravity Waves and Squall Line,
AD-A208 574
* * *
A Numerical Investigation of a Convectively Generated, Inertially Stable, Extratropical Warm-Core Mesovortex Over Land. Part 1. Structure and Evolution,
AD-A208 575

ZHOU, JIANXIN@@
* * *
Computations of Optimal Controls and Designs for Distributed Systems in Optics and Elasticity.
AD-A207 924

*ZHOU, QINGSHAN
* * *
Birch Reduction of the Dichlorocarbene Adduct of poly(1,1-dimethyl-1-sila-cis-pent 3-ENE)(C12C-1): Synthesis and Characterization of poly(1,1-dimethyl-3,4 methylene-1 sila-cis-pent-3-ene) (CH2-1),
AD A208 023

ZIEGLER, F.@@
* * *
Transonic Aerodynamics.
AD-A207 109

ZINN, A.@@@
* * *
Two Methods for Solving the Inverse Acoustic Scattering Problem.
AD-A205 360

*ZINN, B. T
* * *
Investigation of the Flame-Acoustic Wave Interaction during Axial Solid Rocket Instabilities.
AD-A207 929

ZOEBISCH, EVE G.@
* * *
Extension of AM1 to the Halogens,
AD-A205 530

ZWANZIGER, JOSEF W
* * *
Multiresonant Spectroscopy and Dynamics of Molecular Extravalent States: State-Resolved Intramolecular Relaxation of NO2 Above 9 eV,
AD-A205 841

REPORT NUMBER INDEX

89-9S52-INFSC-R1
AD-A206 685

1171-000-22-00211-06-194
AD-A207 093

AEROCHEM-TP-454-B
AD-A205 792

AEROCHEM-TP-482
AD-A206 693

AFGL-TR-88-0250
AD-A206 062

$AFOSR-87-0137
AD-A207 814

AFOSR-TR
AD-A207 811

AFOSR-TR-87-1886
AD-A207 872

AFOSR-TR-87-2033
AD-A208 840

AFOSR-TR 88-0250
AD-A206 062

AFOSR-TR-88-1253
AD-A207 623

AFOSR-TR-88-1317
AD-A205 833

AFOSR-TR-89-0076
AD-A205 837

AFOSR-TR-89-0127
AD-A205 503

AFOSR-TR-89-0140
AD-A206 100

AFOSR-TR-89-0152
AD-A205 564

AFOSR-TR 89 0159
AD A205 566

AFOSR-TR-89-0160
AD-A205 567

AFOSR-TR-89-0161
AD A205 565

AFOSR-TR-89-0164
AD-A205 368

AFOSR-TR-89-0178
AD-A205 387

AFOSR-TR-89-0195
AD-A206 486

AFOSR-TR-89-0217
AD-A206 922

AFOSR-TR-89-0232
AD-A205 989

AFOSR-TR-89-0233
AD-A205 987

AFOSR-TR-89-0234
AD-A206 101

AFOSR-TR-89-0235
AD-A205 296

AFOSR-TR-89-0236
AD-B130 800

AFOSR-TR-89-0237
AD-A205 835

AFOSR-TR-89-0238
AD-A205 836

AFOSR-TR-89-0239
AD A205 839

AFOSR-TR-89-0240
AD A205 832

AFOSR-TR-89-0241
AD A205 988

AFOSR TR-89-0242
AD A206 831

AFOSR-TR-89-0244
AD-A205 361

AFOSR-TR-89-0247
AD-A205 294

AFOSR-TR-89-0248
AD-A205 295

AFOSR-TR-89-0249
AD-A205 293

AFOSR-TR-89-0250
AD-A206 832

AFOSR-TR-89-0251
AD-A206 654

AFOSR-TR-89-0253
AD-A208 262

AFOSR-TR-89-0255
AD-A205 414

AFOSR-TR-89-0256
AD-A205 840

AFOSR-TR-89-0257
AD-A205 360

AFOSR-TR-89-0259
AD-A205 358

AFOSR-TR-89-0260
AD-A205 359

AFOSR-TR-89-0261
AD-A205 834

AFOSR-TR-89-0263
AD-A205 292

AFOSR-TR-89-0264
AD-A205 413

AFOSR-TR-89-0265
AD-A205 415

AFOSR-TR-89-0266
AD-A205 525

ABSTRACTS

TITLE INDEX

2,3:6,7-Bis(2'3'-quinolino)pentacyclo(6.5.0.0(4,12).0(5,10).0(9,13)tridecane,
AD-A207 859

(3 + 2) Resonance Enhanced Multiphoton Ionization of I and Br Formed from the Infrared Multiphoton Decomposition of CF3I and CF3Br,
AD-A205 537

27Al and 29Si NMR (Nuclear Magnetic Resonance) Study of Sol-Gel Derived Aluminosilicates and Sodium Aluminosilicates,
AD-A208 262

Ab Initio Studies of Molecular Structures and Energies. 2. Energies and Stabilities of PH(n), SH(n), and ClH(n) Compounds,
AD-A206 594

Ab Initio Study of Excited States of CN- Stabilized in Point-Charge Lattices,
AD-A205 839

Acoustooptic Processing of Two Dimensional Signals Using Temporal and Spatial Integration.
AD-A208 686

Active Control of Flexible Space Structures Using the Nitinol Shape Memory Actuators.
AD-A205 948

Addition of Dichlorocarbene to Poly(1,1-dimethyl-1-sila-cis-pent-3-ene) and Poly(1,1-dimethyl-1-silia-cis (and trans)-pent-3-ene. Characterization of Microstructures by 13C and 29Si NMR,
AD-A207 847

Admittance Modeling of Structures with Active Controls.
AD-A207 874

Al and Mg Alloys for Aerospace Applications Using Rapid Solidification and Powder Metallurgy Processing..
AD-A207 085

An Algorithm for Tracking Fluid Particles in Numerical Simulations of Homogeneous Turbulence,
AD-A206 239

Alkali-Rare Gas and Metal Halide Molecules as Potential Visible Lasers.
AD-A207 114

Altered Regulation of Intercellular Communication by Epidermal Growth Factor, Transforming Growth Factor Beta and Peptide Hormones in Normal Human Keratinocytes,
AD-A206 871

Analysis and Numerical Analysis of Some Properly and Improperly Posed Problems in Applied Mathematics.
AD-A208 633

Anchored Cell Analysis/Sorting Coupled with the Scrape-Loading/Dye Transfer Technique to Quantify Inhibition of Gap-Junctional Intercellular Communication in WB-F344 Cells by 2,2',4,4', 5,5'-Hexabromobiphenyl,
AD-A206 873

The Anharmonic Force Fields of Silyl Fluoride and Silyl Chloride,
AD-A208 779

Annual Review of Chronopharmacology. Volume 5
AD-A206 148

Antiproton and Millimeter Wave Research.
AD-A208 363

Application of Multi-Channel Hough Transform to Stereo Vision.
AD-A207 937

Applications of Functional Analytical Methods to Problems in Queueing Network Theory and Reliability Theory.
AD-A208 736

Applications of Graph Theory and System Theory to Large Scale Systems.
AD-A207 110

Approaches to Polymeric Nonlinear Optical Materials. Theoretical and Synthetic Design Strategies,
AD-A208 792

Associative Processors and Directed Graphs for Optical Processing.
AD-A206 739

Asynchronous Optical Sampling for Laser-Based Combustion Diagnostics in High-Pressure Flames.
AD-A207 003

Autoionization of H2 Induced by a Doubly Excited Triplet State.
AD-A205 565

An Averaging Method for Stochastic Approximations with Constant Parameters: Small Parameter Values,
AD-A208 622

Basic Instability Mechanisms in Chemically Reacting Subsonic and Supersonic Flows.
AD-A206 669

Basic Research on Processing of Ceramics for Space Structures.
AD-A205 954

Bifurcating Jets at High Reynolds Numbers.
AD-A205 718

Binary Time Series.
AD-A208 679

Birch Reduction of the Dichlorocarbene Adduct of poly(1,1-dimethyl-1-sila-cis-pent-3-ENE)(C12C-1): Synthesis and Characterization of poly(1,1-dimethyl-3,4-methylene-1-sila-cis-pent-3-ene) (CH2-1).
AD-A208 023

Boron Trifluoride Mediated Reaction of 1,9-Dihalopentacyclo(5.4.0.0(2,6).0(3,10).0(5,9)undecane-8,11-diones with Ethyl Diazoacetate: A Novel Synthetic Entry into the Cyclopent(a)indene Ring System.
AD-A207 870

Calculation of Kinetic Data for Processes Leading to UV Signatures.
AD-A206 656

Carbonylation Chemistry of the Tantalum Silyl (Eta5-C5Me5)Cl3TaSiMe3. Synthesis, Characterization, and Reaction Chemistry of (Eta5-C5Me5)Cl3Ta(Eta2 COSiMe3) and Derivatives.
AD-A205 358

Chaotic Response of Aerosurfaces with Structural Nonlinearities.
AD-A208 433

A Characterization of Chlordecone Pretreatment - Altered Pharmacokinetics in Mice.
AD-A208 738

Charged Slurry Droplet Research.
AD-A206 946

Chemical and Oncogene Modulation of Gap Junctional Intercellular Communication.
AD-A206 876

Chemistry of Polynuclear Metal Complexes with Bridging Carbene or Carbyne Ligands. Part 83 Molybdenum and Tungsten Complexes Containing the Alkylidyne Group C(eta6-C6H4(OMe-2)Cr(CO)3).
AD-A206 495

Chemistry of Polynuclear metal complexes with Bridging Carbene or Carbyne Ligands. Part 84. Carbarorane Tungsten Platinum Complexes having a Mu-CC6H3ME(2)-2,6 Ligand: Crystal Structures of (WPt(MU- CC6H3ME(2)-2,6)(CO)N-(Pet3)(MU-Alp;ha:ETA5-C2B9HMe2)(N-2 or 3).
AD-A206 414

Circular Dichroism in Photoelectron Angular Distributions from Two-Color (1+1) REMPI (Resonantly Enhanced Multiphoton Ionization) of NO.
AD-A205 387

Cloud/Cryosphere Interactions.
AD-A208 377

CO Adsorption on Pt(111) Modified with Sulfur.
AD-A205 838

Coating and Impregnation of Carbon Carbon Composites with Ceramics by Electrophoretic Deposition.
AD-A208 873

Collaborative Experimental and Theoretical Study of the Photodissociation and Reactions of the Azide Radical.
AD-A205 597

Combustion Instability in Solid Rocket Motors.
AD A206 843

Components of High-Level Vision: A Cognitive Neuroscience Analysis and Accounts of Neurological Syndromes
AD A207 848

Computation and Theory in Nonlinear Optimization.
AD A207 610

Computational Determination of the Structures and Some Properties of Tetrahedrane, Prismane, and Some of Their Aza Analogues.
AD-A205 603

Computational Methods for Nonlinear Dynamic Problems in Solid and Structural Mechanics: Progress in the Theory and Modeling of Friction and in the Control of Dynamical Systems with Frictional Forces.
AD-A208 763

Computations of Optimal Controls and Designs for Distributed Systems in Optics and Elasticity.
AD-A207 924

Computer Modeling of Soot Formation Comparing Free Radical and Ionic Mechanisms.
AD-A206 693

Conductive and Optically Non-Linear Polymeric Langmuir-Blodgett Films of Poly(3-Dodecylthiophene).
AD-A205 529

Conductive Polymers Based upon Rigid-Rod Ultrahigh-Modulus Macromolecules. Electrochemical Doping of Poly(p-phenylenebenzobisthiazole-2,6-diyl) (PBT).
AD-A208 789

Conference on Mathematical Frontiers and the Physical World.
AD-A208 681

Connectionist Networks Learn to Transmit Chaos.
AD-A208 642

Control and System Theory, Optimization, Inverse and Ill-Posed Problems.
AD-A208 570

Convenient Routes to Di-tert-

butylsilanediyl: Chemical, Thermal and Photochemical Generation.
AD-A206 643

Convergence and Performance of Synchronous and Asynchronous Parallel and Conventional Iterative Methods.
AD-A207 093

Cooperative Phenomena for New Coherent Radiation Sources.
AD-A206 368

Coordinated Noninvasive Studies (CNS) Project.
AD-A205 413

Cycloaddition of Anion Derived Homophthalic Anhydride to cis,cisoid,cis-Tricyclo(6.3.0.0(2,6))undeca-4,9-diene-3,11-dione. Aromatization as a Driving Force for Intramolecular Sigmatropic Hydrogen Transfer.
AD-A207 860

Data Fitting.
AD-A207 086

A Deep Optical Infrared Survey.
AD A207 930

Demodulation Processes in Auditory Perception.
AD-A207 131

Demonstration of Oblique Detonation Wave for Hypersonic Propulsion.
AD-A208 268

Dense Plasma Jet Propagation for Endoatmospheric Ballistic Missile Defense.
AD-A208 655

Description and Manipulation of Membrane Lipid Alterations Associated with Synaptic Functions in Isolated Cerebellar Glomeruli.
AD A206 732

Design of Experiments and Reliability Models.
AD-A207 108

Design Optimization of Systems Governed by Partial Differential Equations. Phase 1.
AD-A207 812

The Determination of Rate-Limiting Steps during Soot Formation.
AD-A208 866

Development and Analysis of Arma Parameter Estimation Schemes in the Presence of Noise.
AD-A205 598

Development of Adaptive Grid Schemes Based on Poisson Grid Generators.
AD-A206 922

Development of Practical MO techniques for Prediction of the properties and Behaviour of Materials.
AD-A206 831

Dieldrin Inhibition of Gap Junctional Intercellular Communication in Rat Glial Cells as Measured by the Fluorescence Photobleaching and Scrape Loading/Dye Transfer Assays.
AD-A206 878

Differential Equations and Continuum Mechanics.
AD-A208 637

Differential Equations, Related Problems of Pade Approximations and Computer Applications.
AD A207 888

Differential Equations, Related Problems of Pade Approximations and Computer Applications.
AD A208 590

A Dilogarithmic Extension of Liouville's Theorem on Integration in Finite Terms.
AD-A206 681

The Dimension of Attractors Underlying Turbulent Poiseuille Flow.
AD-A206 021

Dynamic Response of Embedded Structures.
AD-A206 682

Dynamics of Excited High-Lying States of H2 and D2.
AD-A206 936

Dynamics of Gas-Surface Interactions.
AD-A206 210

Effective Behavior of Composite Materials.
AD-A207 113

Effect of Chemical Mutagens on Herpes Virus - Induced Cellular Transformation and Testing for Mutagenesis in Mouse Cells.
AD-A207 137

Effect of Finite Size on Magnetoresistance.
AD-A206 234

Effects of Hepatic Tumor Promoters Phenobarbital and Polybrominated Biphenyls on Intercellular Communication between Rat Liver Epithelial Cells.
AD-A206 875

Efficient Energy Storage and Conversion Using Adiabatic Compression of Relativistic Electron Plasmas.
AD A208 657

Electron Attachment Rate Constants of HBr, CH3Br, and C2H5Br in N2 and

Ar,
AD-A208 682

Electron Redistribution in Mixed Valence Cytochrome Oxidase Following Photolysis of Carboxy-Oxidase,
AD-A207 804

Energy and Chemical Change.
AD-A206 595

Energy Disposal in Ion-Molecule Reactions.
AD-A205 987

Environmental Effects in Niobium Base Alloys and Other Selected Intermetallic Compounds.
AD-A206 072

Establishment of an Electron Beam Lithography Facility.
AD-A206 215

Evidence for Chaos in Spike Trains of Neurons That Generate Rhythmic Motor Patterns.
AD-A208 625

Evidence for Heterogeneity of Muscarinic Receptors in the Mollusc Pleurobranchaea.
AD-A208 656

Excited Molecules and Clusters in Solid Media. Hydrogen and Tetrahydrogen in Ionic Crystals.
AD-A208 024

Excited-State Resonance Raman Spectroscopy as a Probe of Alumina-Sodium Dodecyl Sulfate Hemimicelles.
AD-A205 359

Experimental and Numerical Investigation of Coherent Structures in Turbulent Wake Flows
AD A207 866

Experimental and Numerical Studies of Laser Sustained Gas Plasmas.
AD-A208 129

Experimental and Theoretical Determination of the Thermomechanical Response of Inelastic Structural Materials to High Energy Thermal Inputs
AD-A206 100

An Experimental Investigation of High Lift/High Rate Aerodynamics of an Unsteady Airfoil.
AD-A206 964

An Experimental Study of the Effect of Streamwise Vortices on Unsteady Turbulent Boundary-Layer Separation.
AD-A205 462

Expert Systems for the Scheduling of Image Processing Tasks on a Parallel Processing System.
AD-A208 613

Exploitation of Multiple Solutions of the Navier-Stokes Equations to Achieve Radically Improved Flight.
AD-A205 939

Extension of AM1 to the Halogens,
AD-A205 530

A Failed Paradigm: Carcinogenesis Is More Than Mutagenesis,
AD-A206 874

Fast-Algorithm Development for Large Eddy Simulation of Circular Jet Turbulence.
AD A207 928

A Fast Algorithm for Non-Newtonian Flow. An Enhanced Particle-Tracking Finite Element Code for Solving Boundary-Valve Problems in Viscoelastic Flow.
AD A206 997

Fast Algorithms for Partial Differential Equations on Advanced Computers.
AD-A206 469

Fast Digital Correlations and Transforms Using Finite Field Techniques.
AD-A208 623

Femtochemistry of the Reaction: IHgI* Yields (IHg...I)* Yields HgI + I,
AD-A208 648

Femtosecond Real-Time Probing of Reactions. 2. The Dissociation Reaction of ICN,
AD-A205 567

Femtosecond Real-Time Probing of Reactions. 3. Inversion to the Potential from Femtosecond Transition-State Spectroscopy Experiments,
AD-A206 680

Femtosecond Studies of Electron-Cation Geminate Recombination in Water,
AD-A206 411

Final Technical Report for Grant AFOSR-79-0043 (University of Rochester, Graduate School of Management).
AD-A208 722

Flow Control for Unsteady and Separated Flows and Turbulent Mixing.
AD-A205 989

Fluids, Gels and Glasses Under Extreme Conditions of Pressure and Temperature.
AD-A205 292

Fluorescence Probes of Spectroscopic and Dynamical Aspects of Molecular Photoionization

AD-A207 185

Fluxons and Order in Long Josephson Junctions.
AD-A207 925

Free Radical-Surface Interactions Using Multiphoton Ionization of Free Radicals.
AD-A206 257

Fuel Structure and Pressure Effects on the Formation of Soot Particles in Diffusion Flames.
AD-A206 839

A Fully Analytic, Low- and Middle-Latitude Ionospheric Model,
AD-A206 880

Functional Occupation Measures and Ergodic Cost Problems for Singularly Perturbed Stochastic Systems,
AD-A208 578

Fundamental Combustion Studies Related to Air-Breathing Propulsion.
AD-A207 186

Fundamental Processes in Partially Ionized Plasmas.
AD-A207 910

Fundamental Studies of Beta Phase Decomposition Modes in Titanium Alloys.
AD-A205 296

Fundamental Studies of the Mechanical Behavior of Microelectronic Thin Film Materials.
AD-A206 057

Fundamental Studies on Spray Combustion and Turbulent Combustion.
AD-A206 438

Geometric Methods with Application to Robust Detection and Estimation.
AD-A206 999

Geometrical Foundations of Mesomechanics and Lagrangian Formalism.
AD-A205 589

Gravity Wave and Turbulence Studies Using a High-Resolution ST Radar.
AD-A205 592

Ground-Based Infrared Observations of Sources Discovered by the AFGL, FIRRSE and IRAS Infrared Surveys.
AD-A206 335

Growth Studies of Metal-Metal/Semiconductor Structures.
AD-A206 988

The Heat Transfer and Fluid Dynamics of Concave Surface Curvature.
AD-A207 811

Heterocycles Based on Group III, [illegible] and V Elements Precursors for Novel Glasses and Ceramics.
AD-A205 586

High Density Ion Implanted Contiguous Disk Bubble Technology.
AD-A207 018

High Electric Field Phenomena in Insulation.
AD-A205 525

High Temp Toughening and Creep Studies.
AD-A208 714

High Temperature Oxidation Studies on Alloys Containing Dispersed Phase Particles and Clarification of the Mechanism of Growth of SiO2.
AD-A207 161

Highly Oriented Fiber Reinforced Ceramic Composites.
AD-A208 119

Hydrogen Adsorption at Nb(100): Photoemission Evidence of Two-Stage Exchange Involving Subsurface States,
AD-A207 846

Ideal Jet Flow in Two Dimensions.
AD-A208 275

III-V Heterojunction Structures and High Speed Devices.
AD-A205 946

Impulsive Loading of Fiber-Reinforced Structures.
AD-A206 989

In situ Radical Detection under Very Low Pressure Photolysis Conditions Using Resonance-Enhanced Multiphoton Ionization. Kinetics of CF3 Radicals Produced from IR multiphoton Dissociation of Hexafluoroacetone,
AD-A205 536

Increasing the Margin of Stability of Arbitrarily Finite Modes of Flexible Large Space Structures with Damping.
AD-A206 487

Inhibited of Gap Junctional Blockage by Palmitoyl Carnitine and TMB-8 in a Rat Liver Epithelial Cell Line,
AD-A206 872

An Instrument for the Simultaneous Measurement of Velocity, Temperature and Density in Unseeded Air Flows.
AD-A205 588

Instrumentation Requirements for the Princeton University Electric Propulsion Laboratory Research Program.

AD-A207 840

An Intelligent Mathematical Modelling System - Mathmodel.
AD-A207 807

The Interaction of Solid Particles with Laser Beams.
AD-A207 055

Interactions of Ultrasonic Waves with Composite Plates.
AD-A206 991

Intermolecular Potential Energy Function, Second Virial Coefficients, and Oligomer Properties of Hydrogen Fluoride.
AD-A207 405

Internal Energy Distribution of OCS Desorbing from a Hot Platinum Surface.
AD-A205 794

International Research Conference on Reliability.
AD-A207 001

International Symposium on Multivariate Analysis (5th) Held in Pittsburgh, Pennsylvania on June 19 24, 1978.
AD-A208 680

Investigation and Modeling of Damage Growth in Composite Laminates.
AD-A207 623

An Investigation of Estimation Techniques in Optimally Guided Air to-Air Missiles.
AD-A208 841

Investigation of Radio Frequency/Microwave Effects Upon the Central Nervous System.
AD-A207 188

Investigation of the Feasibility of Engel-Brewer Compounds as High Temperature Oxidation-Resistand Coatings for Carbon-Carbon Composite Materials.
AD B130 800

Investigation of the Flame-Acoustic Wave Interaction during Axial Solid Rocket Instabilities.
AD-A207 929

Investigation of Three-Dimensional Mesh Generation with Precise Controls.
AD-A205 967

Investigations in Improved Iterative Methods for Solving Sparse Systems of Linear Equations.
AD-A207 266

Investigations in Improved Iterative Methods for Solving Sparse Systems of Linear Equations.
AD-A208 847

Ion-Molecule Reactions in Sooting Acetylene-Oxygen Flames.
AD-A205 792

Is There a Constancy for Velocity?
AD-A208 675

Kinetics of Ni(CO)4 Formation.
AD A207 136

Kinetics of Surface Reactions of CF3 Radicals.
AD-A205 533

Laboratory for X-Ray Optics.
AD-A206 468

Lagrangian Turbulence Near Walls: Structures and Mixing in Admissible Model Flows.
AD A208 466

Large Scale Function Minimization.
AD A207 718

Laser Femtochemistry.
AD-A205 357

Levels of Processing of Speech and Non-Speech.
AD-A208 587

Lewis Acid Promoted Reactions of Substituted Pentacyclo(5.4.0.0(2,6).0(3,10).0(5,9)undecane-8,11-diones with Ethyl Diazoacetate.
AD-A207 858

Long Term Synaptic Plasticity and Learning in Neuronal Networks.
AD-A205 993

Low-Energy Atomic Collisions.
AD-A207 216

Low Energy X-Ray and Electron Physics and Technology for High-Temperature Plasma Diagnostics.
AD-A206 486

Lumped Model Generation and Evaluation: Sensitivity and Lie Algebraic Techniques with Applications to Combustion.
AD-A206 683

Magnetosphere - Thermosphere Coupling: An Experiment in Interactive Modeling.
AD-A206 881

The Mapping of Parallel Algorithms to Reconfigurable Parallel Architectures.
AD-A208 870

Markov Processes Applied to Control, Reliability and Replacement.
AD-A208 634

Mathematical Modeling and Numerical Simulation of the Dynamics of Flexible Structures Subject to Large Overall Motions.

AD-A207 004

Mathematical Techniques for System Realization and Identification.
AD-A207 927

Measurement of Rate Constants of Elementary Gas Reactions of Importance to Upper Atmosphere and Combustion Systems.
AD-A207 138

Mechanism of the Claisen Rearrangement of Allyl Vinyl Ethers.
AD-A205 531

Mesospheric Wind Measurement.
AD-A205 593

Metal/Metallion System in Low Temperature Molten Salts.
AD-A208 025

Metastable Negative Ions and Ion Pair Formation.
AD-A207 886

Microjet Burners for Molecular Beam Sources and Combustion Studies.
AD-A205 793

MM - Wave Components - SIS (superconductor-Insulator-Superconductor) Mixers.
AD-A208 632

Modeling and Computational Algorithms for Parameter Estimation and Optimal Control of Aeroelastic Systems and Large Flexible Structures.
AD-A208 274

Modelling, Information, Processing, and Control.
AD-A207 810

Molecular Beam Epitaxial Growth of Hg(1-x)Cd×Te.
AD-A207 218

Molecular Optics Nonlinear Optical Processes in Organic and Polymeric Crystals and Films.
AD-A206 372

Molecular State Evolution after Excitation with an Ultra-Short Laser Pulse: A Quantum Analysis of NaI and NaBr Dissociation.
AD-A205 423

MPD Thruster Erosion Research.
AD-A205 644

Multi-Instrument Studies of the Auroral Ionosphere.
AD-A206 733

Multilayered Electronic Materials and Devices Based on III-V compounds.
AD-A208 861

Multiphoton Detection Techniques for F and F2.
AD-A208 576

Multiresonant Spectroscopy and Dynamics of Molecular Extravalent States: State-Resolved Intramolecular Relaxation of NO2 Above 9 eV.
AD-A205 841

Multivariate Analysis and Its Applications.
AD-A205 585

Muscarinic Antagonist Enhances One-Trial Food-Aversion Learning in the Mollusc Pleurobranchaea.
AD-A208 636

A Neural Network Approach to Model-Based Recognition.
AD-A206 990

Neural Network Models of Vector Coding, Learning, and Trajectory Formation During Planned and Reactive Arm and Eye Movements.
AD-A206 737

Neural Networks for Visual Perception in Variable Illumination.
AD-A206 151

A New Catalyst for the Efficient and Selective Beta-Hydrosilylation of Acrylonitrile. Effect of Ultrasound.
AD-A206 384

A New Perspective on Rutting in Flexible Pavements.
AD-A205 797

Non-Linear Dynamics and Chaotic Motions in Feedback Controlled Elastic System.
AD-A208 628

Non-Linear Optical Techniques for Thin Film Growth and Visible Ultraviolet Lasers.
AD-A206 811

Nongenotoxic Mechanisms in Carcinogenesis: Role of Inhibited Intercellular Communication.
AD-A206 877

Nonlinear Behavior in Optical and Other Systems.
AD-A207 872

Nonlinear Dynamics and Control of Flexible Structures.
AD-A208 120

Nonlinear Spectroscopy of Multicomponent Droplets and Two- and Three-Dimensional Measurements in Flames.
AD-A205 449

Nonlinear Stability in Fluid and Plasma Dynamics.
AD-A207 715

Nonlinear Systems of Conservation

Laws.
AD-A205 837

Nonlocal and Quasilocal Potentials in the Spontaneous Emission of Molecular Exciplexes Coupled to the Phonon Bath of a Solid Matrix,
AD-A206 883

Nonparametric Test of Independence for Censored Data.
AD-A207 121

Novel Organoboranes as Intermediates for Ceramic Precursors and High-Energy Fuels.
AD-A206 101

Nuclear Magnetic Resonance and Laser Scattering Techniques at High Pressure,
AD-A206 654

Numerical Analysis.
AD-A207 000

Numerical Conformal Mapping and Applications.
AD-A205 602

A Numerical Investigation of a Convectively Generated, Inertially Stable, Extratropical Warm-Core Mesovortex Over Land. Part 1. Structure and Evolution,
AD-A208 575

Numerical Methods for Singularly Perturbed Differential Equations with Applications.
AD-A207 187

Numerical Modeling of Two-Terminal Quantum Well Devices.
AD-A208 238

Numerical Simulation of the Meso Beta Scale Structure and Evolution of the 1977 Johnstown Flood. Part 3. Internal Gravity Waves and Squall Line,
AD-A208 574

Numerical Solution of Ill Posed Problems in Partial Differential Equations.
AD-A207 852

A Numerical Study of an Augmented Lagrangian Method for the Estimation of Parameters in Elliptic Systems,
AD-A208 658

Observation of Adsorbate Vibrational Amplitude Modification during a Phase Transformation in the Overlayer,
AD-A206 338

Observing Primeval Galaxies and Dark Matter with LAIRTS.
AD-A208 286

On Selecting the Largest Success Probability under Unequal Sample Sizes,
AD-A207 878

On the Electronic Structure of the He + H2 System: Characterization of, and Nonadiabatic Interactions between, the 1 1A' and 2 1A' potential Energy Surfaces,
AD-A205 835

On the Fundamental Solution of the Radiative Transfer Equation,
AD-A205 361

On the Stability of Excited Tetrahydrogen,
AD-A207 817

On the Use of Multiprocessing Computers for Global Numerical Weather Prediction.
AD-A206 102

Operation and Upgrading of the Beam Optics Test Stand.
AD A208 626

Optical Measurements of Soot Particles in Flames,
AD-A206 238

Optically Controlled Devices and Ultrafast Laser Sources for Signal Processing.
AD-A208 432

Optimum Aeroelastic Characteristics for Composite Supermaneuverable Aircraft.
AD-A205 503

Organo-Metallic Elements for Associative Information Processing.
AD-A206 730

Organosilicon Compounds and Polymers and Silicon Ceramics.
AD-A206 589

Parametric Analysis of Queueing Networks with Blocking.
AD-A206 840

Partial Support of the International Laser Science Conference (3rd) Held in Atlantic City, New Jersey on 1-4 November 1987.
AD-A206 812

The Pasm Parallel Processing System: Design, Simulation, and Image Processing Applications. Volume 1.
AD-A208 739

Perception of Motion in Statistically-Defined Displays.
AD-A208 695

Perceptual Constraints on Understanding Physical Dynamics.
AD-A207 129

Perceptual Structure and Shape from Texture.
AD-A207 873

Persistent, Efficient Frequency Doubling by Poled Annealed Films of a Chromophore-functionalized Poly(p-hydroxystyrene),
AD-A208 790

A Perturbation-Trajectory Method for the Study of Gas-Surface Collision Dynamics,
AD A207 816

Perturbative Corrections to Basis Incompleteness in Molecular SCF calculations,
AD-A206 593

Photoionization Phenomena Near Threshold,
AD-A208 676

Physical-Chemical Studies of Solutions Processing of Nematic Polymers.
AD-A205 921

Plasma Simulation of Ion Acceleration by Lower Hybrid Waves in the Suprauroral Region,
AD-A206 062

Plastic Deformation of Granular Materials.
AD-A208 589

Po/So Phases: Propagation Velocity Across a 1,500-km-Long, Deep Ocean Hydrophone Array,
AD-A208 783

Point Defects in Semiconductors: Microscopic Identification, Metastable Properties, Defect Migration, and Diffusion.
AD A206 947

Poled Polymeric Nonlinear Optical Materials. Enhanced Second Harmonic Generation Stability of Cross-Linkable Matrix/Chromophore Ensembles.
AD A208 791

Poled Polymeric Second Harmonic Generation Materials. Chemical Manipulation of the Temporal Characteristics of Electric Field-Induced Noncentrosymmetry,
AD-A208 788

Polyphosphazenes and their Relationship to Ceramics and Metals,
AD-A205 564

Population Inversions in Ablation Plasmas Generated by Intense Electron Beams.
AD-A205 716

Potential Complex-Lamellar Decomposition of Fluid Flows.
AD-A207 111

Preparation of SiC/AlN Solid Solutions Using Organometallic Precursors.
AD-A206 998

Pressure Effect on the Product Distribution in Competing Reactions: Formation of a Bis Diels-Alder Adduct Via an Aromatizable Intermediate,
AD-A207 867

Probabilistic Description of Fatigue Crack Growth Under Constant and Variable-Amplitude Loading.
AD-A208 717

Problems in Dynamic Phase Transition.
AD-A207 027

Proceedings of the Connectionists Models Summer School Held in Pittsburgh, Pennsylvania on June 17 26, 1988.
AD-A207 014

Projection Methods for Obtaining Intramodular Energy Transfer Rates from Classical Trajectory Results: Application to 1,2-Difluoroethane,
AD-A205 566

Propagation and Saturation of Nonlinear Inertia-Gravity Waves in the Atmosphere.
AD-A207 871

Pseudomorphic In(x).
AD-A207 037

The Pyrolysis of Acetylene Initiated by Acetone.
AD-A206 879

Qualitative Results for Distributed Systems.
AD-A207 005

Radon Transform Analysis of a Probabilistic Method for Image Generation.
AD-A207 814

Raman Study of Solid State Reactions.
AD-A207 140

Rapidly Convergent Algorithms for Nonsmooth Optimization.
AD-A207 629

Reaction Kinetics and Chemo-Rheology of Poly(p-phenylenebenzobisthiazole) Polymerization in the Ordered Phase,
AD-A206 591

Reaction Probability for the Spontaneous Etching of Silicon by CF3 Free Radicals,
AD-A205 534

Reactions of (eta 5-C5H5)(eta 5-C5Me5)Zr(Si(SiMe3)3)X (X = Cl, M Complexes with Carbon Monoxide and the Isocyanide 2,6 Me2C6H3NC. Crystal Structure of (eta 5-C5H5)-(eta 5 -C5Me5)Zr(eta 2 C(N 2,6-Me2C6H3)Si(SiMe3)3)Cl,

AD-A206 494

Reactions of Laser-Generated CF2 (Free Radicals) on Silicon and Silicon Oxide Surfaces.
AD-A206 599

Reciprocal Interactions of Hairpin-Shaped Vortices and a Boundary Layer.
AD-A206 980

Recognizing 3 D Objects from 2D images Using Structural Knowledge Base of Genetic Views.
AD-A207 875

Reduced Potential-Energy Curves for Diatomic Molecules,
AD-A206 206

Reductive Coupling of Carbonyl Compounds with Zinc and Trimethylchlorosilane to Produce O-Silylated Pinacols. Effect of Ultrasonic Waves,
AD-A206 289

Regulation of Nonlinear and Generalized Linear Systems.
AD-A207 725

Relative Energies of Silaethylene and Methylsilylene.
AD-A205 368

Report of the Gordon Research Conference on Multiphoton Processes Held in New London, New Hampshire on 13-17 June 1988.
AD-A205 414

Report to the Air Force Office of Scientific Research on Grant Number AFOSR-88-0108 for the Partial Support of the 1988 Gordon Conference on Polymers (West).
AD-A205 834

Representation of Shift Invariant Operators on L2 by H at Infinity Transfer Functions: An Elementary Proof, a Generalization to L Rho and a Counterexample for L at Infinity,
AD-A207 736

Research in Knowledge Delivery.
AD-A208 327

Research Proposal Quarterly Status Report for July-September 1988,
AD-A206 810

Resonance in Weakly Nonlinear Systems.
AD-A207 115

Role of Adenosine Analogs and Growth Hormone in Waking and Sleep
AD-A205 605

The Role of Chemical Inhibition of Gap-Junctional Intercellular Communication in Toxicology.
AD-A207 130

Routing and Singular Control for Queueing Networks in Heavy Traffic.
AD-A208 568

A RUTCOR Project on Discrete Applied Mathematics.
AD-A208 572

Self-Diffusion in the Compressed, Highly Viscous Liquid 2-Ethylhexyl Benzoate,
AD-A205 294

Self-Organizing Neural Architectures for Eye Movements, Arm Movements, and Eye-Arm Coordination,
AD-A206 153

Self-Organizing Neural Network Architectures for Real-Time Adaptive Pattern Recognition,
AD-A206 122

Sieves, Signal Extraction, and Design.
AD-A205 840

Signal Processing.
AD-A206 662

The Silanoic Acid Dimer (HSiOOH)2: A Simple Molecular System Incorporating Two Very Strong Hydrogen Bonds,
AD-A208 774

Singular and Bang-Bang Stochastic Control.
AD-A208 627

Solid State 29Si and 11B NMR (nuclear Magnetic Resonance) Studies of Sol-Gel Derived Borosilicates,
AD-A205 295

Solutions to a Class of Nonstandard Stochastic Control Problems with Active Learning,
AD-A207 803

Solving the Brightness from-Luminance Problem: A Neural Architecture for Invariant Brightness Perception.
AD-A206 890

Some Mathematical Problems in Continuum Mechanics
AD-A207 923

Some Remarks on Reachability of Infinite-Dimensional Linear Systems.
AD-A207 112

A Source for Producing Alkali Ion Beams for Low-Energy Surface Scattering Spectroscopies,
AD-A208 022

Special Year on Numerical Linear Algebra.
AD-A208 199

Spectrometric Studies of Gas Phase Collision Processes.
AD-A205 570

Spectroscopic Diagnostics of Electron Temperature and Energy Conversion Efficiency of Laser-Sustained Plasma in Flowing Argon.
AD-A207 054

Spin-Forbidden Radiative Decay Involving Quasidegenerate States. Application to the Beta 1 Sigma+ Yields a 3 Pi Transition in MgO,
AD-A205 836

State Space Models for Aeroelastic and Viscoelastic Systems.
AD-A207 092

State to State Collision Induced Dissociation and Gas/Surface Interactions.
AD-A206 676

Statistical Analysis of the LMS and Modified Stochastic Gradient Algorithms.
AD A208 618

Stereo Boundary Fusion by Cortical Complex Cells: A System of Maps, Filters, and Feedback Networks for Multiplexing Distributed Data,
AD-A205 507

Sticking Coefficient of the SiH2 Free Radical on a Hydrogenated Silicon-Carbon Surface,
AD-A205 532

Stochastic Systems with Multiple Decision Makers and Parametric Uncertainties.
AD-A206 655

Strength and Structure of Ga(1-x)In(x)As Alloys.
AD A205 415

The Structure and Control of Three-Dimensional Shock Wave Turbulent Boundary Layer Interactions.
AD-A205 923

The Structure of Normal-Shock/Turbulent-Boundary-Layer Interactions Modified by Mass Removal.
AD-A208 402

Structure of the Near-Injector Region of Non-Evaporating Pressure-Atomized Sprays,
AD-A206 237

The Structures of Three Strained Cage Molecules,
AD-A207 868

Studies in Stabilization and Control of Beams and Plates.
AD-A208 635

Studies of Frontal Zone Dynamics with a High-Resolution Wind Profiling System.
AD-A205 988

Studies of the Propagation of Short Burst, High Power Microwave Radiation through Neutral and Ionized Media.
AD-A208 664

Studies on Ions and Neutrals Desorbed from Solid Surfaces by Ion and Electron Bombardment.
AD-A206 734

Study of the Influence of Metallurgical Factors on Fatigue and Fracture of Aerospace Structural Materials.
AD-A206 605

Study of the Infrared Celestial Background.
AD-A205 649

A Study of the Nephrotoxicity and Metabolism of Tetralin and Indan in Fischer 344 Rats.
AD-A208 588

Subpicosecond Optical Digital Computation Using Conjugate Parametric Generators.
AD-A207 908

Summary Abstract: Spontaneous Thermal Etching of Silicon by CF3 Radicals,
AD-A205 535

Superconducting Oxide Films for Multispectral Infrared Sensors.
AD-A206 685

Superconductivity and Magnetism in Layered Materials.
AD-A208 487

Surface Plasmon Study of Monolayer-Bilayer Transition in Poly-4-BCMU and Poly-3-BCMU Polydiacetylene Langmuir-Blodgett Films,
AD-A207 404

Sustained Oscillations in a Symmetric Cooperative-Competitive Neural Network: Disproof of a Conjecture About Content Addressable Memory,
AD-A206 154

Sustained Oscillations in a Symmetric Cooperative-Competitive Neural Network: Disproof of a Conjecture about Content Addressable Memory,
AD-A206 377

Symposium: Better Ceramics Through Chemistry III. Volume 121.
AD-A207 128

Synthesis and Photodegradation of Poly(2,5,-bis(dimethylsilyl)thiophene),
AD A208 802

Synthesis of 4,4,8,8,11,11

Hexanitropentacyclo(5.4.0.0(2,6).0(3,10).0(5,9)-undecane,
AD-A207 869

Synthesis of Primary-Alcohol-Terminated Polyepichlorohydrin with Molecular Weight of 4000 to 12000.
AD-A207 624

Theoretical Analysis of Models for Texture.
AD-A208 486

Theoretical Investigations of Chaotic Dynamics.
AD-A207 724

Theoretical Investigations of Molecules Composed only of Fluorine, Oxygen and Nitrogen: Determination of the Equilibrium Structures of FOOF, (NO)2 and FNNF and the Transition State Structure for FNNF cis-transisomerization,
AD-A208 720

Theory and Experimental and Chemical Instabilities.
AD-A205 571

Theory and Implementation of the MBPT Density Matrix. An Application to One-Electron to One Electron Properties,
AD-A205 833

Thermodynamics of High Temperature Materials.
AD-A207 139

Thermodynamics of Organic Compounds.
AD-A207 120

Thermotropic Ionic Liquid Crystals. 6. Structural Parameters of Solid and Liquid Crystal Phases of Anhydrous Short-Chain Sodium Alkanoates
AD-A206 832

Thermotropic Ionic Liquid Crystals. 7. Calculation of Sodium-23 Quadrupole Coupling Constants in Lamellar Phases of Sodium Alkanoates,
AD-A205 293

Three Dimensional Flow and Temperature Profile Attenuation in an Axial Flow Turbine.
AD-A206 736

Three Dimensional High Speed Boundary Layer Flows.
AD-A206 145

Three-Dimensional Modelling for Contact Resistance of Current Flow into a Source/Drain Region.
AD-A206 694

Three-Dimensional Structure of Boundary Layers in Transition to Turbulence.
AD-A205 587

Three-Dimensional Vortex Interactions in Turbulent Boundary Layers.
AD-A208 624

Transonic Aerodynamics.
AD A207 109

Two Methods for Solving the Inverse Acoustic Scattering Problem.
AD-A205 360

Ultrafast Chemical Reactions in the Liquid State,
AD A206 155

Ultrasmall Holographic X-Ray Gratings Using Synchrotron Radiation and X-Ray Lithographic Techniques.
AD-A206 731

Ultrasonic Nondestructive Evaluation of Damage in Continuous Fiber Composites.
AD-A205 713

Ultrasonic Nondestructive Evaluation of Damage in Continuous Fiber Composites.
AD-A208 840

Uncertainties in Soil Constitutive Behavior. Revision.
AD-A205 924

A Uniformly Differentiable Approximation Scheme for Delay Systems Using Splines,
AD-A208 567

Unsteady and Separated Flows.
AD-A206 539

Unsteady Flows Around Three-Dimensional Lifting Surfaces.
AD-A206 331

Use of Four-Dimensional Data Assimilation by Newtonian Relaxation and Latent-Heat Forcing to Improve a Mesoscale-Model Precipitation Forecast: A Case Study,
AD-A208 573

Variability and Chaos: Neurointegrative Principles in Self-Organization of Motor Patterns.
AD-A208 864

Versatile Apparatus for Low-Energy and Hyperthermal Energy Ion Scattering Spectroscopies,
AD-A205 832

Vibrational, Mechanical, and Thermal Properties of III-V semiconductors.
AD-A206 590

Visual Information Processing in the Perception of Features and Objects.
AD-A206 948

Vortex Dynamics and Vortex
Breakdown.
AD-A206 470

Vortices in Long Josephson
Junctions.
AD-A207 936

Wavefront Propagation for Reaction-
Diffusion Systems of PDE.
AD-A207 737

Working Memory Capacity: An
Individual Differences Approach.
AD-A207 127

Workshop on Decision Information
for Tactical Command and Control.
AD-A208 569

X Ray Absorption Spectroscopy of
Electrochemically Generated
Species.
AD-A205 572

Yield Estimation from Spectral
Amplitudes of Direct P and P Coda
Recorded by the Wake Island Deep
Ocean Hydrophone Array.
AD-A208 784

TITLE INDEX

Ab Initio Studies of Molecular Structures and Energies. 2. Energies and Stabilities of PH(n), SH(n), and ClH(n) Compounds,
AD-A206594 REPORT DATE: 89

Ab Initio Study of Excited States of CN- Stabilized in Point-Charge Lattices,
AD-A205839 REPORT DATE: 09 DEC 88 FINAL REPORT

Acoustooptic Processing of Two Dimensional Signals Using Temporal and Spatial Integration.
AD-A208686 REPORT DATE: 12 MAY 89 FINAL REPORT

Active Control of Flexible Space Structures Using the Nitinol Shape Memory Actuators.
AD-A205948 REPORT DATE: OCT 87 FINAL REPORT

Addition of Dichlorocarbene to Poly(1,1-dimethyl-1-sila-cis-pent-3-ene) and Poly(1,1-dimethyl-1-silia-cis (and trans)-pent-3-ene. Characterization of Microstructures by 13C and 29Si NMR,
AD-A207847 REPORT DATE: 88 ANNUAL REPORT

Admittance Modeling of Structures with Active Controls.
AD-A207874 REPORT DATE: 31 MAY 88 FINAL REPORT

Al and Mg Alloys for Aerospace Applications Using Rapid Solidification and Powder Metallurgy Processing.
AD-A207085 REPORT DATE: 28 MAR 89 FINAL REPORT

An Algorithm for Tracking Fluid Particles in Numerical Simulations of Homogeneous Turbulence,
AD-A206239 REPORT DATE: DEC 88 FINAL REPORT

Alkali-Rare Gas and Metal Halide Molecules as Potential Visible Lasers.
AD-A207114 REPORT DATE: OCT 80 FINAL REPORT

Altered Regulation of Intercellular Communication by Epidermal Growth Factor, Transforming Growth Factor-Beta and Peptide Hormones in Normal Human Keratinocytes,
AD-A206871 REPORT DATE: 89 FINAL REPORT

Analysis and Numerical Analysis of Some Properly and Improperly Posed Problems in Applied Mathematics.
AD-A208633 REPORT DATE: 14 OCT 88 FINAL REPORT

Anchored Cell Analysis/Sorting Coupled with the Scrape-Loading/Dye-Transfer Technique to Quantify Inhibition of Gap-Junctional Intercellular Communication in WB-F344 Cells by 2,2',4,4', 5,5'-Hexabromobiphenyl,
AD-A206873 REPORT DATE: 88 FINAL REPORT

The Anharmonic Force Fields of Silyl Fluoride and Silyl Chloride,
AD A208779 REPORT DATE: 88 FINAL REPORT

Annual Review of Chronopharmacology. Volume 5
AD-A206148 REPORT DATE: FEB 89 FINAL REPORT

Antiproton and Millimeter Wave Research.
AD A208363 REPORT DATE: 26 JAN 89 FINAL REPORT

Application of Multi-Channel Hough Transform to Stereo Vision.
AD A207937 REPORT DATE: 01 MAR 89 FINAL REPORT

TITLE INDEX

Applications of Functional Analytical Methods to Problems in Queueing Network Theory and Reliability Theory.
AD A208736 REPORT DATE: OCT 80 FINAL REPORT

Applications of Graph Theory and System Theory to Large Scale Systems.
AD A207110 REPORT DATE: JUL 80 FINAL REPORT

Approaches to Polymeric Nonlinear Optical Materials. Theoretical and Synthetic Design Strategies.
AD A208792 REPORT DATE: 89 FINAL REPORT

Associative Processors and Directed Graphs for Optical Processing.
AD A206739 REPORT DATE: 15 FEB 89 FINAL REPORT

Asynchronous Optical Sampling for Laser-Based Combustion Diagnostics in High-Pressure Flames.
AD A207003 REPORT DATE: 28 FEB 89 FINAL REPORT

Autoionization of H2 Induced by a Doubly Excited Triplet State.
AD A205565 REPORT DATE: 13 JUN 88 FINAL REPORT

An Averaging Method for Stochastic Approximations with Constant Parameters: Small Parameter Values.
AD A208622 REPORT DATE: MAR 80 FINAL REPORT

Basic Instability Mechanisms in Chemically Reacting Subsonic and Supersonic Flows.
AD A206669 REPORT DATE: 08 FEB 89 FINAL REPORT

Basic Research on Processing of Ceramics for Space Structures.
AD A205954 REPORT DATE: 31 JAN 89 FINAL REPORT

Bifurcating Jets at High Reynolds Numbers.
AD A205718 REPORT DATE: 07 DEC 88 FINAL REPORT

Binary Time Series.
AD A208679 REPORT DATE: JUL 80 FINAL REPORT

Birch Reduction of the Dichlorocarbene Adduct of poly(1,1-dimethyl-1-sila-cis-pent-3 ene)(C12C-1): Synthesis and Characterization of poly(1,1-dimethyl-3,4 methylene-1-sila-cis-pent-3-ene) (CH2 1).
AD A208023 REPORT DATE: 89 FINAL REPORT

Boron Trifluoride Mediated Reaction of 1,9-Dihalopentacyclo(5.4.0.0(2,6).0(3,10).0(5,9)undecane-8,11-diones with Ethyl Diazoacetate: A Novel Synthetic Entry into the Cyclopent(a)indene Ring System.
AD A207870 REPORT DATE: 88 FINAL REPORT

Calculation of Kinetic Data for Processes Leading to UV Signatures.
AD A206656 REPORT DATE: 31 MAR 89 FINAL REPORT

Carbonylation Chemistry of the Tantalum Silyl (Eta5-C5Me5)Cl3TaSiMe3. Synthesis, Characterization, and Reaction Chemistry of (Eta5-C5Me5)Cl3Ta(Eta2-COSiMe3) and Derivatives.
AD A205358 REPORT DATE: 89 FINAL REPORT

Chaotic Response of Aerosurfaces with Structural Nonlinearities.
AD A208433 REPORT DATE: MAR 89 ANNUAL REPORT

TITLE INDEX

A Characterization of Chlordecone Pretreatment - Altered Pharmacokinetics in Mice.
AD-A208738 REPORT DATE: 89 FINAL REPORT

Charged Slurry Droplet Research.
AD-A206946 REPORT DATE: 20 FEB 89 FINAL REPORT

Chemical and Oncogene Modulation of Gap Junctional Intercellular Communication.
AD-A206876 REPORT DATE: 88 FINAL REPORT

Chemistry of Polynuclear Metal Complexes with Bridging Carbene or Carbyne Ligands. Part 83. Molybdenum and Tungsten Complexes Containing the Alkylidyne Group C(eta6-C6H4(OMe-2)Cr(CO)3).
AD-A206495 REPORT DATE: 88 ANNUAL REPORT

Chemistry of Polynuclear metal complexes with Bridging Carbene or Carbyne Ligands. Part 84. Carbarorane Tungsten Platinum Complexes having a Mu-CC6H3ME(2)-2,6 Ligand: Crystal Structures of (WPt(MU- CC6H3ME(2)-2,6)(CO)N-(Pet3)(MU-Alp; ha:ETA5-C2B9HMe2)(N= 2 or 3).
AD-A206414 REPORT DATE: 89 ANNUAL REPORT

Circular Dichroism in Photoelectron Angular Distributions from Two-Color (1+1) REMPI (Resonantly Enhanced Multiphoton Ionization) of NO.
AD-A205387 REPORT DATE: 14 DEC 87 FINAL REPORT

Cloud/Cryosphere Interactions.
AD-A208377 REPORT DATE: 19 APR 89 FINAL REPORT

CO Adsorption on Pt(111) Modified with Sulfur.
AD-A205838 REPORT DATE: 15 DEC 88 FINAL REPORT

Coating and Impregnation of Carbon-Carbon Composites with Ceramics by Electrophoretic Deposition.
AD-A208873 REPORT DATE: APR 89 FINAL REPORT

Collaborative Experimental and Theoretical Study of the Photodissociation and Reactions of the Azide Radical.
AD-A205597 REPORT DATE: 22 FEB 88 ANNUAL REPORT

Combustion Instability in Solid Rocket Motors.
AD-A206843 REPORT DATE: 21 MAR 89 FINAL REPORT

Components of High-Level Vision: A Cognitive Neuroscience Analysis and Accounts of Neurological Syndromes.
AD-A207848 REPORT DATE: 28 FEB 89 ANNUAL REPORT

Computation and Theory in Nonlinear Optimization.
AD-A207610 REPORT DATE: 14 NOV 88 FINAL REPORT

Computational Determination of the Structures and Some Properties of Tetrahedrane, Prismane, and Some of Their Aza Analogues.
AD-A205603 REPORT DATE: 89 FINAL REPORT

Computational Methods for Nonlinear Dynamic Problems in Solid and Structural Mechanics: Progress in the Theory and Modeling of Friction and in the Control of Dynamical Systems with Frictional Forces
AD A208763 REPORT DATE: 31 MAR 89 FINAL REPORT

TITLE INDEX

Computations of Optimal Controls and Designs for Distributed Systems in Optics and Elasticity.
AD A207924 REPORT DATE: 24 MAR 89 FINAL REPORT

Computer Modeling of Soot Formation Comparing Free Radical and Ionic Mechanisms.
AD A206693 REPORT DATE: MAR 89 ANNUAL REPORT

Conductive and Optically Non-Linear Polymeric Langmuir-Blodgett Films of Poly(3-Dodecylthiophene),
AD-A205529 REPORT DATE: 88 FINAL REPORT

Conductive Polymers Based upon Rigid-Rod Ultrahigh-Modulus Macromolecules. Electrochemical Doping of Poly(p-phenylenebenzobisthiazole-2,6-diyl) (PBT),
AD A208789 REPORT DATE: 88 FINAL REPORT

Conference on Mathematical Frontiers and the Physical World.
AD-A208681 REPORT DATE: 21 JUL 82 FINAL REPORT

Connectionist Networks Learn to Transmit Chaos.
AD A208642 REPORT DATE: 88 FINAL REPORT

Control and System Theory, Optimization, Inverse and Ill-Posed Problems.
AD A208570 REPORT DATE: 14 SEP 88 FINAL REPORT

Convenient Routes to Di-tert-butylsilanediyl: Chemical, Thermal and Photochemical Generation,
AD A206643 REPORT DATE: OCT 88 FINAL REPORT

Convergence and Performance of Synchronous and Asynchronous Parallel and Conventional Iterative Methods
AD-A207093 REPORT DATE: 28 FEB 89 ANNUAL REPORT

Cooperative Phenomena for New Coherent Radiation Sources.
AD-A206368 REPORT DATE: OCT 88 FINAL REPORT

Coordinated Noninvasive Studies (CNS) Project.
AD A205413 REPORT DATE: NOV 88 FINAL REPORT

Cycloaddition of Anion Derived Homophthalic Anhydride to cis,cisqid,cis-Tricyclo(6.3.0.0(2,6))undeca-4,9-diene-3,11-dione. Aromatization as a Driving Force for Intramolecular Sigmatropic Hydrogen Transfer,
AD-A207860 REPORT DATE: 89 FINAL REPORT

Data Fitting.
AD A207086 REPORT DATE: 80 FINAL REPORT

A Deep Optical Infrared Survey.
AD A207930 REPORT DATE: 07 MAR 89 FINAL REPORT

Demodulation Processes in Auditory Perception.
AD A207131 REPORT DATE: 03 JAN 89 FINAL REPORT

Demonstration of Oblique Detonation Wave for Hypersonic Propulsion.
AD A208268 REPORT DATE: 30 MAR 89 FINAL REPORT

TITLE INDEX

Dense Plasma Jet Propagation for Endoatmospheric Ballistic Missile Defense.
AD-A208655 REPORT DATE: JUN 88 FINAL REPORT

Description and Manipulation of Membrane Lipid Alterations Associated with Synaptic Functions in Isolated Cerebellar Glomeruli.
AD A206732 REPORT DATE: 17 FEB 89 FINAL REPORT

Design of Experiments and Reliability Models.
AD-A207108 REPORT DATE: 31 AUG 80 FINAL REPORT

Design Optimization of Systems Governed by Partial Differential Equations. Phase 1
AD A207812 REPORT DATE: MAR 89 FINAL REPORT

The Determination of Rate-Limiting Steps during Soot Formation.
AD-A208866 REPORT DATE: 27 APR 89 ANNUAL REPORT

Development and Analysis of Arma Parameter Estimation Schemes in the Presence of Noise.
AD-A205598 REPORT DATE: 04 JAN 89 ANNUAL REPORT

Development of Adaptive Grid Schemes Based on Poisson Grid Generators.
AD-A206922 REPORT DATE: JAN 89 FINAL REPORT

Development of Practical MO Techniques for Prediction of the properties and Behaviour of Materials.
AD-A206831 REPORT DATE: 26 JAN 89 FINAL REPORT

Dieldrin Inhibition of Gap Junctional Intercellular Communication in Rat Glial Cells as Measured by the Fluorescence Photobleaching and Scrape Loading/Dye Transfer Assays,
AD A206878 REPORT DATE: 87 FINAL REPORT

Differential Equations and Continuum Mechanics.
AD-A208637 REPORT DATE: 02 MAY 89 FINAL REPORT

Differential Equations, Related Problems of Pade Approximations and Computer Applications.
AD-A208590 REPORT DATE: 88 FINAL REPORT

Differential Equations, Related Problems of Pade Approximations and Computer Applications.
AD-A207888 REPORT DATE: 31 DEC 88 FINAL REPORT

A Dilogarithmic Extension of Liouville's Theorem on Integration in Finite Terms.
AD A206681 REPORT DATE: 28 FEB 88 FINAL REPORT

The Dimension of Attractors Underlying Turbulent Poiseuille Flow.
AD A206021 REPORT DATE: 13 FEB 89 FINAL REPORT

Dynamic Response of Embedded Structures
AD-A206682 REPORT DATE: 14 JAN 89 FINAL REPORT

Dynamics of Excited High-Lying States of H2 and D2
AD A206936 REPORT DATE: NOV 88 FINAL REPORT

Dynamics of Gas-Surface Interactions.
AD A206210 REPORT DATE: 02 FEB 89 FINAL REPORT

Effect of Chemical Mutagens on Herpes Virus - Induced Cellular Transformation and Testing for Mutagenesis in Mouse Cells.
AD A207137 REPORT DATE: 31 MAY 80 FINAL REPORT

Effect of Finite Size on Magnetoresistance.
AD A206234 REPORT DATE: 01 FEB 89 FINAL REPORT

Effective Behavior of Composite Materials.
AD A207113 REPORT DATE: JUL 80 FINAL REPORT

Effects of Hepatic Tumor Promoters Phenobarbital and Polybrominated Biphenyls on Intercellular Communication between Rat Liver Epithelial Cells.
AD A206875 REPORT DATE: 88 FINAL REPORT

Efficient Energy Storage and Conversion Using Adiabatic Compression of Relativistic Electron Plasmas.
AD A208657 REPORT DATE: 17 JAN 89 FINAL REPORT

Electron Attachment Rate Constants of HBr, CH3Br, and C2H5Br in N2 and Ar.
AD A208682 REPORT DATE: 15 MAY 88 FINAL REPORT

Electron Redistribution in Mixed Valence Cytochrome Oxidase Following Photolysis of Carboxy-Oxidase.
AD A207804 REPORT DATE: 88 FINAL REPORT

Energy and Chemical Change.
AD-A206595 REPORT DATE: 27 NOV 88 FINAL REPORT

Energy Disposal in Ion-Molecule Reactions.
AD-A205987 REPORT DATE: 15 JAN 89 FINAL REPORT

Environmental Effects in Niobium Base Alloys and Other Selected Intermetallic Compounds.
AD-A206072 REPORT DATE: 15 DEC 88 ANNUAL REPORT

Establishment of an Electron Beam Lithography Facility.
AD-A206215 REPORT DATE: 13 FEB 89 FINAL REPORT

Evidence for Chaos in Spike Trains of Neurons That Generate Rhythmic Motor Patterns.
AD-A208625 REPORT DATE: 88 FINAL REPORT

Evidence for Heterogeneity of Muscarinic Receptors in the Mollusc Pleurobranchaea.
AD A208656 REPORT DATE: 88 FINAL REPORT

Excited Molecules and Clusters in Solid Media Hydrogen and Tetrahydrogen in Ionic Crystals.
AD-A208024 REPORT DATE: 07 OCT 88 FINAL REPORT

Excited State Resonance Raman Spectroscopy as a Probe of Alumina-Sodium Dodecyl Sulfate Hemimicelles.
AD A205359 REPORT DATE: 89 FINAL REPORT

TITLE INDEX

Experimental and Numer[illegible]vestigation of Coherent Structures in Turbulent Wake Flows.
AD-A207866 RE[illegible]ATE: 25 APR 89 FINAL REPORT

Experimental and Numerical Studies of Laser Sustained Gas Plasmas.
AD-A208129 REPORT DATE: APR 89 FINAL REPORT

Experimental and Theoretical Determination of the Thermomechanical Response of Inelastic Structural Materials to High Energy Thermal Inputs.
AD-A206100 REPORT DATE: DEC 88 FINAL REPORT

An Experimental Investigation of High Lift/High Rate Aerodynamics of an Unsteady Airfoil.
AD-A206964 REPORT DATE: MAR 89 FINAL REPORT

An Experimental Study of the Effect of Streamwise Vortices on Unsteady Turbulent Boundary-Layer Separation.
AD-A205462 REPORT DATE: 09 DEC 88 FINAL REPORT

Expert Systems for the Scheduling of Image Processing Tasks on a Parallel Processing System.
AD-A208613 REPORT DATE: DEC 86 FINAL REPORT

Exploitation of Multiple Solutions of the Navier-Stokes Equations to Achieve Radically Improved Flight.
AD-A205939 REPORT DATE: 27 FEB 89 FINAL REPORT

Extension of AM1 to the Halogens.
AD-A205530 REPORT DATE: 88 FINAL REPORT

A Failed Paradigm: Carcinogenesis Is More Than Mutagenesis.
AD-A206874 REPORT DATE: 88 FINAL REPORT

A Fast Algorithm for Non-Newtonian Flow. An Enhanced Particle-Tracking Finite Element Code for Solving Boundary-Valve Problems in Viscoelastic Flow.
AD-A206997 REPORT DATE: 05 JAN 89 FINAL REPORT

Fast Algorithms for Partial Differential Equations on Advanced Computers.
AD-A206469 REPORT DATE: 02 MAR 89 FINAL REPORT

Fast Digital Correlations and Transforms Using Finite Field Techniques.
AD-A208623 REPORT DATE: DEC 79 FINAL REPORT

Fast-Algorithm Development for Large-Eddy Simulation of Circular-Jet Turbulence.
AD-A207928 REPORT DATE: MAR 89 FINAL REPORT

Femtochemistry of the Reaction: IHgI* Yields (IHg...I)* Yields HgI + I.
AD-A208648 REPORT DATE: 31 MAR 89 FINAL REPORT

Femtosecond Real-Time Probing of Reactions. 2. The Dissociation Reaction of ICN.
AD-A205567 REPORT DATE: 01 NOV 88 FINAL REPORT

Femtosecond Real Time Probing of Reactions 3. Inversion to the Potential from Femtosecond Transition-State Spectroscopy Experiments.
AD-A206680 REPORT DATE: 15 JAN 89

TITLE INDEX

Femtosecond Studies of Electron-Cation Geminate Recombination in Water.
AD-A206411 REPORT DATE: 89 ANNUAL REPORT

Final Technical Report for Grant AFOSR-79-0043 (University of Rochester, Graduate School of Management).
AD-A208722 REPORT DATE: DEC 81 FINAL REPORT

Flow Control for Unsteady and Separated Flows and Turbulent Mixing.
AD-A205989 REPORT DATE: 31 OCT 88 ANNUAL REPORT

Fluids, Gels and Glasses Under Extreme Conditions of Pressure and Temperature.
AD-A205292 REPORT DATE: 17 FEB 89 FINAL REPORT

Fluorescence Probes of Spectroscopic and Dynamical Aspects of Molecular Photoionization.
AD-A207185 REPORT DATE: NOV 88 FINAL REPORT

Fluxons and Order in Long Josephson Junctions.
AD-A207925 REPORT DATE: 24 FEB 89 FINAL REPORT

Free Radical-Surface Interactions Using Multiphoton Ionization of Free Radicals.
AD-A206257 REPORT DATE: JAN 89 FINAL REPORT

Fuel Structure and Pressure Effects on the Formation of Soot Particles in Diffusion Flames.
AD-A206839 REPORT DATE: 15 FEB 89 ANNUAL REPORT

A Fully Analytic, Low- and Middle-Latitude Ionospheric Model.
AD-A206880 REPORT DATE: 01 FEB 89 FINAL REPORT

Functional Occupation Measures and Ergodic Cost Problems for Singularly Perturbed Stochastic Systems.
AD-A208578 REPORT DATE: APR 89 ANNUAL REPORT

Fundamental Combustion Studies Related to Air-Breathing Propulsion.
AD-A207186 REPORT DATE: 01 SEP 81 FINAL REPORT

Fundamental Processes in Partially Ionized Plasmas.
AD-A207910 REPORT DATE: AUG 88 FINAL REPORT

Fundamental Studies of Beta Phase Decomposition Modes in Titanium Alloys.
AD-A205296 REPORT DATE: 31 JAN 89 ANNUAL REPORT

Fundamental Studies of the Mechanical Behavior of Microelectronic Thin Film Materials.
AD-A206057 REPORT DATE: JAN 89 FINAL REPORT

Fundamental Studies on Spray Combustion and Turbulent Combustion.
AD-A206438 REPORT DATE: 06 FEB 89 ANNUAL REPORT

Geometric Methods with Application to Robust Detection and Estimation.
AD-A206999 REPORT DATE: 89 FINAL REPORT

Geometrical Foundations of Mesomechanics and Lagrangian Formalism.
AD-A205589 REPORT DATE: 05 JAN 89 FINAL REPORT

TITLE INDEX

Gravity Wave and Turbulence Studies Using a High-Resolution ST Radar.
AD-A205592 REPORT DATE: 01 FEB 89 ANNUAL REPORT

Ground-Based Infrared Observations of Sources Discovered by the AFGL, FIRRSE and IRAS Infrared Surveys.
AD-A206335 REPORT DATE: 30 JUN 88 FINAL REPORT

Growth Studies of Metal-Metal/Semiconductor Structures.
AD-A206988 REPORT DATE: 31 MAR 89 FINAL REPORT

The Heat Transfer and Fluid Dynamics of Concave Surface Curvature.
AD-A207811 REPORT DATE: 21 APR 88 FINAL REPORT

Heterocycles Based on Group III, IV, and V Elements Precursors for Novel Glasses and Ceramics.
AD-A205586 REPORT DATE: 31 MAY 88 ANNUAL REPORT

High Density Ion Implanted Contiguous Disk Bubble Technology.
AD-A207018 REPORT DATE: 31 MAR 89 FINAL REPORT

High Electric Field Phenomena in Insulation.
AD-A205525 REPORT DATE: 15 JAN 89 FINAL REPORT.

High Temp Toughening and Creep Studies.
AD-A208714 REPORT DATE: 11 MAY 89 FINAL REPORT

High Temperature Oxidation Studies on Alloys Containing Dispersed Phase Particles and Clarification of the Mechanism of Growth of SiO2.
AD-A207161 REPORT DATE: 14 FEB 89 FINAL REPORT

Highly Oriented Fiber Reinforced Ceramic Composites.
AD-A208119 REPORT DATE: 31 MAR 89 FINAL REPORT

Hydrogen Adsorption at Nb(100): Photoemission Evidence of Two-Stage Exchange Involving Subsurface States.
AD-A207846 REPORT DATE: 88 ANNUAL REPORT

Ideal Jet Flow in Two Dimensions.
AD-A208275 REPORT DATE: 31 JAN 89 FINAL REPORT

III-V Heterojunction Structures and High Speed Devices.
AD-A205946 REPORT DATE: 17 FEB 89 FINAL REPORT

Impulsive Loading of Fiber-Reinforced Structures.
AD-A206989 REPORT DATE: 01 MAR 89 FINAL REPORT

In situ Radical Detection under Very Low Pressure Photolysis Conditions Using Resonance-Enhanced Multiphoton Ionization. Kinetics of CF3 Radicals Produced from IR Multiphoton Dissociation of Hexafluoroacetone.
AD-A205536 REPORT DATE: 88 FINAL REPORT

Increasing the Margin of Stability of Arbitrarily Finite Modes of Flexible Large Space Structures with Damping
AD A206487 REPORT DATE: DEC 88 ANNUAL REPORT

TITLE INDEX

Inhibited of Gap Junctional Blockage by Palmitoyl Carnitine and TMB-8 in a Rat Liver Epithelial Cell Line.
AD-A206872 REPORT DATE: 88 FINAL REPORT

An Instrument for the Simultaneous Measurement of Velocity, Temperature and Density in Unseeded Air Flows.
AD-A205588 REPORT DATE: 31 JAN 89 FINAL REPORT

Instrumentation Requirements for the Princeton University Electric Propulsion Laboratory Research Program.
AD-A207840 REPORT DATE: 30 JUL 88 FINAL REPORT

An Intelligent Mathematical Modelling System - Mathmodel.
AD-A207807 REPORT DATE: 31 MAR 89 FINAL REPORT

The Interaction of Solid Particles with Laser Beams.
AD-A207055 REPORT DATE: 08 APR 89 FINAL REPORT

Interactions of Ultrasonic Waves with Composite Plates.
AD-A206991 REPORT DATE: 24 MAR 89 FINAL REPORT

Intermolecular Potential Energy Function, Second Virial Coefficients, and Oligomer Properties of Hydrogen Fluoride.
AD-A207405 REPORT DATE: 01 NOV 81 FINAL REPORT

Internal Energy Distribution of OCS Desorbing from a Hot Platinum Surface.
AD-A205794 REPORT DATE: 88 FINAL REPORT

International Research Conference on Reliability.
AD-A207001 REPORT DATE: 10 NOV 88 FINAL REPORT

International Symposium on Multivariate Analysis (5th) Held in Pittsburgh, Pennsylvania on June 19-24, 1978.
AD-A208680 REPORT DATE: 79 FINAL REPORT

Investigation and Modeling of Damage Growth in Composite Laminates.
AD-A207623 REPORT DATE: 25 SEP 88 FINAL REPORT

An Investigation of Estimation Techniques in Optimally Guided Air-to-Air Missiles.
AD-A208841 REPORT DATE: NOV 81 FINAL REPORT

Investigation of Radio Frequency/Microwave Effects Upon the Central Nervous System.
AD-A207188 REPORT DATE: 26 JUN 80 FINAL REPORT

Investigation of the Feasibility of Engel-Brewer Compounds as High Temperature Oxidation Resistand Coatings for Carbon-Carbon Composite Materials.
AD-B130800 REPORT DATE: 31 DEC 88 ANNUAL REPORT

Investigation of the Flame-Acoustic Wave Interaction during Axial Solid Rocket Instabilities.
AD-A207929 REPORT DATE: 31 MAR 89 FINAL REPORT

Investigation of Three-Dimensional Mesh Generation with Precise Controls.
AD-A205967 REPORT DATE: 31 JAN 89 FINAL REPORT

TITLE INDEX

Investigations in Improved Iterative Methods for Solving Sparse Systems of Linear Equations.
AD-A207266 REPORT DATE: AUG 80 FINAL REPORT

Investigations in Improved Iterative Methods for Solving Sparse Systems of Linear Equations.
AD-A208847 REPORT DATE: 22 AUG 80 FINAL REPORT

Ion-Molecule Reactions in Sooting Acetylene-Oxygen Flames,
AD-A205792 REPORT DATE: 88 FINAL REPORT

Is There a Constancy for Velocity?
AD-A208675 REPORT DATE: 89 FINAL REPORT

Kinetics of Ni(CO)4 Formation.
AD-A207136 REPORT DATE: 26 NOV 80 FINAL REPORT

Kinetics of Surface Reactions of CF3 Radicals,
AD-A205533 REPORT DATE: 87 FINAL REPORT

Laboratory for X-Ray Optics.
AD-A206468 REPORT DATE: 01 OCT 88 FINAL REPORT

Lagrangian Turbulence Near Walls: Structures and Mixing in Admissible Model Flows.
AD-A208466 REPORT DATE: 09 MAY 89 FINAL REPORT

Large Scale Function Minimization.
AD-A207718 REPORT DATE: 14 OCT 88 FINAL REPORT

Laser Femtochemistry,
AD-A205357 REPORT DATE: 23 DEC 88 FINAL REPORT

Levels of Processing of Speech and Non-Speech.
AD-A208587 REPORT DATE: 27 APR 89 ANNUAL REPORT

Lewis Acid Promoted Reactions of Substituted Pentacyclo(5.4.0.0(2,6).0(3,10).0(5,9)undecane-8,11-diones with Ethyl Diazoacetate,
AD-A207858 REPORT DATE: 89 FINAL REPORT

Long Term Synaptic Plasticity and Learning in Neuronal Networks.
AD-A205993 REPORT DATE: 14 JAN 89 FINAL REPORT

Low Energy X-Ray and Electron Physics and Technology for High-Temperature Plasma Diagnostics.
AD-A206486 REPORT DATE: OCT 87 FINAL REPORT

Low Energy Atomic Collisions.
AD-A207216 REPORT DATE: 31 OCT 80 FINAL REPORT

Lumped Model Generation and Evaluation: Sensitivity and Lie Algebraic Techniques with Applications to Combustion
AD-A206683 REPORT DATE: 03 MAR 89 FINAL REPORT

Magnetosphere - Thermosphere Coupling: An Experiment in Interactive Modeling.
AD-A206881 REPORT DATE: 01 MAR 89 FINAL REPORT

The Mapping of Parallel Algorithms to Reconfigurable Parallel Architectures.
AD-A208870 REPORT DATE: MAY 86 FINAL REPORT

Markov Processes Applied to Control, Reliability and Replacement.
AD-A208634 REPORT DATE: APR 89 FINAL REPORT

Mathematical Modeling and Numerical Simulation of the Dynamics of Flexible Structures Subject to Large Overall Motions.
AD-A207004 REPORT DATE: 89 FINAL REPORT

Mathematical Techniques for System Realization and Identification.
AD-A207927 REPORT DATE: JUN 88 FINAL REPORT

Measurement of Rate Constants of Elementary Gas Reactions of Importance to Upper Atmosphere and Combustion Systems.
AD-A207138 REPORT DATE: 31 AUG 80 FINAL REPORT

Mechanism of the Claisen Rearrangement of Allyl Vinyl Ethers.
AD-A205531 REPORT DATE: 89 FINAL REPORT

Mesospheric Wind Measurement.
AD A205593 REPORT DATE: 29 SEP 88 FINAL REPORT

Metal/Metallion System in Low Temperature Molten Salts.
AD A208025 REPORT DATE: 24 MAR 89 FINAL REPORT

Metastable Negative Ions and Ion Pair Formation.
AD-A207886 REPORT DATE: 25 JAN 89 FINAL REPORT

Microjet Burners for Molecular-Beam Sources and Combustion Studies.
AD-A205793 REPORT DATE: SEP 88 FINAL REPORT

MM - Wave Components - SIS (Superconductor-Insulator-Superconductor) Mixers.
AD A208632 REPORT DATE: 26 89 FINAL REPORT

Modeling and Computational Algorithms for Parameter Estimation and Optimal Control of Aeroelastic Systems and Large Flexible Structures.
AD A208274 REPORT DATE: 15 FEB 89 FINAL REPORT

Modelling, Information, Processing, and Control.
AD A207810 REPORT DATE: 15 JAN 89 FINAL REPORT

Molecular Beam Epitaxial Growth of Hg(1-x)CdxTe.
AD A207218 REPORT DATE: JUN 80 FINAL REPORT

Molecular Optics Nonlinear Optical Processes in Organic and Polymeric Crystals and Films
AD A206372 REPORT DATE: APR 88 FINAL REPORT

Molecular State Evolution after Excitation with an Ultra-Short Laser Pulse: A Quantum Analysis of NaI and NaBr Dissociation,
AD-A205423 REPORT DATE: 04 NOV 88 ANNUAL REPORT

MPD Thruster Erosion Research.
AD-A205644 REPORT DATE: 30 NOV 88 FINAL REPORT

Multilayered Electronic Materials and Devices Based on III-V Compounds.
AD-A208861 REPORT DATE: DEC 88 FINAL REPORT

Multiphoton Detection Techniques for F and F2.
AD-A208576 REPORT DATE: 28 APR 89 ANNUAL REPORT

Multiresonant Spectroscopy and Dynamics of Molecular Extravalent States: State-Resolved Intramolecular Relaxation of NO2 Above 9 eV,
AD-A205841 REPORT DATE: 89 FINAL REPORT

Multivariate Analysis and Its Applications.
AD-A205585 REPORT DATE: 14 FEB 89 ANNUAL REPORT

Multi-Instrument Studies of the Auroral Ionosphere.
AD-A206733 REPORT DATE: 24 MAR 89 FINAL REPORT

Muscarinic Antagonist Enhances One-Trial Food-Aversion Learning in the Mollusc Pleurobranchaea.
AD-A208636 REPORT DATE: 15 MAR 89 FINAL REPORT

A Neural Network Approach to Model-Based Recognition.
AD-A206990 REPORT DATE: 01 FEB 89 ANNUAL REPORT

Neural Network Models of Vector Coding, Learning, and Trajectory Formation During Planned and Reactive Arm and Eye Movements.
AD-A206737 REPORT DATE: FEB 89 FINAL REPORT

Neural Networks for Visual Perception in Variable Illumination,
AD A206151 REPORT DATE: AUG 88 FINAL REPORT

A New Catalyst for the Efficient and Selective Beta-Hydrosilylation of Acrylonitrile. Effect of Ultrasound,
AD A206384 REPORT DATE: 89 ANNUAL REPORT

A New Perspective on Rutting in Flexible Pavements.
AD A205797 REPORT DATE: 24 FEB 89 FINAL REPORT

Nongenotoxic Mechanisms in Carcinogenesis: Role of Inhibited Intercellular Communication,
AD-A206877 REPORT DATE: 88 FINAL REPORT

Nonlinear Behavior in Optical and Other Systems.
AD-A207872 REPORT DATE: 30 SEP 86 FINAL REPORT

Nonlinear Dynamics and Control of Flexible Structures.
AD A208120 REPORT DATE: 30 MAR 89 ANNUAL REPORT

Nonlinear Spectroscopy of Multicomponent Droplets and Two- and Three-Dimensional Measurements in Flames.
AD-A205449 REPORT DATE: 27 JAN 89 ANNUAL REPORT

Nonlinear Stability in Fluid and Plasma Dynamics.
AD-A207715 REPORT DATE: 28 FEB 89 FINAL REPORT

Nonlinear Systems of Conservation Laws.
AD-A205837 REPORT DATE: 21 NOV 88 FINAL REPORT

Nonlocal and Quasilocal Potentials in the Spontaneous Emission of Molecular Exciplexes Coupled to the Phonon Bath of a Solid Matrix,
AD-A206883 REPORT DATE: 15 JAN 89 FINAL REPORT

Nonparametric Test of Independence for Censored Data.
AD-A207121 REPORT DATE: JUN 80 FINAL REPORT

Non Linear Dynamics and Chaotic Motions in Feedback Controlled Elastic System.
AD-A208628 REPORT DATE: 88 FINAL REPORT

Non Linear Optical Techniques for Thin Film Growth and Visible Ultraviolet Lasers.
AD A206811 REPORT DATE: 30 NOV 88 FINAL REPORT

Novel Organoboranes as Intermediates for Ceramic Precursors and High-Energy Fuels.
AD-A208101 REPORT DATE: 01 JAN 89 FINAL REPORT

Nuclear Magnetic Resonance and Laser Scattering Techniques at High Pressure,
AD-A206654 REPORT DATE: 87 FINAL REPORT

Numerical Analysis.
AD-A207000 REPORT DATE: 89 ANNUAL REPORT

Numerical Conformal Mapping and Applications.
AD-A205602 REPORT DATE: 18 JAN 89 ANNUAL REPORT

A Numerical Investigation of a Convectively Generated, Inertially Stable, Extratropical Warm-Core Mesovortex Over Land. Part 1. Structure and Evolution,
AD A208575 REPORT DATE: DEC 88 ANNUAL REPORT

Numerical Methods for Singularly Perturbed Differential Equations with Applications.
AD A207187 REPORT DATE: MAY 80 FINAL REPORT

Numerical Modeling of Two-Terminal Quantum Well Devices.
AD A208238 REPORT DATE: 17 APR 89 FINAL REPORT

Numerical Simulation of the Meso-Beta Scale Structure and Evolution of the 1977 Johnstown Flood. Part 3. Internal Gravity Waves and Squall Line,
AD A208574 REPORT DATE: 01 APR 88 ANNUAL REPORT

Numerical Solution of Ill Posed Problems in Partial Differential Equations.
AD-A207852 REPORT DATE: 30 JUN 88 FINAL REPORT

TITLE INDEX

A Numerical Study of an Augmented Lagrangian Method for the Estimation of Parameters in Elliptic Systems.
AD-A208658 REPORT DATE: JAN 89 FINAL REPORT

Observation of Adsorbate Vibrational Amplitude Modification during a Phase Transformation in the Overlayer.
AD-A206338 REPORT DATE: 19 DEC 88 FINAL REPORT

Observing Primeval Galaxies and Dark Matter with LAIRTS.
AD-A208286 REPORT DATE: 05 DEC 88 FINAL REPORT

On Selecting the Largest Success Probability under Unequal Sample Sizes.
AD-A207878 REPORT DATE: 89 FINAL REPORT

On the Electronic Structure of the He + H2 System: Characterization of, and Nonadiabatic Interactions between, the 1 1A' and 2 1A' Potential Energy Surfaces.
AD-A205835 REPORT DATE: 15 OCT 88 FINAL REPORT

On the Fundamental Solution of the Radiative Transfer Equation.
AD-A205361 REPORT DATE: 20 SEP 88 FINAL REPORT

On the Stability of Excited Tetrahydrogen.
AD-A207817 REPORT DATE: 88 FINAL REPORT

On the Use of Multiprocessing Computers for Global Numerical Weather Prediction.
AD-A206102 REPORT DATE: 15 FEB 89 FINAL REPORT

Operation and Upgrading of the Beam Optics Test Stand.
AD-A208626 REPORT DATE: FEB 89 FINAL REPORT

Optical Measurements of Soot Particles in Flames.
AD-A206238 REPORT DATE: 88 FINAL REPORT

Optically Controlled Devices and Ultrafast Laser Sources for Signal Processing.
AD-A208432 REPORT DATE: 09 FEB 89 FINAL REPORT

Optimum Aeroelastic Characteristics for Composite Supermaneuverable Aircraft.
AD-A205503 REPORT DATE: 27 NOV 88 FINAL REPORT

Organosilicon Compounds and Polymers and Silicon Ceramics.
AD A206589 REPORT DATE: 02 MAR 89 FINAL REPORT

Organo-Metallic Elements for Associative Information Processing.
AD-A206730 REPORT DATE: 15 JAN 89 FINAL REPORT

Parametric Analysis of Queueing Networks with Blocking.
AD-A206840 REPORT DATE: 01 NOV 88 FINAL REPORT

Partial Support of the International Laser Science Conference (3rd) Held in Atlantic City, New Jersey on 1 4 November 1987.
AD-A206812 REPORT DATE: DEC 88 FINAL REPORT

The Pasm Parallel Processing System: Design, Simulation, and Image Processing Applications. Volume 1.
AD A208739 REPORT DATE: 31 DEC 89 FINAL REPORT

Perception of Motion in Statistically-Defined Displays.
AD A208695 REPORT DATE: 15 APR 89 FINAL REPORT

Perceptual Constraints on Understanding Physical Dynamics.
AD A207129 REPORT DATE: 28 FEB 89 FINAL REPORT

Perceptual Structure and Shape from Texture.
AD A207873 REPORT DATE: 14 MAR 89 FINAL REPORT

Persistent, Efficient Frequency Doubling by Poled Annealed Films of a Chromophore Functionalized Poly(p-hydroxystyrene),
AD A208790 REPORT DATE: 88 FINAL REPORT

A Perturbation-Trajectory Method for the Study of Gas-Surface Collision Dynamics,
AD A207816 REPORT DATE: 89 FINAL REPORT

Perturbative Corrections to Basis Incompleteness in Molecular SCF Calculations,
AD A206593 REPORT DATE: 89

Photoionization Phenomena Near Threshold,
AD A208676 REPORT DATE: 89 FINAL REPORT

Physical-Chemical ...ies of Solutions Processing of Nematic Polymers.
AD A205921 EPORT DATE: 08 FEB 89 FINAL REPORT

Plasma Simulation of ...on Acceleration by Lower Hybrid Waves in the Suprauroral Region,
AD A206062 REPORT DATE: 27 SEP 88 ANNUAL REPORT

Plastic Deformation of Granular Materials.
AD A208589 REPORT DATE: 31 MAR 89 FINAL REPORT

Point Defects in Semiconductors: Microscopic Identification, Metastable Properties, Defect Migration, and Diffusion.
AD A206947 REPORT DATE: 31 MAR 89 FINAL REPORT

Poled Polymeric Nonlinear Optical Materials. Enhanced Second Harmonic Generation Stability of Cross-Linkable Matrix/Chromophore Ensembles,
AD A208791 REPORT DATE: 89 FINAL REPORT

Poled Polymeric Second Harmonic Generation Materials. Chemical Manipulation of the Temporal Characteristics of Electric Field Induced Noncentrosymmetry,
AD A208788 REPORT DATE: 88 FINAL REPORT

Polyphosphazenes and their Relationship to Ceramics and Metals,
AD A205564 REPORT DATE: 06 JAN 89 FINAL REPORT

Population Inversions in Ablation Plasmas Generated by Intense Electron Beams
AD A205716 REPORT DATE: NOV 88 FINAL REPORT

Potential Complex-Lamellar Decomposition of Fluid Flows.
AD-A207111 REPORT DATE: 30 JUN 80 FINAL REPORT

Po/So Phases: Propagation Velocity Across a 1,500-km-Long, Deep Ocean Hydrophone Array.
AD-A208783 REPORT DATE: 87 FINAL REPORT

Preparation of Sic/AIN Solid Solutions Using Organometallic Precursors.
AD-A206998 REPORT DATE: 15 FEB 89 FINAL REPORT

Pressure Effect on the Product Distribution in Competing Reactions: Formation of a Bis Diels-Alder Adduct Via an Aromatizable Intermediate.
AD-A207867 REPORT DATE: 02 FEB 89 FINAL REPORT

Probabilistic Description of Fatigue Crack Growth Under Constant-and Variable-Amplitude Loading.
AD-A208717 REPORT DATE: MAR 89 FINAL REPORT

Problems in Dynamic Phase Transition.
AD-A207027 REPORT DATE: 18 NOV 88 FINAL REPORT

Proceedings of the Connectionists Models Summer School Held in Pittsburgh, Pennsylvania on June 17-26, 1988.
AD-A207014 REPORT DATE: 19 FEB 89 FINAL REPORT

Projection Methods for Obtaining Intramodular Energy Transfer Rates from Classical Trajectory Results: Application to 1, 2-Difluoroethane.
AD-A205566 REPORT DATE: 01 NOV 88 FINAL REPORT

Propagation and Saturation of Nonlinear Inertia-Gravity Waves in the Atmosphere.
AD-A207871 REPORT DATE: 14 APR 89 FINAL REPORT

Pseudomorphic In(x).
AD-A207037 REPORT DATE: 31 MAR 89 ANNUAL REPORT

The Pyrolysis of Acetylene Initiated by Acetone.
AD-A206879 REPORT DATE: 89 FINAL REPORT

Qualitative Results for Distributed Systems.
AD-A207005 REPORT DATE: 04 OCT 88 FINAL REPORT

Radon Transform Analysis of a Probabilistic Method for Image Generation.
AD-A207814 REPORT DATE: 12 APR 89 ANNUAL REPORT

Raman Study of Solid State Reactions.
AD-A207140 REPORT DATE: 31 AUG 80 FINAL REPORT

Rapidly Convergent Algorithms for Nonsmooth Optimization.
AD-A207629 REPORT DATE: 15 DEC 88 FINAL REPORT

Reaction Kinetics and Chemo-Rheology of Poly(p-phenylenebenzobisthiazole) Polymerization in the Ordered Phase.
AD-A206591 REPORT DATE: JUL 88

TITLE INDEX

Reaction Probability for the Spontaneous Etching of Silicon by CF3 Free Radicals.
AD A205534 REPORT DATE: 88 FINAL REPORT

Reactions of Laser-Generated CF2 (Free Radicals) on Silicon and Silicon Oxide Surfaces.
AD A206599 REPORT DATE: 89 FINAL REPORT

Reactions of (eta 5-C5H5)(eta 5-C5Me5)Zr(Si(SiMe3)3)X (X = Cl, Me) Complexes with Carbon Monoxide and the Isocyanide 2, 6-Me2C6H3NC. Crystal Structure of (eta 5 C5H5)-(eta 5 -C5Me5)Zr(eta 2-C(N-2,6 Me2C6H3)Si(SiMe3)3)Cl,
AD-A206494 REPORT DATE: 88 ANNUAL REPORT

Reciprocal Interactions of Hairpin-Shaped Vortices and a Boundary Layer.
AD A206980 REPORT DATE: 31 DEC 88 FINAL REPORT

Recognizing 3 D Objects from 2D Images Using Structural Knowledge Base of Genetic Views.
AD-A207875 REPORT DATE: 31 AUG 88 FINAL REPORT

Reduced Potential Energy Curves for Diatomic Molecules,
AD A206206 REPORT DATE: 01 FEB 89 FINAL REPORT

Reductive Coupling of Carbonyl Compounds with Zinc and Trimethylchlorosilane to Produce O Silylated Pinacols. Effect of Ultrasonic Waves,
AD-A206289 REPORT DATE: 88 FINAL REPORT

Regulation of Nonlinear and Generalized Linear Systems.
AD A207725 REPORT DATE: 14 SEP 88 FINAL REPORT

Relative Energies of Silaethylene and Methylsilylene.
AD A205368 REPORT DATE: 88 FINAL REPORT

Report of the Gordon Research Conference on Multiphoton Processes Held in New London, New Hampshire on 13-17 June 1988.
AD A205414 REPORT DATE: 06 JUL 88 FINAL REPORT

Report to the Air Force Office of Scientific Research on Grant Number AFOSR-88-0108 for the Partial Support of the 1988 Gordon Conference on Polymers (West).
AD-A205834 REPORT DATE: 25 JAN 89 FINAL REPORT

Representation of Shift Invariant Operators on L2 by H at Infinity Transfer Functions: An Elementary Proof, a Generalization to L Rho and a Counterexample for L at Infinity,
AD A207736 REPORT DATE: MAR 89 FINAL REPORT

Research in Knowledge Delivery.
AD-A208327 REPORT DATE: 28 MAR 89 FINAL REPORT

Research Proposal Quarterly Status Report for July-September 1988,
AD A206810 REPORT DATE: OCT 88 FINAL REPORT

Resonance in Weakly Nonlinear Systems.
AD A207115 REPORT DATE: MAY 80 FINAL REPORT

TITLE INDEX

Role of Adenosine Analogs and Growth Hormone in Waking and Sleep.
AD-A205605 REPORT DATE: 16 FEB 89 FINAL REPORT

The Role of Chemical Inhibition of Gap-Junctional Intercellular Communication in Toxicology.
AD-A207130 REPORT DATE: MAR 89 FINAL REPORT

Routing and Singular Control for Queueing Networks in Heavy Traffic.
AD-A208568 REPORT DATE: APR 89 FINAL REPORT

A RUTCOR Project on Discrete Applied Mathematics.
AD-A208572 REPORT DATE: 30 JAN 89 FINAL REPORT

Self Diffusion in the Compressed, Highly Viscous Liquid 2-Ethylhexyl Benzoate.
AD-A205294 REPORT DATE: 88 ANNUAL REPORT

Self-Organizing Neural Architectures for Eye Movements, Arm Movements, and Eye-Arm Coordination.
AD A206153 REPORT DATE: 88 FINAL REPORT

Self-Organizing Neural Network Architectures for Real-Time Adaptive Pattern Recognition.
AD-A206122 REPORT DATE: 88 FINAL REPORT

Sieves, Signal Extraction, and Design.
AD-A205840 REPORT DATE: 04 JAN 89 FINAL REPORT

Signal Processing.
AD-A206662 REPORT DATE: 28 FEB 89 FINAL REPORT

The Silanoic Acid Dimer (HSiOOH)2: A Simple Molecular System Incorporating Two Very Strong Hydrogen Bonds.
AD-A208774 REPORT DATE: 89 FINAL REPORT

Singular and Bang-Bang Stochastic Control.
AD-A208627 REPORT DATE: 88 FINAL REPORT

Solid State 29Si and 11B NMR (Nuclear Magnetic Resonance) Studies of Sol-Gel Derived Borosilicates.
AD-A205295 REPORT DATE: 88 ANNUAL REPORT

Solutions to a Class of Nonstandard Stochastic Control Problems with Active Learning.
AD-A207803 REPORT DATE: DEC 88 FINAL REPORT

Solving the Brightness-from-Luminance Problem: A Neural Architecture for Invariant Brightness Perception.
AD A206890 REPORT DATE: FEB 89 FINAL REPORT

Some Mathematical Problems in Continuum Mechanics
AD A207923 REPORT DATE: 29 SEP 88 FINAL REPORT

Some Remarks on Reachability of Infinite Dimensional Linear Systems
AD A207112 REPORT DATE: MAR 79 FINAL REPORT

A Source for Producing Alkali Ion Beams for Low Energy Surface Scattering Spectroscopies.
AD A208022 REPORT DATE: APR 89 FINAL REPORT

Special Year on Numerical Linear Algebra.
AD A208199 REPORT DATE: 01 SEP 88 FINAL REPORT

Spectrometric Studies of Gas Phase Collision Processes.
AD A205570 REPORT DATE: 10 FEB 89 FINAL REPORT

Spectroscopic Diagnostics of Electron Temperature and Energy Conversion Efficiency of Laser-Sustained Plasma in Flowing Argon.
AD A207054 REPORT DATE: 25 AUG 88 FINAL REPORT

Spin Forbidden Radiative Decay Involving Quasidegenerate States. Application to the Beta 1 Sigma+ Yields a 3 Pi Transition in MgO.
AD A205836 REPORT DATE: 15 DEC 88 FINAL REPORT

State Space Models for Aeroelastic and Viscoelastic Systems.
AD-A207092 REPORT DATE: 15 FEB 89 ANNUAL REPORT

State to State Collision Induced Dissociation and Gas/Surface Interactions.
AD-A206676 REPORT DATE: 01 MAR 89 FINAL REPORT

Statistical Analysis of the LMS and Modified Stochastic Gradient Algorithms.
AD-A208618 REPORT DATE: 14 MAY 89 ANNUAL REPORT

Stereo Boundary Fusion by Cortical Complex Cells: A System of Maps, Filters, and Feedback Networks for Multiplexing Distributed Data.
AD A205507 REPORT DATE: 89 FINAL REPORT

Sticking Coefficient of the SiH2 Free Radical on a Hydrogenated Silicon-Carbon Surface.
AD-A205532 REPORT DATE: JAN 89 FINAL REPORT

Stochastic Systems with Multiple Decision Makers and Parametric Uncertainties.
AD A206655 REPORT DATE: 20 JUN 88 FINAL REPORT

Strength and Structure of Ga(1-x)In(x)As Alloys.
AD-A205415 REPORT DATE: 31 JAN 89 FINAL REPORT

The Structure and Control of Three-Dimensional Shock Wave Turbulent Boundary Layer Interactions.
AD-A205923 REPORT DATE: 14 FEB 89 FINAL REPORT

The Structure of Normal Shock/Turbulent-Boundary-Layer Interactions Modified by Mass Removal.
AD A208402 REPORT DATE: 28 FEB 89 FINAL REPORT

Structure of the Near-Injector Region of Non-Evaporating Pressure-Atomized Sprays.
AD-A206237 REPORT DATE: JAN 89 FINAL REPORT

The Structures of Three Strained Cage Molecules.
AD A207868 REPORT DATE: 89 FINAL REPORT

Studies in Stabilization and Control of Beams and Plates
AD A208635 REPORT DATE: 31 AUG 88 FINAL REPORT

TITLE INDEX

Studies of Frontal Zone Dynamics with a High-Resolution Wind Profiling System.
AD-A205988 REPORT DATE: 15 JAN 89 FINAL REPORT

Studies of the Propagation of Short Burst, High Power Microwave Radiation through Neutral and Ionized Media.
AD-A208664 REPORT DATE: MAR 89 FINAL REPORT

Studies on Ions and Neutrals Desorbed from Solid Surfaces by Ion and Electron Bombardment.
AD-A206734 REPORT DATE: 24 MAR 89 FINAL REPORT

Study of the Influence of Metallurgical Factors on Fatigue and Fracture of Aerospace Structural Materials.
AD-A206605 REPORT DATE: 01 MAR 89 FINAL REPORT

Study of the Infrared Celestial Background.
AD-A205649 REPORT DATE: 30 SEP 88 FINAL REPORT

A Study of the Nephrotoxicity and Metabolism of Tetralin and Indan in Fischer 344 Rats
AD-A208588 REPORT DATE: 01 MAY 89 FINAL REPORT

Subpicosecond Optical Digital Computation Using Conjugate Parametric Generators.
AD-A207908 REPORT DATE: 31 MAR 89 FINAL REPORT

Summary Abstract: Spontaneous Thermal Etching of Silicon by CF3 Radicals,
AD-A205535 REPORT DATE: 88 FINAL REPORT

Superconducting Oxide Films for Multispectral Infrared Sensors.
AD-A206685 REPORT DATE: 07 FEB 89 FINAL REPORT

Superconductivity and Magnetism in Layered Materials.
AD-A208487 REPORT DATE: 16 MAY 89 FINAL REPORT

Surface Plasmon Study of Monolayer-Bilayer Transition in Poly-4-BCMU and Poly-3-BCMU Polydiacetylene Langmuir-Blodgett Films,
AD-A207404 REPORT DATE: 89 FINAL REPORT

Sustained Oscillations in a Symmetric Cooperative-Competitive Neural Network: Disproof of a Conjecture about Content Addressable Memory,
AD-A206377 REPORT DATE: 88 ANNUAL REPORT

Sustained Oscillations in a Symmetric Cooperative-Competitive Neural Network: Disproof of a Conjecture About Content Addressable Memory,
AD-A206154 REPORT DATE: 88 FINAL REPORT

Symposium: Better Ceramics Through Chemistry III. Volume 121.
AD A207128 REPORT DATE: 26 AUG 88 FINAL REPORT

Synthesis and Photodegradation of Poly(2,5, bis(dimethylsilyl)thiophene),
AD A208802 REPORT DATE: 89 FINAL REPORT

Synthesis of Primary Alcohol-Terminated Polyepichlorohydrin with Molecular Weight of 4000 to 12000.
AD A207624 REPORT DATE: 30 MAR 89 FINAL REPORT

TITLE INDEX

Synthesis of 4,4,8,8,11,11-Hexanitropentacyclo(5.4.0.0(2,6).0(3,10).0(5,9)-undecane.
AD-A207869 REPORT DATE: 89 FINAL REPORT

Theoretical Analysis of Models for Texture.
AD-A208486 REPORT DATE: MAR 80 FINAL REPORT

Theoretical Investigations of Chaotic Dynamics.
AD-A207724 REPORT DATE: 30 NOV 88 FINAL REPORT

Theoretical Investigations of Molecules Composed only of Fluorine, Oxygen and Nitrogen: Determination of the Equilibrium Structures of FOOF, (NO)2 and FNNF and the Transition State Structure for FNNF cis-transisomerization.
AD-A208720 REPORT DATE: 89 FINAL REPORT

Theory and Experimental and Chemical Instabilities.
AD-A205571 REPORT DATE: 31 JAN 89 ANNUAL REPORT

Theory and Implementation of the MBPT Density Matrix. An Application to One-Electron to One-Electron Properties.
AD-A205833 REPORT DATE: 10 JUN 88 FINAL REPORT

Thermodynamics of High Temperature Materials.
AD-A207139 REPORT DATE: SEP 79 FINAL REPORT

Thermodynamics of Organic Compounds.
AD-A207120 REPORT DATE: 80 FINAL REPORT

Thermotropic Ionic Liquid Crystals. 6. Structural Parameters of Solid and Liquid Crystal Phases of Anhydrous Short-Chain Sodium Alkanoates.
AD-A206832 REPORT DATE: 87 ANNUAL REPORT

Thermotropic Ionic Liquid Crystals. 7. Calculation of Sodium-23 Quadrupole Coupling Constants in Lamellar Phases of Sodium Alkanoates.
AD-A205293 REPORT DATE: 01 APR 87

Three Dimensional Flow and Temperature Profile Attenuation in an Axial Flow Turbine.
AD-A206736 REPORT DATE: 15 MAR 89 FINAL REPORT

Three Dimensional High Speed Boundary Layer Flows.
AD-A206145 REPORT DATE: 28 SEP 88 FINAL REPORT

Three-Dimensional Modelling for Contact Resistance of Current Flow into a Source/Drain Region.
AD A206694 REPORT DATE: 31 MAY 88 FINAL REPORT

Three-Dimensional Structure of Boundary Layers in Transition to Turbulence.
AD-A205587 REPORT DATE: 06 FEB 89 FINAL REPORT

Three-Dimensional Vortex Interactions in Turbulent Boundary Layers.
AD-A208624 REPORT DATE: 15 APR 89 FINAL REPORT

Transonic Aerodynamics.
AD A207109 REPORT DATE: AUG 80 FINAL REPORT

Two Methods for Solving the Inverse Acoustic Scattering Problem.
AD-A205360 REPORT DATE: 88 FINAL REPORT

Ultrafast Chemical Reactions in the Liquid State.
AD-A206155 REPORT DATE: 88 FINAL REPORT

Ultrasmall Holographic X-Ray Gratings Using Synchrotron Radiation and X-Ray Lithographic Techniques.
AD-A206731 REPORT DATE: NOV 88 FINAL REPORT

Ultrasonic Nondestructive Evaluation of Damage in Continuous Fiber Composites.
AD-A205713 REPORT DATE: NOV 87 FINAL REPORT

Ultrasonic Nondestructive Evaluation of Damage in Continuous Fiber Composites.
AD-A208840 REPORT DATE: 89 FINAL REPORT

Uncertainties in Soil Constitutive Behavior. Revision.
AD-A205924 REPORT DATE: 01 FEB 89 FINAL REPORT

A Uniformly Differentiable Approximation Scheme for Delay Systems Using Splines.
AD-A208567 REPORT DATE: APR 89 FINAL REPORT

Unsteady and Separated Flows.
AD-A206539 REPORT DATE: 30 NOV 88 ANNUAL REPORT

Unsteady Flows Around Three-Dimensional Lifting Surfaces.
AD-A206331 REPORT DATE: NOV 85 FINAL REPORT

Use of Four-Dimensional Data Assimilation by Newtonian Relaxation and Latent-Heat Forcing to Improve a Mesoscale Model Precipitation Forecast: A Case Study.
AD-A208573 REPORT DATE: DEC 88 ANNUAL REPORT

Variability and Chaos: Neurointegrative Principles in Self-Organization of Motor Patterns.
AD-A208864 REPORT DATE: 15 MAR 89 ANNUAL REPORT

Versatile Apparatus for Low-Energy and Hyperthermal Energy Ion Scattering Spectroscopies.
AD-A205832 REPORT DATE: DEC 88 FINAL REPORT

Vibrational, Mechanical, and Thermal Properties of III-V Semiconductors.
AD-A206590 REPORT DATE: 14 FEB 89 FINAL REPORT

Visual Information-Processing in the Perception of Features and Objects.
AD-A206948 REPORT DATE: 05 JAN 89 ANNUAL REPORT

Vortex Dynamics and Vortex Breakdown.
AD-A206470 REPORT DATE: 16 AUG 88 ANNUAL REPORT

Vortices in Long Josephson Junctions.
AD-A207936 REPORT DATE: 05 FEB 89 FINAL REPORT

TITLE INDEX

Wavefront Propagation for Reaction-Diffusion Systems of PDE.
AD-A207737 REPORT DATE: MAR 89 FINAL REPORT

Working Memory Capacity: An Individual Differences Approach.
AD-A207127 REPORT DATE: 27 FEB 89 FINAL REPORT

Workshop on Decision Information for Tactical Command and Control.
AD-A208569 REPORT DATE: 77 FINAL REPORT

X Ray Absorption Spectroscopy of Electrochemically Generated Species.
AD-A205572 REPORT DATE: 27 JAN 89 ANNUAL REPORT

Yield Estimation from Spectral Amplitudes of Direct P and P Coda Recorded by the Wake Island Deep Ocean Hydrophone Array.
AD-A208784 REPORT DATE: OCT 87 FINAL REPORT

2,3:6,7-Bis(2'3'-quinolino)pentacyclo(6.5.0.0(4,12).0(5,10).0(9,13)tridecane.
AD-A207859 REPORT DATE: 88 FINAL REPORT

27Al and 29Si NMR (Nuclear Magnetic Resonance) Study of Sol-Gel Derived Aluminosilicates and Sodium Aluminosilicates.
AD-A208262 REPORT DATE: 88 FINAL REPORT

3 + 2) Resonance Enhanced Multiphoton Ionization of I and Br Formed from the Infrared Multiphoton Decomposition of CF3I and CF3Br.
AD-A205537 REPORT DATE: 88 FINAL REPORT

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-B130 800 11/4

AEROJET ELECTROSYSTEMS CO AZUSA CA

(U) Investigation of the Feasibility of Engel-Brewer Compounds as High Temperature Oxidation-Resistand Coatings for Carbon-Carbon Composite Materials.

DESCRIPTIVE NOTE: Annual rept. 10 Dec 87-31 Dec 88,

DEC 88

PERSONAL AUTHORS: Alvey, Mark D.; George, Patricia M.

CONTRACT NO. F49620-88-C-0005

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR
TR-89-0236

UNCLASSIFIED REPORT

Distribution authorized to U.S. Gov't. agencies and their contractors; Specific Authority; 13 Mar 89. Other requests shall be referred to Air Force Office of Scientific Research, Bldg. 40, Bolling AFB, Washington, DC 20332-6448.

ABSTRACT: (U) Sample procurement and fabrication was the main thrust of the research effort in the past year. This was not an easy task as zirconium triplatinide, hafnium tri-iridinide and carbon-carbon composites coated with these materials were not commercially available. Representative samples of each material were fabricated. The cleaning, characterization and oxidation of polycrystalline zirconium triplatinide was performed with the following results. Argon ion bombardment at 2 kilo electron volts for 1 200 seconds removed carbon and oxygen contamination from vacuum chamber residual gases below observable levels, once the sample had been initially cleaned for approximately 18 000 seconds. Auger electron spectroscopy showed that the near surface region of the sample was stoichiometric in composition, and oxidation of zirconium triplatinide occurred above 1425 Kelvin. A method of coating carbon-carbon composites was initiated during the research period. Carbon carbon composites, Engel-Brewer hafnium, Iridium, Platinum,

AD-B130 800

AD-B130 800 CONTINUED

Zirconium. (JES)

DESCRIPTORS: (U) *CARBON CARBON COMPOSITES, ARGON, AUGER ELECTRON SPECTROSCOPY, CARBON, COATINGS, CONTAMINATION, ELECTRONS, ION BOMBARDMENT, IRIDIUM, OXIDATION, OXYGEN, PLATINUM, POLYCRYSTALLINE, PROCUREMENT, REGIONS, SURFACES, VOLTAGE.

IDENTIFIERS: (U) WUAFOSR2306A2, PE61102F.

AD B130 800

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EV132L

AD-A208 873 11/4

ISRAEL INST OF METALS HAIFA

(U) Coating and Impregnation of Carbon-Carbon Composites with Ceramics by Electrophoretic Deposition.

DESCRIPTIVE NOTE: Final scientific rept. 1 Mar 88-28 Feb 89.

APR 89 84P

PERSONAL AUTHORS: Gal-Or, L.; Liubovich, S.

CONTRACT NO. AFOSR-88-0097

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR TR 89-0685

UNCLASSIFIED REPORT

ABSTRACT: (U) Electrophoretic deposition of ceramic coatings on porous graphite and on a 2D C-C composite was studied using colloidal and fused SiO2, SiC and SiN. It was shown that all these ceramic materials acquire an electric charge and hence deposit under the electric field. In addition to the formation of a surface deposit, the induction of particles into the pores of porous graphite was demonstrated. The effects of deposition voltage, solvent properties and particle concentration on penetration were studied by examination of cross-sections in the SEM and by quantitative analysis of induced SiO2. Ceramic deposits of CeO2, ZrO2 and Al2O3 were formed on graphite and 2D C-C by an electrochemical reduction of aqueous solutions containing inorganic salts of the appropriate metals. (jes)

DESCRIPTORS: (U) *CARBON CARBON COMPOSITES, ADDITION, CERAMIC COATINGS, CERAMIC MATERIALS, COATINGS, DEPOSITION, DEPOSITS, ELECTRIC CHARGE, ELECTRIC FIELDS, ELECTROCHEMISTRY, ELECTROPHORESIS, GRAPHITE, IMPREGNATION, INDUCTION SYSTEMS, INORGANIC COMPOUNDS, METALS, PARTICLES, POROUS MATERIALS, QUANTITATIVE ANALYSIS, REDUCTION, SALTS, SOLUTIONS(MIXTURES), SOLVENTS, SURFACES, VOLTAGE, WATER.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A2

AD A208 873

AD-A208 870 12/5 12/6

PURDUE UNIV LAFAYETTE IN

(U) The Mapping of Parallel Algorithms to Reconfigurable Parallel Architectures.

DESCRIPTIVE NOTE: Final rept.,

MAY 86 7P

PERSONAL AUTHORS: Jamieson, Leah H.; Siegel, Howard J.; Delp, Edward J.; Whinston, Andrew

CONTRACT NO. F49620-86-K-0006

MONITOR: AFOSR TR-89-0731

UNCLASSIFIED REPORT

ABSTRACT: (U) One of the significant problems which must be addressed if we are to realize the computing potential offered by parallel architectures has to do with developing a better understanding of the relationship between parallel algorithms and parallel architectures. In this paper research on the mapping of algorithms to reconfigurable parallel architectures is presented. The thrust of this work is in identifying those characteristics of parallel algorithms which have the greatest effect on their execution, and in identifying a correspondence between those characteristics and the characteristics of parallel architectures. The context of this work is in the design of an Intelligent Operating System for the PASM reconfigurable multimicroprocessor system. The task of the Intelligent Operating System will be to direct the selection and scheduling of algorithms and the configuring of the architecture for the execution of an image understanding system. Reprints. (RH)

DESCRIPTORS: (U) *ALGORITHMS, *ARCHITECTURE, *MICROPROCESSORS, *PARALLEL PROCESSING, *SCHEDULING, MAPPING, MULTIPLE OPERATION, PAPER, PARALLEL ORIENTATION, REPRINTS.

IDENTIFIERS: (U) PE61102F.

AD-A208 870

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 866 7/4 7/3 21/2

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) The Determination of Rate-Limiting Steps during Soot Formation.

DESCRIPTIVE NOTE: Annual rept. 1 Feb 88-31 Jan 89,

APR 89 82P

PERSONAL AUTHORS: Colket, M. B.; Hall, R. J.; Sangiovanni, J. J.; Seery, D. J.

REPORT NO. UTRC89-13

CONTRACT NO. F49620-88-C-0051

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-89-0715

UNCLASSIFIED REPORT

ABSTRACT: (U) A single-pulse shock tube has been used to examine toluene pyrolysis and the rich oxidation of benzene diluted in argon over the temperature range of 1200 to 2000K and at total pressures of ten to thirteen atmospheres. Dwell times were about 500 microseconds. Collected gas samples were analyzed using gas chromatography for hydrogen, carbon oxides and C1- to C14- hydrocarbons. Low molecular weight products during benzene oxidation include cyclopentadiene and vinylacetylene and support literature proposals for oxidation of benzene. High molecular weight products are dominated by species containing mixtures of five- and six-membered rings. During toluene pyrolysis very rapid production of polyaromatic hydrocarbons occurs between 1400 and 1450K, consistent with temperatures at which particle inception occurs in diffusion flames. (aw)

DESCRIPTORS: (U) *BENZENE, *OXIDATION, *PYROLYSIS, *SOOT, *TOLUENES, *REACTION KINETICS, ARGON, CARBON, CYCLOPENTENES, DIFFUSION, DWELL TIME, FLAMES, GAS CHROMATOGRAPHY, GASES, HYDROCARBONS, HYDROGEN, LIGHTWEIGHT, MOLECULAR WEIGHT, OXIDES, PARTICLES, PENTADIENES, RINGS, SAMPLING, TEMPERATURE, ACETYLENE, VINYL RADICALS.

IDENTIFIERS: (U) Cyclopentadiene, Vinylacetylene, Diffusion flames.

AD-A208 866 CONTINUED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 864 6/3

OREGON STATE UNIV CORVALLIS

(U) Variability and Chaos: Neurointegrative Principles in Self-Organization of Motor Patterns.

DESCRIPTIVE NOTE: Rept. for 1 Oct 86-14 Jan 89,

MAR 89 31P

PERSONAL AUTHORS: Mpitsos, G. J.; Creech, H. C.; Cohan, C. S.; Mendelson, M.

CONTRACT NO. AFOSR-86-0076

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR
TR-89-0705

UNCLASSIFIED REPORT

ABSTRACT: (U) We discuss the possibility that variability may be a central feature of self-organizing processes. We suggest that variability may be inherently part of the mechanisms by which adaptive neurocircuits emerge, and contrast such functional neurocircuits against definitions involving anatomical or dynamical structures which the self-organizational definition both contains and supercedes. The experimental work focuses on an invertebrate animal, the sea slug, Pleurobranchaea californica, which has a rich behavioral repertoire of buccal/oral behaviors, and a relatively simple nervous system containing identifiable neurons. We present evidence from work on a set of 20 neurons, which we refer to as BCNs (buccal-cerebral neurons), that communicate between the buccal ganglion and cerebral ganglion. These neurons are crucial for generating all buccal/oral behaviors, and provide an advantageous source of experimental material for inquiring into the self-organization of group activity. Variability in the activity of the BCNs, and in the motoneurons that they drive, is attributable to low-dimensional chaos. These findings indicate that some variability may arise from the same mechanisms that generate the patterned activity: i.e., that the observed variations are not noise that is superimposed on the code underlying a behavior. The role

AD-A208 864 CONTINUED

of sensory feedback in the production of adaptive behavior of animals as they interact with complex and often unpredictable environments is discussed and we suggest that chaotic neural activity provides a means for the nervous system to create new informational space rendering animals more stably adaptable in such changing environments. (AW)

DESCRIPTORS: (U) *MOTOR NEURONS, *NEURAL NETS, *NERVE TRANSMISSION, ANATOMY, BEHAVIOR, CEREBRUM, DYNAMICS, FEEDBACK, GANGLIA, INVERTEBRATES, MATERIALS, NERVE CELLS, NERVOUS SYSTEM, PATTERNS, PRODUCTION, SELF ORGANIZING SYSTEMS, SENSES(PHYSIOLOGY), SOURCES, MOUTH, GASTROPODA.

IDENTIFIERS: (U) Self organization, *Neurocircuits, Buccal oral behavior, Sea slugs, Pleurobranchaea California, Adaptive neurocircuits.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 861 20/12

WASHINGTON UNIV SEATTLE

(U) Multilayered Electronic Materials and Devices Based on III-V Compounds.

DESCRIPTIVE NOTE: Final rept. 1 Oct 86-30 Sep 88,

DEC 88 13P

PERSONAL AUTHORS: Olsen, Larry C.

CONTRACT NO. AFOSR-87-0034

PROJECT NO. 2917

TASK NO. A6

MONITOR: AFOSR
TR-89-0732

UNCLASSIFIED REPORT

ABSTRACT: (U) The objectives of this program were to purchase and install a Metal Organic Chemical Vapor Deposition (MOCVD) system in the Electronic Materials Laboratory at the Tri-Cities University Center of the University of Washington. This system would be used to grow films of III-V compounds. This reactor will be used to grow layered structures based on Gallium Arsenide, AlxGa1-xAs, InyGa(1-y)As or GaAsxP1-x. Prior to shipping the MOCVD system, Spire personnel grew GaAs films on GaAs substrates with the TUC 500XT reactor. Excellent results were obtained. Films grown on two-inch wafers exhibited a thickness uniformity of better than 2% and a doping uniformity better than 4.5%. With three-inch wafers, films were characterized by a thickness uniformity of 4% and doping uniformity of 8%. They also found that the Aluminum Gallium Arsenide composition uniformity was better than 2% for AlGaAs films grown on two-inch waters. Finally, the background doping in epitaxial GaAs films grown with the TUC reactor was determined to be less than 1.5x10 to the 14th power/CC. These performance figures represent a significant improvement in GaAs epitaxial film growth. (AW)

DESCRIPTORS: (U) *SEMICONDUCTING FILMS, *GALLIUM ARSENIDES, *VAPOR DEPOSITION, ALUMINUM GALLIUM ARSENIDES, BACKGROUND, CHEMICAL COMPOSITION, DOPING, ELECTRONIC

AD A208 861

AD-A208 861 CONTINUED

EQUIPMENT, ELECTRONICS LABORATORIES, EPITAXIAL GROWTH, GALLIUM COMPOUNDS, GROUP III COMPOUNDS, GROUP V COMPOUNDS, LAYERS, MATERIALS, STRUCTURES, SUBSTRATES, THICKNESS, WAFERS, WATER, INDIUM, PHOSPHIDES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A6, *Metal organic chemical vapor deposition, MOCVD (Metal Organic Chemical Vapor Deposition).

AD A208 861

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD A208 847 12/1

UNIVERSITY OF SOUTH FLORIDA TAMPA

(U) Investigations in Improved Iterative Methods for Solving Sparse Systems of Linear Equations.

DESCRIPTIVE NOTE: Final rept. 1 Jun 79-31 May 80,

AUG 80 4P

PERSONAL AUTHORS: Saff, E. B.

CONTRACT NO. F49620-79-C-0102

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-89-0681

UNCLASSIFIED REPORT

ABSTRACT: (U) Research conducted by the principal investigator during the period June 1, 1979 to May 31, 1980, resulted in the following research articles which have either appeared in print, or have been accepted in refereed mathematical journals, in this period: Inequalities for polynomials with a prescribed zero; On the Enestrom Kakeya Theorem and Its Sharpness; Bounds for incomplete polynomials vanishing at both endpoints of an interval; Remarks on some conjectures of G. G. Lorentz; On incomplete polynomials; An extension of the Enestrom-Kakeya Theorem and its sharpness; On zeros of generalized Bessel polynomials; Incomplete factorizations of matrices and connections with H-matrices; On two conjectures on the zeros of generalized Bessel polynomials; Incomplete polynomials: an electrostatic approach; An introduction to the Convergence Theory of Pade' Approximants. (kr)

DESCRIPTORS: (U) *ITERATIONS, CONVERGENCE, ELECTROSTATICS, INEQUALITIES, MATRICES(MATHEMATICS), LINEAR ALGEBRAIC EQUATIONS, MATHEMATICS, PERIODICALS, POLYNOMIALS, THEORY.

IDENTIFIERS: (U) WUAFOSR2304A3.

AD A208 847

AD-A208 841 12/1 17/7.3

UNIVERSITY OF WEST FLORIDA PENSACOLA DEPT OF SYSTEMS SCIENCE

(U) An Investigation of Estimation Techniques in Optimally Guided Air-to-Air Missiles.

DESCRIPTIVE NOTE: Final rept. Jun-Sep 81,

NOV 81 14P

PERSONAL AUTHORS: Harbor, Royce D.

CONTRACT NO. AFOSR-81-0180

PROJECT NO. 2307

TASK NO. D9

MONITOR: AFOSR TR-89-0687

UNCLASSIFIED REPORT

ABSTRACT: (U) In previous work the author sought to explain the fact that certain states estimated by an extended Kalman filter differed significantly from the same quantities generated by a truth model. Results indicated that the probable cause for this behavior was the state model of the system used in the extended Kalman filter. In the present work the study was extended to include the treatment of differences observed in system behavior when under the influence of extended Kalman filters based upon six-state and nine-state models. When the apparent anomalies in system performance are viewed in the light of filter modeling limitations, the performance of both the six-state and nine-state filters appear to be well within the bounds of expectation. A similar statement could be made for the relative performance between the two filters. Clearly, the six-state filter would not be satisfactory in a realistic environment. The nine-state filter, however, while performing quite well for the runs examined, might be made still better through improvements in its state model. Keywords: Mathematical filter estimations; Air to air missiles; Optimal guidance. (EDC)

DESCRIPTORS: (U) *ESTIMATES, *GUIDANCE, *KALMAN FILTERING, AIR TO AIR MISSILES, ANOMALIES, GUIDED

AD-A208 841

AD-A208 841 CONTINUED

MISSILES, LIMITATIONS, MATHEMATICAL FILTERS, MATHEMATICAL MODELS, OPTIMIZATION.

IDENTIFIERS: (U) Extended Kalman filters, PE61102F, WUAFOSR2307D9.

AD-A208 840 11/4

TEXAS A AND M UNIV COLLEGE STATION DEPT OF AEROSPACE ENGINEERING

(U) Ultrasonic Nondestructive Evaluation of Damage in Continuous Fiber Composites.

DESCRIPTIVE NOTE: Final rept. 1984-1988,

89 92P

PERSONAL AUTHORS: Kinra, Vikram K.

CONTRACT NO. AFOSR-84-0066

PROJECT NO. 2308

TASK NO. B2

MONITOR: AFOSR
TR 87-2033

UNCLASSIFIED REPORT

ABSTRACT: (U) A new technique for measuring the wavespeed and attenuation in the thickness direction, in extremely thin laminates, and the excitation and detection of Lamb waves in the lengthwise direction has been developed. Thus both in-plane and out-of-plane and out-of-plane measurements can be made. Damage in the form of transverse cracking in cross-ply graphite/epoxy laminates has been studied by the use of these two techniques. For through-the-thickness measurements the stiffness was found to be insensitive to transverse cracking. The attenuation, however, was found to be quite sensitive and, therefore, has been shown to be a reliable damage metric. For the complementary case of Lamb wave propagation in the lengthwise direction, both the stiffness and the attenuation were observed to be sensitive damage parameters. Velocity, Composites, Ultrasonic, Attenuation, Damage, Nondestructive evaluation. (jes)

DESCRIPTORS: (U) *FIBER REINFORCED COMPOSITES, ATTENUATION, CRACKS, DAMAGE, EPOXY LAMINATES, GRAPHITE, LAMINATES, MEASUREMENT, NONDESTRUCTIVE TESTING, PARAMETERS, RELIABILITY, SENSITIVITY, STIFFNESS, THICKNESS, THINNESS, TRANSVERSE, ULTRASONIC TESTS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 840 CONTINUFD

IDENTIFIERS: (U) PE61102F, WUAFOSR2308B2.

AD-A208 802 7/6 7/3

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES LOKER HYDROCARBON RESEARCH INST

(U), Synthesis and Photodegradation of Poly(2,5,-bis(dimethylsilyl)thiophene),

89 9P

PERSONAL AUTHORS: Hu, Shui-Sheng; Weber, William P.

CONTRACT NO. AFOSR-89-0007

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-89 0713

UNCLASSIFIED REPORT

SUPPL. ENTARY NOTE: Pub. in Polymer Bulletin, v21 p133-140 1989.

ABSTRACT: (U) Poly(2,5-bis(dimethylsilyl) thiophene) (I), a copolymer with alternating thiophene and disilyl units, has been prepared by the Wurtz coupling of 2,5-bis(dimethylchlorosilyl)-thiophene (IV) with sodium metal in toluene. I has been characterized by 1H, 13C and 29Si NMR, IR, UV, GPC, TGA and elemental analysis. The photolysis of I in benzene/methanol solution results in degradation of the polymer. The structure of the photo-products and possible mechanisms for their formation are discussed. Keywords: Copolymer; Thiophene; Photodegradation; Methyl radicals; Silyl radicals; Reprints. (MJM)

DESCRIPTORS: (U) *POLYMERS, *THIOPHENES, BENZENE, CARBINOLS, DEGRADATION, METALS, METHYL RADICALS, PHOTODEGRADATION, PHOTOLYSIS, REPRINTS, SODIUM, SOLUTIONS(GENERAL), SYNTHESIS, TOLUENES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 792 7/6

NORTHWESTERN UNIV EVANSTON IL

(U) Approaches to Polymeric Nonlinear Optical Materials. Theoretical and Synthetic Design Strategies,

89 11P

PERSONAL AUTHORS: Li, D.; Minami, N.; Ratner, M. A.; Ye, C.; Marks, T. J.

CONTRACT NO. AFOSR-86-0105, $NSF-DMR85-20280

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-89-0654

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Synthetic Metals, v28 pD585-D593 1989.

ABSTRACT: (U) Two aspects of the rational construction of polymeric frequency doubling materials are described. First, a computationally efficient SCF LCAO MECI pi electron theoretical approach has been developed to aid in chromophore design and to better understand molecular electronic structure/architectural features which give rise to high quadratic molecular optical nonlinearities (beta). Selected high-beta chromophores are then covalently linked via several synthetic procedures to robust, glassy, film-forming chloromethylated or hydroxylated polystyrenes. By this procedure, it is possible to achieve very high chromophore densities in polymeric films with good optical transparency and chemical stability characteristics. Coating of these polymers onto conductive glass, followed by electric field poling near Tg yields robust films with high persistent SHG efficiencies. As an example, films of poly(p-hydroxystyrene) functionalized with N-(4-nitrophenyl)-L-prolinol exhibit d33 as high as 18 x 10 to the -9th esu at 1.06 micro (16 times the corresponding value for KDP). Polymers, Styrenes, Reprints. (mjm)

DESCRIPTORS: (U) *POLYMERIC FILMS, CHEMICAL PROPERTIES, COATINGS, CONDUCTIVITY, CONSTRUCTION, ELECTRONICS,

AD-A208 792

AD-A208 792 CONTINUED

ELECTRONS, FILMS, FREQUENCY, GLASS, HYDROXYL RADICALS, METHODOLOGY, MOLECULAR STRUCTURE, NONLINEAR SYSTEMS, OPTICAL MATERIALS, OPTICS, POLYMERS, POLYSTYRENE, REPRINTS, STABILITY, STRATEGY, STYRENES, THEORY, TRANSPARENCIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A208 792

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 791 7/6

NORTHWESTERN UNIV EVANSTON IL

(U) Poled Polymeric Nonlinear Optical Materials. Enhanced Second Harmonic Generation Stability of Cross-Linkable Matrix/Chromophore Ensembles,

89 4P

PERSONAL AUTHORS: Hubbard, Michael A.; Marks, Tobin J.; Yang, Jian; Wong, George K.

CONTRACT NO. AFOSR-86-0105, $NSF-DMR85-20280

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-89-0655

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemistry of Materials, v1 n2 p167-169 1989.

ABSTRACT: (U) The creation and stabilization of microstructural acentricity is central to the successful design of polymeric materials with large quadratic optical nonlinearities. While significant preferential alignment of chromophore molecules doped into polymer glasses can be achieved by electric field poling, the pronounced temporal instability of such alignment, and hence the temporal instability of second harmonic generation (SHG) characteristics, remains an unsolved problem. These disorientation effects are a natural consequence of the dynamic processes by which glassy polymers undergo physical aging/relaxation to minimum free volume. We recently reported a promising approach to chromophore immobilization in which high-beta, nonlinear optical (NLO) chromophores are covalently bound to the backbone of a high-Tg, TB glassy polymer. We communicate here the development of a second, complementary approach in which a high beta guest chromophore is dispersed in an optically transparent host matrix that can then be simultaneously poled and chemically cross linked Reprints (mjm)

DESCRIPTORS: (U) *POLYMERS, AGING(MATERIALS).

AD A208 791

AD-A208 791 CONTINUED

CHROMOPHORES, DYNAMICS, GLASS, HARMONIC GENERATORS, MATERIALS, NONLINEAR SYSTEMS, OPTICAL MATERIALS, OPTICAL PROPERTIES, PHYSICAL PROPERTIES, PHYSIOLOGICAL DISORIENTATION, QUADRATIC EQUATIONS, RELAXATION, REPRINTS, STABILITY, VOLUME.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD A208 791

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 790 7/6

NORTHWESTERN UNIV EVANSTON IL

(U) Persistent, Efficient Frequency Doubling by Poled Annealed Films of a Chromophore-Functionalized Poly(p-hydroxystyrene),

88 5P

PERSONAL AUTHORS: Ye, C.; Minami, N.; Marks, T. J.; Yang, J.; Wong, G. K.

CONTRACT NO. AFOSR-86-0105, $NSF-DMR85-20280

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-89-0653

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Macromolecules, v21 n9 p2899-2901 1988.

ABSTRACT: (U) All synthetic strategies for polymeric second-harmonic generation (SHG) materials must address the crucial issues of maximizing chromophore densities while achieving maximum, persistent noncentrosymmetry. An attractive alternative to poling glassy polymers simply doped with nonlinear optical (NLO) chromophores are materials in which NLO chromophores are covalently linked to the polymer backbone, thus offering potential impediment both to phase separation at high chromophore densities and to deleterious relaxation of poling-induced chromophore alignment. We report here an embodiment of this strategy which employs structure-enforcing hydrogen-bond networks, achieves high chromophore densities, and affords polymer films with persistent (on a timescale of months) second-harmonic coefficients equal to or in excess of the corresponding value for LiNbO3. General observations relevant to NLO film processing and the applicability of current theoretical models are also reported. Lithium niobates, Polystyrenes, Reprints. (mjm)

DESCRIPTORS: (U) *POLYMERIC FILMS, ANNEALING, CHROMOPHORES, EFFICIENCY, FILMS, FREQUENCY, LITHIUM NIOBATES, MODELS, PHASE, POLYMERS, POLYSTYRENE, PROCESSING, REPRINTS, SEPARATION, STRATEGY, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD A208 790

AD A208 790

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 789 7/6

NORTHWESTERN UNIV EVANSTON IL

(U) Conductive Polymers Based upon Rigid-Rod Ultrahigh-Modulus Macromolecules. Electrochemical Doping of Poly(p-phenylenebenzobisthiazole-2,6-diyl) (PBT),

88 5P

PERSONAL AUTHORS: DePra, Patricia A.; Gaudiello, John G.; Marks, Tobin J.

CONTRACT NO. AFOSR-86-0105, $NSF-DMR85-20280

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-89-0652

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Macromolecules, v21 n7 p2295-2297 1988.

ABSTRACT: (U) Rigid-rod benzobisazole based macromolecules, as exemplified by poly(p-phenylenebenzobisthiazole 2,6-diyl) (PBT,I), constitute some of the mechanically strongest and most robust polymeric substances known. Especially when processed into a highly ordered and crystalline microstructure, PBT exhibits impressive thermal and environmental stability as well as extremely high tensile strength and modulus. In addition to these characteristics, the architecture of the PBT pi-electron system suggests a possible pathway for delocalization and charge transport. We address here this latter issue and provide the first evidence the PBT can be electrochemically doped and undoped, either as thin coatings or as extruded, highly oriented free-standing films and fibers, to yield an electrically conductive polymer. Polymers, Thiazoles, Benzyl radicals, Reprints. (mjm)

DESCRIPTORS: (U) *POLYMERS, BENZYL RADICALS, CHARGE TRANSFER, COATINGS, CONDUCTIVITY, ELECTRICAL CONDUCTIVITY, ENVIRONMENTS, HIGH STRENGTH, MACROMOLECULES, REPRINTS, TENSILE STRENGTH, THERMAL STABILITY, THIAZOLES, THINNESS.

AD-A208 789 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 788 7/6 20/6 11/9

NORTHWESTERN UNIV EVANSTON IL

(U) Poled Polymeric Second Harmonic Generation Materials. Chemical Manipulation of the Temporal Characteristics of Electric Field-Induced Noncentrosymmetry.

88 9P

PERSONAL AUTHORS: Hubbard, M. A.; Minami, N.; Ye, C.; Marks, T. J.; Yang, J.

CONTRACT NO. AFOSR-86-0105, $NSF-DMR85-20280

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-89-0656

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in SPIE v971 Nonlinear Optical Properties of Organic Materials p136-143 1988.

ABSTRACT: (U) This contribution describes two approaches to the construction of polymeric nonlinear optical materials with persistent second harmonic generation efficiency. In the first, poly(p-hydroxystyrene) is covalently functionalized with chromophores having large quadratic hyperpolarizabilities. Films of these polymers are poled at fields up to 1.8 MV/cm to yield materials with stable (on the timescale of months) second harmonic coefficients (d33) as high as 18 x 10 to the-9 power esu. In site measurements indicate that field-induced chromophore alignment is rapid at temperature substantially below T sub g and that relaxation of the alignment is even more rapid upon removal of the field. Annealing of the films prior to poling enhances the stability of second harmonic generation and allows poling at higher fields. A second approach is disperse chromophores in an uncured epoxy host and to then simultaneously cure and pole the resulting ensembles. This procedure also stabilizes preferential chromophore alignments for relatively long periods of time. Reprints. (AW)

DESCRIPTORS: (U) *OPTICAL MATERIALS, *POLYMERS.

AD-A208 788

AD-A208 788 CONTINUED

ALIGNMENT, ANNEALING, CHROMOPHORES, COEFFICIENTS, EFFICIENCY, ELECTRIC POWER, FILMS, HARMONIC GENERATORS, HARMONICS, LONG RANGE(TIME), MATERIALS, MEASUREMENT, NONLINEAR SYSTEMS, RELAXATION, REMOVAL, REPRINTS, SITES, TEMPERATURE, YIELD, SYMMETRY.

IDENTIFIERS: (U) PE61102F, WUAOSR2303A3, *Second harmonic generation materials, Noncentrosymmetry, Hyperpolarization, Polyhydroxystyrenes.

AD-A208 788

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 784 8/11 19/11

HAWAII INST OF GEOPHYSICS HONOLULU

(U) Yield Estimation from Spectral Amplitudes of Direct P and P Coda Recorded by the Wake Island Deep Ocean Hydrophone Array,

OCT 87 21P

PERSONAL AUTHORS: McCreery, Charles S.

REPORT NO. HIG-CONTRIB-1892

CONTRACT NO. AFOSR-89-0339

PROJECT NO. 2309

TASK NO. A2

MONITOR: AFOSR TR-89-0717

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Bulletin of the Seismological Society of America, v77 n5 p1748-1766 Oct 87.

ABSTRACT: (U) Spectral amplitudes of direct P and P coda between 0.5 and 6 Hz were measured for 14 Eastern Kazakh test explosions using 8 hydrophones of the Wake Island Array(WIA). A new model for these data was developed to estimate relative yields of those explosions. Each log spectral amplitude is considered to be the sum of four parameters and an error term. The 3 frequency-dependent parameters represent: 1) the average Eastern Kazakh spectrum at the WIA; 2) the spectral shape characteristics unique to each event; and 3) the station or hydrophone corrections. The fourth parameter represents relative yield. A total of 346 parameter, were needed to model all 901 spectral amplitudes that were measured, and first-order linear regression technique were used to invert the data for these parameters Standard deviations of the computed relative yields are very small. Deviations between the relative yields and their corresponding relative NEIS body-wave magnitudes, however, are larger. This difference is interpreted to be an indicator of the level of inhomogeneity in the worldwide pattern of energy radiated from Eastern Kazakh tests. It is proposed that the yield of a large explosion

AD-A208 784

AD-A208 784 CONTINUED

might be disguised by siting the explosion at a location that selectively defocuses energy towards continents where most seismic stations are located. Reprints. (EDC)

DESCRIPTORS: (U) *SEISMIC WAVES, *PRIMARY WAVES(SEISMIC WAVES), AMPLITUDE, CORRECTIONS, ENERGY, ESTIMATES, GLOBAL, HETEROGENEITY, HYDROPHONES, LINEAR REGRESSION ANALYSIS, MATHEMATICAL MODELS, PARAMETERS, PATTERNS, REPRINTS, SHAPE, SPECTRA, STANDARD DEVIATION, TEST AND EVALUATION, YIELD, NUCLEAR EXPLOSIONS, UNDERGROUND EXPLOSIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2309A2, Wake Island Deep Ocean Hydrophone Array, *Coda(Seismic waves).

AD A208 784

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 783 8/11

HAWAII INST OF GEOPHYSICS HONOLULU

(U) Po/So Phases: Propagation Velocity Across a 1,500-km-Long, Deep Ocean Hydrophone Array.

87 17P

PERSONAL AUTHORS: Walker, Daniel A.; McCreery, Charles S.

REPORT NO. HIG-CONTRIB-1903

CONTRACT NO. AFOSR-89-0339

PROJECT NO. 2309

TASK NO. A2

MONITOR: AFOSR
TR-89-0718

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physics of the Earth, v35 p111-125 1987.

ABSTRACT: (U) Pd/So phases from numerous earthquakes along the margin of the Northwestern Pacific Basin were successfully recorded by a 1,5000 by a 1,5000-km-long ocean bottom hydrophone (OBH) array deployed for two months near Wake Island. Data from ten shallow-focus (<100km) events at 20 deg (2,2000 km) to 34 deg (3,8000 km) epicentral distance were used to compute propagation velocities across the array for the onsets of Po and So. The values found are 7.96 + or - 0.05 km/s for Po and 4.58 + or - 0.06 km/s for So. Travel-time intercepts associated with these velocities are, respectively, - 7.21 plus or minus 2.40 s and - 12.84 plus or minus 7.61 s. These velocities are significantly lower than those previously reported for the Northwestern Pacific using single station data. Although the low velocities and negative intercepts could simply be the result of bias in the data, they might also be due to the effects of azimuthal anisotropy along travel paths, or to increasing propagation velocity with lithospheric age, or to a different mode of propagation near the source. Keywords: Primary seismic wave velocity; Earthquake epicenters; Wave propagation; Reprints. (EDC)

AD A208 783

AD-A208 783 CONTINUED

DESCRIPTORS: (U) *SEISMIC WAVES, ACOUSTIC ARRAYS, ANISOTROPY, AZIMUTH, BIAS, DEEP OCEANS, EARTHQUAKES, EPICENTERS, HYDROPHONES, INTERCEPTION, LOW VELOCITY, NORTH PACIFIC OCEAN, PATHS, REPRINTS, TRAVEL, TRAVEL TIME, VELOCITY, WAVE PROPAGATION, LITHOSPHERE, PRIMARY WAVES(SEISMIC WAVES), SEISMIC ARRAYS, SEISMIC DATA.

IDENTIFIERS: (U) PE61102F, WUAFOSR2309A2, Seismic velocity, Northwest Pacific Ocean.

AD A208 783

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD A208 779 7/4

GEORGIA UNIV ATHENS CENTER FOR COMPUTATIONAL QUANTUM CHEMISTRY

(U) The Anharmonic Force Fields of Silyl Fluoride and Silyl Chloride,

88 15P

PERSONAL AUTHORS: Yamaguchi, Yukio; Schaefer, Henry F., III

REPORT NO. CCQC-CONTRIB-26

CONTRACT NO. AFOSR-88-0167

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-89-0691

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Molecular Spectroscopy, v132 p193-206 1988.

ABSTRACT: (U) The complete cubic and quartic force fields of H3SiF and H3SiCl are predicted from ab initio SCF calculations using the 6-31G basis set. The computed geometries, rotational constants, vibrational wavenumbers, anharmonicity constants, vibration-rotation interaction constants, l-doubling constants, Coriolis coupling constants, and centrifugal distortion constants are compared with the available experimental data. Many experimental unknown spectroscopic constants are predicted, especially for D3SiF and D3SiCl. Reprints. (AW)

DESCRIPTORS: (U) *SILICON COMPOUNDS, *FORCE(MECHANICS), CENTRIFUGAL FIELDS, CONSTANTS, CORIOLIS EFFECT, COUPLING(INTERACTION), DISTORTION, EXPERIMENTAL DATA, QUARTIC EQUATIONS, REPRINTS, ROTATION, SPECTROSCOPY, CHLORIDES, FLUORIDES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3, *Silyl chloride, *Silyl fluoride, *Force fields, *Anharmonic force fields.

AD A208 779

AD-A208 774 7/4

GEORGIA UNIV ATHENS CENTER FOR COMPUTATIONAL QUANTUM CHEMISTRY

(U) The Silanoic Acid Dimer (HSiOOH)2: A Simple Molecular System Incorporating Two Very Strong Hydrogen Bonds,

89 7P

PERSONAL AUTHORS: Seidl, Edward T.; Schaefer, Henry F., III

REPORT NO. CCQC-CONTRIB-29

CONTRACT NO. AFOSR-87-0182

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-89-0693

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical Society, v111 n5 p1569-1574 1989.

ABSTRACT: (U) Ab initio molecular electronic structure theory has been used to predict and characterize the remarkable species (HSiOOH)2. The dissociation energy to two silanoic acid monomers is predicted to be D sub 0 + 25 kcal/mol, twice that observed for the well-characterized valence isoelectronic formic acid dimer. Fundamental vibrational frequencies allowed in the infrared spectrum are predicted as follows: v(O-H) = 2905/cm, v(Si=O) = 1229/cm, and v(Si-O) = 955/cm. By avoiding formal double bonds to silicon, a much lower energy cyclic isomer of the silanoic acid dimer may be found, and this structure is also theoretically characterized. Reprints. (AW)

DESCRIPTORS: (U) *DIMERS, *MOLECULAR STRUCTURE, *SILICON COMPOUNDS, ACIDS, BONDING, CHEMICAL DISSOCIATION, ELECTRONICS, ENERGY, FREQUENCY, HYDROGEN BONDS, INFRARED SPECTRA, MONOMERS, REPRINTS, SILICON, THEORY, VIBRATION, ORGANIC ACIDS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

AD A208 774

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 763 20/11

COMPUTATIONAL MECHANICS CO INC AUSTIN TX

(U) Computational Methods for Nonlinear Dynamic Problems in Solid and Structural Mechanics: Progress in the Theory and Modeling of Friction and in the Control of Dynamical Systems with Frictional Forces.

DESCRIPTIVE NOTE: Final technical rept. 1 Nov 88-28 Feb 89,

MAR 89 405P

PERSONAL AUTHORS: Oden, J. T.; Tworzydlo, W. W.; Martins, J. A.

REPORT NO. TR-89-05

CONTRACT NO. F49620-86-C-0051

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR TR-89-0627

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report summarizes work on a three-year project devoted to dynamic friction and on control of systems with frictional forces. Detailed theoretical and numerical studies of static and dynamic friction and various phenomena of dynamic friction (stick-slip motion, self-excited oscillations, frictional damping, etc.) are described. Included in the report is also a study of methods of statistical homogenization, devised to develop new micromechanics based models of contact and friction. The question of optimal control with distributed dynamical systems of viscoelastic bodies with frictional forces is also described. A final component of this study focuses on the mathematical and numerical analysis of elastohydrodynamic lubrication problems and is included in the final chapter. The studies presented in this report provide both a theoretical and numerical basis for modeling contact and friction. These models are shown to produce results in very good qualitative and quantitative agreement with experimental results. Keywords: Friction, Damping,

AD-A208 763 CONTINUED

Structural dynamics, Elastohydrodynamic lubrication. (MJM)

DESCRIPTORS: (U) *NUMERICAL METHODS AND PROCEDURES, *STRUCTURAL MECHANICS, AGREEMENTS, CONTROL, CONTROL SYSTEMS, DAMPING, DISTRIBUTION, DYNAMICS, EXCITATION, FRICTION, HOMOGENEITY, HYDRODYNAMICS, HYDROELASTICITY, LUBRICATION, MATHEMATICAL ANALYSIS, MODELS, MOTION, NONLINEAR SYSTEMS, NUMERICAL ANALYSIS, OPTIMIZATION, OSCILLATION, SELF OPERATION, STATISTICS, STRUCTURAL PROPERTIES, THEORY, VISCOELASTICITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 739 12/7

PURDUE UNIV LAFAYETTE IN SCHOOL OF ELECTRICAL ENGINEERING

(U) The Pasm Parallel Processing System: Design, Simulation, and Image Processing Applications. Volume 1.

DESCRIPTIVE NOTE: Final rept. 1 Jan 86-31 Dec 89,

DEC 89 394P

PERSONAL AUTHORS: Kuehn, James T.

CONTRACT NO. F49620-86-K-0006, F30602-78-0025

MONITOR: AFOSR TR-89-0731

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Doctral thesis. Sponsored in part by Contracts F30602-C-0193, F30602-83-K-0119 and Grants AFOSR-78-3581 and DAAG29-82-K-0101.

ABSTRACT: (U) Advances in device and packaging technologies are producing incremental gains in the performance of computer systems. However, these gains are being more than offset by new applications having a need to process large data sets, a need real-time computation, or other requirements which make them prohibitively expensive to perform on conventional computer systems. This has forced computer architects to consider parallel/ distributed computer designs. In Part I of this thesis, the strengths and weaknesses of a variety of existing and proposed parallel computer designs are examined. These characteristics are used to motivate and support the design decisions made for a particular parallel computer architecture, PASM. It is PASM that is the primary focus of the work in this thesis. (RH)

DESCRIPTORS: (U) *COMPUTER ARCHITECTURE, *IMAGE PROCESSING, *PARALLEL PROCESSING, *PARALLEL PROCESSORS, *SIMULATION, *SYSTEMS ENGINEERING, ARCHITECTS, COMPUTATIONS, COMPUTERS, DISTRIBUTION, PACKAGING, PERFORMANCE(ENGINEERING), REAL TIME.

IDENTIFIERS: (U) PE61102F.

AD A208 739

AD-A208 738 6/11

OREGON STATE UNIV CORVALLIS DEPT OF FISHERIES AND WILDLIFE

(U) A Characterization of Chlordecone Pretreatment - Altered Pharmacokinetics in Mice,

89 9P

PERSONAL AUTHORS: Carpenter, Hillary M.; Curtis, Lawrence R.

CONTRACT NO. AFOSR-87-0185

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR TR-89-0686

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Drug Metabolism and Disposition, v17 n2 p131-138 1989.

ABSTRACT: (U) Lipophilic chlorinated hydrocarbons pose a potential health hazard to humans and animals and the toxicity of a number of these compounds has been well documented. Despite the low environmental concentrations of most of these chemicals, much of the research conducted to date has used maximally tolerated doses. Our research, conducted with low, apparently nontoxic, doses of the insecticide chlordecone (CD), showed that the administration of CD (5 mg/kg ip) to mice (C57BL/6N and DBA/2N strains) caused a time-dependent alteration in the pattern of distribution of subsequently administered dose of (carbon 14)CD. Livers of CD-pretreated animals contained less label than did those from controls and CD pretreatment increased amounts of label in kidney, lung, fat, and muscle. Changes did not appear to be due to an altered rate of metabolism and analysis of total Cd in tissues (unlabeled plus (14C)CD) indicated that these responses were not due to a simple redistribution phenomenon. We have termed this preexposure effect a pretreatment disposition response (PDR) and feel it may reflect an important cellular response to lipophilic compounds. CD induced PDR is dose related, exhibits a threshold, and is saturable at a given level of induction.

AD A208 738

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 738 CONTINUED

Reprints. (AW)

DESCRIPTORS: (U) *INSECTICIDES, *PHARMACOKINETICS, *TOXIC TOLERANCES, ANIMALS, CELLS(BIOLOGY), CHEMICALS, CONCENTRATION(COMPOSITION), DISTRIBUTION, DOSAGE, ENVIRONMENTS, TOXIC HAZARDS, HEALTH, HUMANS, LOW LEVEL, LUNG, METABOLISM, MICE, PATTERNS, RATES, REPRINTS, RESPONSE(BIOLOGY), TOXICITY, SUBLETHAL DOSAGE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5.

AD-A208 738

AD-A208 736 12/3

MASSACHUSETTS UNIV AMHERST DEPT OF MATHEMATICS AND STATISTICS

(U) Applications of Functional Analytical Methods to Problems in Queueing Network Theory and Reliability Theory.

DESCRIPTIVE NOTE: Final rept.,

OCT 80 2P

PERSONAL AUTHORS: Rosenkrantz, Walter A.

CONTRACT NO. F49620-79-C-0209

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR 89-0679

UNCLASSIFIED REPORT

ABSTRACT: (U) The diffusion approximation for queueing networks is proved via the Trotter-kato Theorem. This involves delicate calculations involving the domains of certain operators some of which have been successful and some not. One tries t solve the martingale problem instead of characterizing the domain and hopes to use the Stroock-Varadham approach in order to prove the corresponding limit theorem. For example, we solve the martingale problem for a class of Markov processes whose infinite simal generators are integro-differential operators. Extensions of these results to more complicated queueing systems are currently in progress. Publications: (1) On the Accuracy of Kingman's Heavy Traffic Approximation in the Theory of Queues; (2) Limit theorems for Markov processes via a variant of the Trotter-Kato theorem; and (3) On a integro-differential equation occurring in Queueing and Storage theory. (jhd)

DESCRIPTORS: (U) *QUEUEING THEORY, *RELIABILITY, *FUNCTIONAL ANALYSIS, ACCURACY, DIFFERENTIAL EQUATIONS, DIFFUSION, INTEGRAL EQUATIONS, MARKOV PROCESSES, NETWORKS, RELIABILITY, STORAGE, THEORY, TRAFFIC.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A208 736

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 736 CONTINUED

Intergodifferential equations, Martingales(Mathematics), Trotter kato theorem.

AD-A208 722 15/6

ROCHESTER UNIV NY GRADUATE SCHOOL OF MANAGEMENT

(U) Final Technical Report for Grant AFOSR-79-0043 (University of Rochester, Graduate School of Management).

DESCRIPTIVE NOTE: Final rept. 1 Jul 79 30 Jul 81,

DEC 81 3P

PERSONAL AUTHORS: Keilson, J.

CONTRACT NO. AFOSR-79-0043

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-89-0680

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *LOGISTICS MANAGEMENT, MATHEMATICAL MODELS.

IDENTIFIERS: (U) WUAFOSR2304A5, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 720 7/4 20/10

GEORGIA UNIV RESEARCH FOUNDATION INC ATHENS

(U) Theoretical Investigations of Molecules Composed only of Fluorine, Oxygen and Nitrogen: Determination of the Equilibrium Structures of FOOF, (NO)2 and FNNF and the Transition State Structure for FNNF cis-transisomerization,

89 19P

PERSONAL AUTHORS: Lee, Timothy J.; Rice, Julia E.; Scuseria, Gustavo E.; Schaefer, Henry F., III

CONTRACT NO. AFOSR-87-0182

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-89-0692

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Theoretical Chimica Acta v75 p81-98 1989.

ABSTRACT: (U) The deficiencies of common ab initio methods for the reliable prediction of the equilibrium structures of compounds composed of only the fluorine, oxygen and nitrogen atoms are investigated. Specifically, the importance of using large one-particle basis sets with multiple sets of polarization functions has been studied. Additionally, the need for a set of f basis functions was investigated. Several different single reference electron correlation methods have been tested in order to determine whether it is possible for a single reference based method to be routinely used on such chemical systems. These electron correlation methods include second order Moller-Plesset perturbation theory (MP2), singles and doubles configuration interaction (CISD), the coupled pair functional (CPF) approach and singles and doubles coupled cluster (CCSD) theory. Keywords: Theoretical chemistry, Quantum chemistry, Reprints. (AW)

DESCRIPTORS: (U) *FLUORINE COMPOUNDS, *NITROGEN, *OXYGEN COMPOUNDS, *QUANTUM CHEMISTRY, *MOLECULAR STRUCTURE, ATOMS, CLUSTERING, CONFIGURATIONS, CORRELATION, COUPLING(INTERACTION), ELECTRONS, EQUILIBRIUM(GENERAL), FUNCTIONS, INTERACTIONS, MOLECULES, PARTICLES, POLARIZATION, PREDICTIONS, RELIABILITY, REPRINTS, THEORY, TRANSITIONS, ISOMERIZATION, TRANSITIONS.

IDENTIFIERS: (U) WUAFOSR2303B3, PE61102F.

AD-A208 720 CONTINUED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 717 11/6.1

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

(U) Probabilistic Description of Fatigue Crack Growth Under Constant-and Variable-Amplitude Loading.

DESCRIPTIVE NOTE: final rept.,

MAR 89 188P

PERSONAL AUTHORS: Ghonem, H.; Zeng, M.

CONTRACT NO. AFOSR-85-0362

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFOSR TR-89-0716

UNCLASSIFIED REPORT

ABSTRACT: (U) This report is concerned with the description of the development and application of a stochastic crack growth model. It is built as a discontinuous Markov process and is inhomogeneous with respect to the number of cycles required for the crack to reach a specified crack length. The model is then used to describe the evolution of the crack length in terms of growth curves, each of whose points possess equal probability of advancing from one position to another forward position. The validity of the model is established by applying it to constant-as well as to variable amplitude loading. In those applications the theoretical constant probability crack growth curves generated by the model compared to those experimentally obtained using Al 7075-T6 and Al 2024-T3 material for constant-amplitude loading while Ti-6Al-4V was used in single overload application. Results of these comparisons indicate the ability of the proposed model when fitted with parameters whose values can be obtained from a limited numbers of experimental tests, to predict the crack growth statistics under different loading conditions. Keywords: Crack; Overload; Stochastic process; Retardation; Titanium alloy; Aluminum alloys; Vanadium. (kt)

AD-A208 717 CONTINUED

DESCRIPTORS: (U) *ALUMINUM ALLOYS, *CRACK PROPAGATION, *FATIGUE(MECHANICS), *TITANIUM ALLOYS, *VANADIUM, AMPLITUDE, CRACKS, CYCLES, EXPERIMENTAL DESIGN, FORWARD AREAS, LENGTH, MARKOV PROCESSES, MATHEMATICAL MODELS, MODELS, OVERLOAD, POSITION(LOCATION), PROBABILITY, STATISTICS, LOADS(FORCES), STOCHASTIC PROCESSES, TEST METHODS, VALIDATION, VARIABLES.

IDENTIFIERS: (U) WUAFOSR2302B2, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 714 7/2 11/4

ILLINOIS UNIV AT URBANA DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) High Temp Toughening and Creep Studies.

DESCRIPTIVE NOTE: Final rept. 1 Jun 85-28 Feb 89,

MAY 89 128P

PERSONAL AUTHORS: Kriven, Waltraud M.

CONTRACT NO. AFOSR-85-0242

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR TR-89-0688

UNCLASSIFIED REPORT

ABSTRACT: (U) Early in 1985, the lanthanide sesquioxides (Ln203) were identified as potential high temperature transformation toughners alternative to zirconia (ZrO2). their 8-10% volume increase accompanying the monoclinic (B) to cubic (C) transformation suggested that they should be more powerful than ZrO2. In addition, the Ms temperature was raised up to 2200 C indicating that, based on thermodynamics alone, transformation toughening up to this temperature should be possible. Hence a proposal was written with the aim of transformation toughening silicon carbide (SIC) with dispersions of monoclinic dysprosia particles giving a microstructure analogous to Zirconia-toughened-alumina (ZTA). Keywords: Composite materials; Cracking; Graphite; Sintering; Silica; Annealing; Silicon carbides. (kt)

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *CHEMICAL REACTIONS, ANNEALING, CRACKS, CREEP, GRAPHITE, MICROSTRUCTURE, PARTICLES, SILICON CARBIDES, SILICON DIOXIDE, SINTERING, THERMODYNAMICS, ZIRCONIUM OXIDES, ALUMINUM.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A2, *Lanthanide sesquiozides, Zirconia.

AD-A208 714

AD-A208 695 6/5 5/8 6/4 9/5

NORTHWESTERN UNIV EVANSTON IL CRESAP NEUROSCIENCE LAB

(U) Perception of Motion in Statistically-Defined Displays.

DESCRIPTIVE NOTE: Final scientific rept. 1 Oct 85-30 Sep 88,

APR 89 278P

PERSONAL AUTHORS: Sekuler, Robert

CONTRACT NO. AFOSR-85-0370

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR TR-89-0769

UNCLASSIFIED REPORT

ABSTRACT: (U) This project used statistically-complex displays to probe higher-orders of human motion perception. The project's overall aim was to establish the characteristics of human visual mechanisms that extract information from these and other displays. A fundamental contribution was the systematic refinement and extension of a model in which motion information is extracted and processed, via non-linear interactions, by directionally-selective visual mechanisms. Prior work has shown that a percept of global coherent motion can be produced from the combination of many different, localized motion vectors. Using random-dot cinematograms, we established that hysteresis is strongly associated with such percepts. It was previously found that practice seemed to produce direction-selective improvement in observers' ability to discriminate between highly similar directions of motion. Investigators clarified the basis for this improvement by recording an observers eye movements while they target motion. Investigators also created random-dot cinematograms in which each dot's successive movements were independently drawn from a Gaussian distribution of directions of some characteristic bandwidth. Such displays, comprising many different, spatially intermingled local motion vectors, can produce a percept of global coherent motion in a single direction. Keywords: motion visual perception;

AD A208 695

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 695 CONTINUED

Math models; Statistical displays; Cinematograms. (EDC)

DESCRIPTORS: (U) *DISPLAY SYSTEMS, *MOTION, *SPACE PERCEPTION, COHERENCE, DISCRIMINATE ANALYSIS, EYE MOVEMENTS, GLOBAL, HUMANS, HYSTERESIS, INTERACTIONS, MATHEMATICAL MODELS, MOVING TARGETS, NONLINEAR SYSTEMS, NORMAL DISTRIBUTION, OBSERVERS, ORIENTATION(DIRECTION), PERCEPTION(PSYCHOLOGY), REFINING, STATISTICS, VISION, VISUAL AIDS, VISUAL PERCEPTION, MATHEMATICAL MODELS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A5, *Motion perception, Cinematograms, Statistical displays.

AD-A208 686 9/1 9/6 20/6 20/1
17/9 20/14

CALIFORNIA INST OF TECH PASADENA DEPT OF ELECTRICAL ENGINEERING

(U) Acoustooptic Processing of Two Dimensional Signals Using Temporal and Spatial Integration.

DESCRIPTIVE NOTE: Final rept. 1 May 88-28 Feb 89,

MAY 89 126P

PERSONAL AUTHORS: Psaltis, Demetri; Hong, John; Hudson, Scott; Yu, Jeff, Mok, Fai

CONTRACT NO. AFOSR-85-0332

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR TR-89-0730

UNCLASSIFIED REPORT

ABSTRACT: (U) Acoustopic signal processing architectures and methods are developed for a variety of 2-D problems. A formulation of the universe synthetic aperture radar problem as an energy minimization procedure is reported. Acoustopic systems for multiple target detection and 2-D spectrum analysis are experimentally demonstrated. The application of acoustopics to the adaptive beam-forming for broadband antenna arrays is described. (RH)

DESCRIPTORS: (U) *ACOUSTOOPTICS, *ADAPTIVE SYSTEMS, *ANTENNA ARRAYS, *BEAM FORMING, *BROADBAND ANTENNAS, *SIGNAL PROCESSING, *SYNTHETIC APERTURE RADAR, *TARGET DETECTION, ARCHITECTURE, MULTIPLE OPERATION, PROCESSING, SIGNALS, TARGETS, TWO DIMENSIONAL.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B1

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AL A208 682 7/3

SAN DIEGO STATE UNIV CA DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Electron Attachment Rate Constants of HBr, CH3Br, and C2H5Br in N2 and Ar,

MAY 88 6P

PERSONAL AUTHORS: Wang, W. C.; Lee, L. C.

CONTRACT NO. AFOSR-86-0205

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR TR-89-0694

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Applied Physics, v63 n10 p4905-4910, 15 May 88.

ABSTRACT: (U) The electron attachment rate constants of bromine compounds in the buffer gases of N2 and Ar (approx. 250 Torr) were measured as a function of E/N (or mean electron energy electron energy). The measured electron attachment rate constants of HBr, CH3Br, and C2H5Br show maximum values of 1.05X10 to the -9th, 1.08X 10 to the -11th, and 9.3x10 to the 11th cc/s at mean electron energies of 0.55, 0.4, and 0.8 eV respectively. The electron drift velocities for the gas mixtures of CH3Br in N2 and Ar were also measured. Electron attachment, Rate constants, Measurements, Laser beam wavelength, Nitrogen, Argon, Methyl bromide, Ethyl radicals, Hydrogen bromide, Reprints. (mjm)

DESCRIPTORS: (U) *ARGON, *ETHYL RADICALS, *HYDROGEN COMPOUNDS, ATTACHMENT, BROMIDES, BROMINE COMPOUNDS, CONSTANTS, DRIFT, ELECTRON ENERGY, ELECTRONS, FREQUENCY, LASER BEAMS, MEAN, METHYL RADICALS, NITROGEN, RATES, REPRINTS, VALUE, VELOCITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A7.

AD-A208 682

AD-A208 681 12/1

NEW YORK UNIV NY COURANT INST OF MATHEMATICAL SCIENCES

(U) Conference on Mathematical Frontiers and the Physical World.

DESCRIPTIVE NOTE: Final rept. 9 Jan 81-28 Feb 82,

JUL 82 2P

PERSONAL AUTHORS: Varadhan, S. R.

CONTRACT NO. AFOSR-ISSA-81-00037, $NSF-MCS81-09183

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR TR-89-0739

UNCLASSIFIED REPORT

ABSTRACT: (U) This conference was held at the Courant Institute of Mathematical Sciences of New York University on October 30-31 of 1981. There were eight lectures delivered by distinguished speakers during the two days covering a wide spectrum of topics in mathematics and its applications. The speakers were Professors Bombieri, Chorin, John, Keller, Lanford, Lebowitz, Lewy, and Lieb. The conference was attended by over two hundred scientists and was in many ways a great success. A copy of the program is enclosed for your information. (KR)

DESCRIPTORS: (U) *MATHEMATICS, GLOBAL, LECTURES, SYMPOSIA, PHYSICAL PROPERTIES, SPECTRA.

AD A208 681

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD A208 680 12/3

PITTSBURGH UNIV PA DEPT OF MATHEMATICS AND STATISTICS

(U) International Symposium on Multivariate Analysis (5th) Held in Pittsburgh, Pennsylvania on June 19-24, 1978.

DESCRIPTIVE NOTE: Final rept.,

79 14P

PERSONAL AUTHORS: Krishnaiah, P. R.

CONTRACT NO. AFOSR-78-3548

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-89-0740

UNCLASSIFIED REPORT

ABSTRACT: (U) The Fifth International Symposium on Multivariate Analysis was held at the University of Pittsburg during the period of June 19-24, 1978. In this volume, distinguished workers in the field from many countries discuss the current developments on a very broad spectrum of topics in the theory and applications of multivariate analysis. The topics covered include classification and pattern recognition, contingency tables, decomposition of multivariate probabilities, design and analysis of experiments, distribution theory, econometric estimation, limit theorems, multivariate analysis of variance, non-parametric methods, optimum properties of test procedures, psychometrics, random matrices, reduction of dimensionality, reliability, scaling methods, simultaneous test procedures, sociometry, statistical physics, stochastic control theory, time series and stochastic processes. (KR)

DESCRIPTORS: (U) *MULTIVARIATE ANALYSIS, *SYMPOSIA, ANALYSIS OF VARIANCE, CONTROL THEORY, DECOMPOSITION, DISTRIBUTION THEORY, ECONOMETRICS, ESTIMATES, INTERNATIONAL, NONPARAMETRIC STATISTICS, OPTIMIZATION, PATTERN RECOGNITION, PENNSYLVANIA, PHYSICS, PROBABILITY, PSYCHOMETRICS, RELIABILITY, SCALING FACTORS, STATISTICS, STOCHASTIC CONTROL, STOCHASTIC PROCESSES, SYNCHRONISM, TEST METHODS, TIME SERIES ANALYSIS.

AD A208 680

AD-A208 680 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD A208 680

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 679 20/12 20/2 7/2 20/6

MARYLAND UNIV COLLEGE PARK DEPT OF MATHEMATICS

(U) Binary Time Series.

DESCRIPTIVE NOTE: Final rept.,

JUL 80 2P

PERSONAL AUTHORS: Kedem, B.; Slud, E.

CONTRACT NO. F49620-79-C-0095

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-89-0674

UNCLASSIFIED REPORT

ABSTRACT: (U) This research dealt with higher order crossings, quantities which were defined and proved to be useful in discrimination in time series. In particular the Higher Order Crossings Theorem has been proved and a new goodness of fit and discrimination statistic has been suggested and applied in testing model adequacy in ARIMA processes, and in discrimination in EEG data. A connection with an application to particles arrangements in physics has been found and a quantity called an m'th order unit has been defined. This has been applied in finding the distribution of rare events in Binary Series. (KR)

DESCRIPTORS: (U) *BINARY ARITHMETIC, *TIME SERIES ANALYSIS, CROSSINGS, DISTRIBUTION, ELECTROENCEPHALOGRAPHY, EXPERIMENTAL DATA, PARTICLES, PHYSICS, THEOREMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5, *Binary series.

AD-A208 679

AD-A208 676 20/8 20/5

OREGON UNIV EUGENE DEPT OF PHYSICS

(U) Photoionization Phenomena Near Threshold.

89 11P

PERSONAL AUTHORS: Crasemann, B.

CONTRACT NO. AFOSR-87-0026

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-89-0704

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Comments on Atomic and Molecular Physics, v22 n4 p163-172 1989.

ABSTRACT: (U) Dynamic correlation effects produce a multifaceted many-electron response when the atomic electron cortege is photoionized. Drastic changes in rearrangement take place as the incident photons are tuned from threshold to high energy and the ionization mechanism evolves from a single second-order quantum process to a sequence of discrete excitation, relaxation, and decay phases. Post-collision interaction links these very different regimes, and resonant scattering theory permits a unified treatment. The study of the near-threshold behavior of dynamic correlation satellites and of post-collision interaction phenomena holds promise of further elucidating this intricate subject. Keywords: Atomic physics, Inner-shell processes, Atomic rearrangement dynamics, Correlation satellites, Post-collision interaction, Resonant Raman transitions, Synchrotron radiation, Reprints. (AW)

DESCRIPTORS: (U) *PHOTOIONIZATION, *THRESHOLD EFFECTS, CORRELATION, DECAY, DYNAMICS, EXCITATION, HIGH ENERGY, IONIZATION, NUCLEAR PHYSICS, PHASE, PHOTONS, RADIATION, RAMAN SPECTRA, REPRINTS, RESONANCE, SCATTERING, SEQUENCES, SYNCHROTRONS, THEORY, TRANSITIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A4, Inner shell processes, Atomic rearrangement, Correlation satellites.

AD-A208 676

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD A208 675 23/3 6/4

SMITH-KETTLEWELL EYE RESEARCH FOUNDATION SAN FRANCISCO CA

(U) Is There a Constancy for Velocity?

89 10P

PERSONAL AUTHORS: McKee, Suzanne P.; Welch, Leslie

CONTRACT NO. AFOSR-85-0380

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR TR-89-0727

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Vision Research, v29 n5 p553-561 1989.

ABSTRACT: (U) Human observers are unable to use disparity information to transform the angular velocity signal into a precise object-based code. The Weber fraction for discriminating changes in objective velocity (cm/sec) is about twice the Weber fraction for discriminating changes in angular velocity (deg/sec), and is substantially higher than predicted from a combination of the errors in judging disparity and angular velocity. By comparison, judgments of the distance traversed by the moving target show excellent size constancy. The discrimination of changes in objective size (cm) is as precise as the discrimination of changes in angular size (deg). The angular velocity signal is useful without transformation into an object-centered signal; it guides eye and body movements, and is the basis of motion parallax judgments. The need to retain this angular signal may explain why there is no efficient mechanism for velocity constancy. Keywords: Visual perception; Motion; Velocity; Discrimination; Size discrimination; Size constancy; Velocity constancy; Reprints. (JHD)

DESCRIPTORS: (U) *MOTION, *VISUAL PERCEPTION, ANGLES, ANGULAR MOTION, DISCRIMINATION, EFFICIENCY, ERRORS, HUMANS, MOVING TARGETS, OBSERVERS, REPRINTS, SIGNALS, SIZES(DIMENSIONS), VELOCITY.

AD A208 675 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A5, Parallax.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 664 20/14 20/9

MARYLAND UNIV COLLEGE PARK DEPT OF ELECTRICAL ENGINEERING

(U) Studies of the Propagation of Short Burst, High Power Microwave Radiation through Neutral and Ionized Media.

DESCRIPTIVE NOTE: Final rept. 1 Dec 85-30 Nov 88,

MAR 89 84P

PERSONAL AUTHORS: Destler, William W.; Striffler, Charles D.

CONTRACT NO. AFOSR-86-0046

PROJECT NO. 2301

TASK NO. AB

MONITOR: AFOSR TR-89-0710

UNCLASSIFIED REPORT

ABSTRACT: (U) Experiments were completed on the propagation of very high power (500 kw/cmsq), short burst (3-30 ms) microwaves through a neutral media. Results indicate that breakdown field strengths are about a factor of two higher when the test cell is shielded from x rays generated by the microwave source. Standard theoretical models were shown to give very accurate predictions of actual observations for all cases except when the RF frequency was near the plasma frequency. Keywords: Earth atmosphere, Microwave transmission, Burst transmission, Breakdown electron threshold, Electromagnetic shielding, Microwave pulses, Large orbit gyrotrons, Plasmas physics, Air (EDC)

DESCRIPTORS: (U) *BURST TRANSMISSION, *MICROWAVES, ACCURACY, AIR, BREAKDOWN(ELECTRONIC THRESHOLDOLD), EARTH ATMOSPHERE, ELECTROMAGNETIC SHIELDING, ELECTROMAGNETIC WAVE PROPAGATION, MICROWAVE FREQUENCY, GYROTRONS, HIGH POWER, IONIZATION, MEDIA, MICROWAVE EQUIPMENT, MICROWAVE TRANSMISSION, MATHEMATICAL MODELS, NEUTRAL, ORBITS, PLASMAS(PHYSICS), MATHEMATICAL PREDICTION, PULSES, RADIATION, RADIOFREQUENCY, RADIOFREQUENCY POWER, SOURCES, THEORY, X RAYS.

AD-A208 664 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A8.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 658 12/3

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) A Numerical Study of an Augmented Lagrangian Method for the Estimation of Parameters in Elliptic Systems,

JAN 89 37P

PERSONAL AUTHORS: Ito, K.; Kroller, M.; Kunisch, K.

CONTRACT NO. F49620-86-C-0111

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-89-0697

UNCLASSIFIED REPORT

ABSTRACT: (U) A method based on an augmented Lagrangian formulation is developed which allows one to estimate coefficients in an elliptic differential equation from measurements of the state. This is a hybrid method combining the output-least-squares and the equation-error technique. Seminorm regularization is employed, and convergence and stability properties are discussed. Several aspects of an efficient implementation are described. Finally the effectiveness of the method is demonstrated by means of one and two dimensional examples. (KR)

DESCRIPTORS: (U) *LAGRANGIAN FUNCTIONS, *NUMERICAL ANALYSIS, AUGMENTATION, COEFFICIENTS, DIFFERENTIAL EQUATIONS, ELLIPSES, ESTIMATES, FORMULAS(MATHEMATICS), HYBRID SYSTEMS, PARAMETERS, STABILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD A208 658

AD-A208 657 10/4 20/9

APPLIED MICROWAVE PLASMA CONCEPTS CARLSBAD CA

(U) Efficient Energy Storage and Conversion Using Adiabatic Compression of Relativistic-Electron Plasmas.

DESCRIPTIVE NOTE: Final rept. for 15 May 86-31 Dec 88,

JAN 89 34P

PERSONAL AUTHORS: Guest, Gareth E.; Dandl, Raphael A.; Miller, Robert L.

REPORT NO. AMPC-028-036

CONTRACT NO. F49620-86-C-0055

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR TR-89 0711

UNCLASSIFIED REPORT

ABSTRACT: (U) The Plasma Electron Microwave Source (PEMS) concept in a relativistic-electron plasma confined in a magnetic-mirror device. The stored energy is transformed into microwave through amplification of whistler waves that can be launched externally for amplifier operation or generated spontaneously for oscillator operation. The anisotropy of the hot-electron temperature governs the maximum plasma energy density that can be stored, the amplification rates, and the saturated power level of the unstable whistler waves. This report summarizes the results of theoretical studies of (1) the critical aspects of hot electron plasmas generated by ECH techniques, such as the Upper Off-Resonant Heating pioneered by Dandl in the ELMO series of experiments; and, (2) the spatial amplification rates of unstable whistler waves in these plasmas. It is shown that a substantial fraction of the energy stored in a hot-electron plasma can be transformed into repetitive pulses of microwave power by employing the PEMS approach, with typical values of gain, about 40db and bandwidth. (JHD)

DESCRIPTORS: (U) *ENERGY STORAGE, *MAGNETIC MIRRORS, *PLASMA DEVICES, *WHISTLERS, ADIABATIC CONDITIONS,

AD A208 657

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 657 CONTINUED

AMPLIFICATION, AMPLIFIERS, ANISOTROPY, COMPRESSION, DENSITY, EFFICIENCY, ELECTRON ENERGY, GAIN, MICROWAVES, OSCILLATORS, PLASMAS(PHYSICS), POWER LEVELS, RADIOFREQUENCY POWER, SATURATION, SOURCES, SPATIAL DISTRIBUTION, TEMPERATURE, PLASMA WAVES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A8.

AD-A208 656 6/3 6/15 6/1

OREGON STATE UNIV CORVALLIS

(U) Evidence for Heterogeneity of Muscarinic Receptors in the Mollusc Pleurobranchaea.

DESCRIPTIVE NOTE: Rept. for 1 Oct 86-14 Jan 89,

88 12P

PERSONAL AUTHORS: Murray, T. F.; Mpitsos, G. J.

CONTRACT NO. AFOSR-86-0067

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR
TR 89-0728

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Brain Research Bulletin, v21 p181-190 1988.

ABSTRACT: (U) The properties of the specific binding of the muscarinic antagonist (Iodine 125)3-quinuclidinyl-4-iodobenzilate ((125I)4IQNB) to nervous tissue of Pleurobranchaea californica were characterized. The specific binding of (125)4IQNB to Pleurobranchaea nervous tissue was characterized by its high affinity and saturability. A comparison of the numbers of binding sites recognized by (125))4IQNB and 1-(Tritium)QNB in nervous tissue of three invertebrate species indicated that in Aplysia and Cancer magister (crab) ganglia membranes the two radioligands labeled comparable numbers of binding sites; however, in Pleurobranchaea membranes 1-(3H)QNB recognized only a subpopulation (8 10%) of the total number of (125I)4IQNB binding sites. The disparity in the numbers of binding sites labeled by these radioligands was consistent with our finding of a heterogeneity of muscarinic antagonist binding sites in 1-QNB competition experiments in Pleurobranchaea. Computer-assisted analysis of 1-QNB competition of (125I)4IQNB specific binding demonstrated that these data were best described by a two-site model with high- and low-affinity sites for I-QNB. Reprints. (AW)

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD A208 656 CONTINUED

DESCRIPTORS: (U) *GANGLIA, *GASTROPODA, *PHARMACOLOGICAL ANTAGONISTS, APLYSIA, BINDERS, CRABS, HETEROGENEITY, INVERTEBRATES, MEMBRANES(BIOLOGY), MUSCARINE, NERVES, NUMBERS, POPULATION, RECEPTION, REPRINTS, TISSUES(BIOLOGY), NERVE BLOCKING, IODINE, RADIOACTIVE ISOTOPES, LABELED SUBSTANCES, BENZENE COMPOUNDS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A1, *Muscarinic antagonists, Iodine 125, Benzilate/3-quinuclidinyl-4-iodo, *Pleurobranchaea californica, *Muscarinic receptors, *Benzilates.

AD-A208 655 20/9 19/12

R AND D ASSOCIATES ALEXANDRIA VA WASHINGTON RESEARCH LAB

(U) Dense Plasma Jet Propagation for Endoatmospheric Ballistic Missile Defense.

DESCRIPTIVE NOTE. Final rept. 1 Oct 86-30 Jun 88.

JUN 88 79P

CONTRACT NO. F49620-87-C-0006

PROJECT NO. D812

TASK NO. F1

MONITOR: AFOSR TR-89-0720

UNCLASSIFIED REPORT

ABSTRACT: (U) A variety of schemes have been proposed for delivering lethal amounts of energy and/or momentum to targets such as missiles and high speed aircraft. One class of technology involves the use of high speed plasmas. The primary attraction of such technology is the possibility of utilizing relatively compact accelerators and electrical power systems that could allow highly mobile and agile operation from rocket or aircraft platforms, or in special ordnance. This research has been developing the experimental conditions necessary to achieve reasonable comparison with theoretical predictions for plasma jet propagation in the atmosphere. Time-resolved measurements have been made of high speed argon plasma jets penetrating a helium background (simulating xenon jets propagating into air). Basic radial confinement of the jet has been observed by photography and spectroscopy and structures in the flow field resemble those predicted by numerical calculations. Results from our successful initial experiments have been used to design improved diagnostic procedures and arcjet source characteristics for further experiments. (EDC)

DESCRIPTORS: (U) *DENSE GASES, *PLASMA JETS, DIRECTED ENERGY WEAPONS, AIRCRAFT, ANTIMISSILE DEFENSE SYSTEMS, ARGON, BACKGROUND, COMPUTATIONS, CONFINEMENT(GENERAL), DIAGNOSIS(GENERAL), EARTH ATMOSPHERE, ELECTRIC POWER, ELECTRICAL EQUIPMENT, ENDOATMOSPHERE, FLOW FIELDS, GUIDED MISSILES, HELIUM, HIGH VELOCITY, MEASUREMENT, MOBILE,

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 655 CONTINUED

MOMENTUM, NUMERICAL ANALYSIS, PARTICLE ACCELERATORS, PHOTOGRAPHY, PLASMAS(PHYSICS), PREDICTIONS, PROPAGATION, SIMULATION, SPECTROSCOPY, TARGETS, THEORY, TIME, XENON.

IDENTIFIERS: (U) PE63220C, WUAFOSRD812F1.

AD-A208 648 7/2 7/4

CALIFORNIA INST OF TECH PASADENA ARTHUR AMOS NOYES LAB OF CHEMICAL PHYSICS

(U) Femtochemistry of the Reaction: IHgI* Yields (IHg...I) * Yields HgI + I,

MAR 89 9P

PERSONAL AUTHORS: Bowman, R. M.; Dantus, M.; Zewail, A. H.

CONTRACT NO. AFOSR-87-0071

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-89-0714

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v156 n2-3 p131-137 1989.

ABSTRACT: (U) Femtochemistry of the reaction IHgI yields IHg + I yields HgI+I is reported. We observe femtosecond decays with an oscillatory modulation. These observations are related to the reaction trajectories on the global PES, which involve a symmetric stretch, an antisymmetric stretch and a bend. Keywords: Iodine compounds; Mercury compounds; Femtochemistry; Reaction dynamics; Real time; Dissociation; Dynamics; Vibrational; Rotational states; Reprints. (MJM)

DESCRIPTORS: (U) *IODINE COMPOUNDS, *MERCURY COMPOUNDS, *REACTION KINETICS, DISSOCIATION, DYNAMICS, MODULATION, OSCILLATION, REAL TIME, REPRINTS, RESPONSE, TRAJECTORIES, YIELD, DECAY, MOLECULAR ROTATION, MOLECULAR VIBRATION, MOLECULAR STATES.

IDENTIFIERS: (U) *Femtochemistry.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 642 23/3 6/4

OREGON STATE UNIV NEWPORT OR HATFIELD MARINE SCIENCE CENTER

(U) Connectionist Networks Learn to Transmit Chaos.

DESCRIPTIVE NOTE: Rept. for 10 Jan 86-14 Jan 89,

88 10P

PERSONAL AUTHORS: Mpitsos, George J.; Burton, Robert M., Jr.; Creech, H. C.

CONTRACT NO. AFOSR-86-0076

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR TR-89-0708

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Brain Research Bulletin, v21 p539-546 1988.

ABSTRACT: (U) The activity of some neurons during the generation of coordinated motor patterns may be attributable to chaos. Because even simple biological systems are difficult to control, connectionist networks are used to inquire into the question of whether a chaotic signal originating in one part of the nervous system can be learned and transmitted by another. A number of different architectures are examined, and the findings reported for a simple network consisting of one input unit, four hidden units, and one output unit. During training sessions, the input of the circuit was given analog values of either the 3.60 or 3.95 logistic equation, or of one variable of the three-variable Rossler attractor. The backpropagated error in the learning algorithm was a function of the difference between the input value and the output at each iteration. Iterations involving small changes in analog value resulted in good similarity between the input and output signals, but little learning occurred because of the small error propagated back to the synapses. With larger differences in the analog values (and larger feedback error) at each iteration, networks learned to transmit

AD-A208 642 CONTINUED

different chaotic attractors. Once the network learned one input, it could transmit another without changing the synapses. Reprints. (JHD)

DESCRIPTORS: (U) *BIONICS, *NERVOUS SYSTEM, *NETWORKS, *SYNAPSE, ALGORITHMS, ANALOG SYSTEMS, BIOLOGY, CIRCUITS, ERRORS, FEEDBACK, INPUT OUTPUT PROCESSING, LEARNING, MOTORS, NERVE CELLS, PATTERNS, REPRINTS, SIGNALS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A1, Rossler attractor, Chaos.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 637 7/6

CALIFORNIA INST OF TECH PASADENA DEPT OF APPLIED MATHEMATICS

(U) Differential Equations and Continuum Mechanics.

DESCRIPTIVE NOTE: Final rept.,

MAY 89 6P

PERSONAL AUTHORS: Cohen, Donald S.

CONTRACT NO. AFOSR-87-0270

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR
TR-89-0703

UNCLASSIFIED REPORT

ABSTRACT: (U) Recent advances in materials science and synthetic chemistry have led to the development and design of new classes of polymeric materials with desirable and beneficial properties. These are of enormous importance in many industrial and military situations. Most of these materials have features not well understood scientifically and not explainable with current standard equations of motion. The authors looked at several classes of these polymers with the intent of developing the nonlinear models for the study of transport by and through them. The models are then applied to specific new technological problems necessitating the development of new asymptotic, perturbation and numerical techniques for their solutions. (KR)

DESCRIPTORS: (U) *CONTINUUM MECHANICS, *DIFFERENTIAL EQUATIONS, *POLYMERS, INDUSTRIES, MATERIALS, MATHEMATICAL MODELS, NONLINEAR SYSTEMS, NUMERICAL METHODS AND PROCEDURES, SYNTHESIS(CHEMISTRY), TRANSPORT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A4.

AD-A208 637

AD-A208 636 5/8 6/15

OREGON STATE UNIV CORVALLIS

(U) Muscarinic Antagonist Enhances One-Trial Food-Aversion Learning in the Mollusc Pleurobranchaea.

DESCRIPTIVE NOTE: Rept. for 1 Oct 86-14 Jan 89,

MAR 89 14P

PERSONAL AUTHORS: Mpitsos, George J.; Murray, Thomas F.; Creech, H. C.; Barker, David L.

CONTRACT NO. AFOSR-86-0076

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR
TR-89-0706

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Brain Research Bulletin, v21 p169-179 1988.

ABSTRACT: (U) One hour before training, in two replicate studies on the sea slug Pleurobranchaea californica, all animals (N=114) received body-cavity injections of scopolamine, oxotremorine, or the equivalent volume of the saline/seawater vehicle that was used to inject the drugs. The low drug doses (2 micromoles/kg) were near the threshold for generating observable neurophysiological responses, but did not affect feeding thresholds arising to a stimulus derived from beer (Sbr) and to one derived from squid (Ssq). By comparison to the other injection, scopolamine 1) increased the ability of the experimental animals to make the discrimination between Sbr and Ssq, and 2) prevented learning to avoid Sbr in the control animals. An accompanying paper provides a detailed characterization of muscarinic receptor pharmacology in Pleurobranchaea. Keywords: Muscarinic antagonist, Food-aversion, Mollusc, Electric shocks, Learning, Reprints. (KT)

DESCRIPTORS: (U) *CONDITIONING(LEARNING), *PHARMACOLOGICAL ANTAGONISTS, *AVOIDANCE, CONTROL, DOSE RATE, DRUGS, GASTROPODA, LABORATORY ANIMALS, LOW RATE,

AD-A208 636

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD A208 636 CONTINUED

MUSCARINE, NEUROPHYSIOLOGY, PHARMACOLOGY, RECEPTION, REPRINTS, RESPONSE(BIOLOGY), SALINITY, SEA WATER, VOLUME, FOOD BEVERAGES, STIMULI, CONDITIONED RESPONSE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A1, Pleurobranchaea californica, Sea slugs, Oxotremorine, Muscarinic antagonists, Muscarinic receptors, Electric shocks, Beer.

AD-A208 635 13/13

GEORGETOWN UNIV WASHINGTON D C

(U) Studies in Stabilization and Control of Beams and Plates.

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

AUG 88 3P

PERSONAL AUTHORS: Lagnese, John E.

CONTRACT NO. AFOSR-86-0162

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-89-0726

UNCLASSIFIED REPORT

ABSTRACT: (U) The principal achievement of the research undertaken under this grant was the development of comprehensive theories of exact controllability and stabilization of thin plate dynamics by means of forces and moments applied on the edge of the plate, based on continuum models of plates. Two major research monographs, which lay the foundations of the theories, were written. The motivation for this study, and its ultimate goal, is the design and analysis of practical strategies for active control and vibration suppression in flexible structures. A second, related, area of research was the design of feedback controls acting on the edge of the plate which uniformly stabilize plate motion, i.e, which cause all of the modes to decay at some uniform rate. Once again, such control strategies were sought for a wide variety of plate models, including nonlinear models. In fact, our results for nonlinear models (in which the nonlinearities may be both in the dynamics and in the feedback control) are probably the first of their kind. Structural beams, Thermal stresses. (JES)

DESCRIPTORS: (U) *BEAMS(STRUCTURAL), CONTROL, DOCUMENTS, DYNAMICS, FEEDBACK, FLEXIBLE STRUCTURES, FOUNDATIONS(STRUCTURES), MATHEMATICAL MODELS, MODELS, MOMENTS, MOTIVATION, NONLINEAR SYSTEMS, RATES, STRATEGY, SUPPRESSION, THEORY, THERMAL STRESSES, VIBRATION.

AD A208 636

AD A208 635

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 635 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A208 634 12/3

PRINCETON UNIV NJ

(U) Markov Processes Applied to Control, Reliability and Replacement.

DESCRIPTIVE NOTE: Final rept. Oct 87-Sep 88,

APR 89 5P

PERSONAL AUTHORS: Cinlar, E.

CONTRACT NO. AFOSR-87-0050

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR 89-0700

UNCLASSIFIED REPORT

ABSTRACT: (U) This reports on the work done on stochastic comparisons of semimartingale Markov processes, opportunistic replacement policies, stochastic flows, and the book project on probability theory and stochastic processes. Keywords: Stochastic flows; Random variables; Hunt processes. (KR)

DESCRIPTORS: (U) *MARKOV PROCESSES, FLOW, POLICIES, PROBABILITY, RANDOM VARIABLES, RELIABILITY, REPLACEMENT, REPORTS, STOCHASTIC PROCESSES, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO EVI32L

AD-A208 633 12/1

IOWA STATE UNIV AMES DEPT OF MATHEMATICS

(U) Analysis and Numerical Analysis of Some Properly and Improperly Posed Problems in Applied Mathematics.

DESCRIPTIVE NOTE: Final rept. 15 Oct 87-14 Oct 88,

OCT 88 18P

PERSONAL AUTHORS: Levine, Howard A.

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR
TR 89-0702

UNCLASSIFIED REPORT

ABSTRACT: (U) We proposed to study several different types of problems involving partial differential equations which arise naturally in applications: Qualitative behavior of solutions of nonlinear evolution equations; and Parameter identification problems. (KR)

DESCRIPTORS: (U) *APPLIED MATHEMATICS, *PARTIAL DIFFERENTIAL EQUATIONS, BEHAVIOR, EVOLUTION(GENERAL), IDENTIFICATION, NONLINEAR ALGEBRAIC EQUATIONS, NUMERICAL ANALYSIS, PARAMETERS, PROBLEM SOLVING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A9.

AD A208 633

AD-A208 632 9/1 20/12

HYPRES INC ELMSFORD NY

(U) MM - Wave Components - SIS (Superconductor-Insulator-Superconductor) Mixers.

DESCRIPTIVE NOTE: *Final rept. Nov 86-Dec 88,

89 50P

PERSONAL AUTHORS: Whiteley, S. R.

CONTRACT NO. F49620-87-C-0014

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR
TR-89-0620

UNCLASSIFIED REPORT

ABSTRACT: (U) Superconductor-Insulator-Superconductor (SIS) tunnel junction mixers are known to provide ultra-high sensitivity receiver applications above 30 GHz. In this two year (Phase II) program, HYPRES, in collaboration with the National Radio Astronomy Observatory, have developed novel fully integrated SIS mixer circuits, and demonstrated a unique high efficiency cooling system. The integrated SIS mixer chip contains, aside from the actual mixer elements, passive tuning components, an IF filter, a coplanar transmission line, and a waveguide coupler, necessary components heretofore realized off-chip. Fabrication of the integrated mixer required development of a nine level process and optimization of the process dependent electrical parameters of the SIS devices. The device performs efficiently in the range of 75-115 GHz. A novel dewar-based cooler, which makes use of the extremely low thermal conductivity of the fused silica chip substrate to achieve an incremental thermal load of 25 mW, was fabricated and demonstrated. Such a cryostat allows relatively long term unattended operation of SIS, or other, cryogenic devices. (rh)

DESCRIPTORS: (U) *CHIPS(ELECTRONICS), *MIXERS(ELECTRONICS), *WAVEGUIDE COUPLERS, ASTRONOMICAL OBSERVATORIES, COOLING AND VENTILATING EQUIPMENT,

AD A208 6 2

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 632 · CONTINUED

CRYOGENICS, CRYOSTATS, EFFICIENCY, ELECTRICAL PROPERTIES, FUSED SILICA, HIGH RATE, LOW LEVEL, OPERATION, OPTIMIZATION, PARAMETERS, PASSIVE SYSTEMS, PLANAR STRUCTURES, RADIO ASTRONOMY, SUBSTRATES, THERMAL CONDUCTIVITY, THERMAL PROPERTIES, TRANSMISSION LINES, TUNING, WAVES.

IDENTIFIERS: (U) PE61102F, WUAFOSR3005A1, HYPRESS proprietary.

AD-A208 628 20/11

CARNEGIE-MELLON UNIV PITTSBURGH PA

(U) Non-Linear Dynamics and Chaotic Motions in Feedback Controlled Elastic System.

DESCRIPTIVE NOTE: Final rept. 1 Dec 83-30 Sep 88.

88 9P

CONTRACT NO. AFOSR-84-0051

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR TR-89-0725

UNCLASSIFIED REPORT

ABSTRACT: (U) J. Guckenheimer, D. Armbruster (postdoc) and S. Campbell (grad student) and I have continued our work on the global dynamics and bifurcations of O(2) symmetric ODEs. Such systems are obtained as finite dimensional projections or reductions of spatially translation- and reflection-invariant PDE S, for example. In 1987/88, partially supported by this grant, we provided a complete analysis of heteroclinic cycles and modulated travelling waves in two mode (k:2K) interacting systems. In particular, we pointed out that heteroclinic cycles are structurally stable features in such systems. (MJM)

DESCRIPTORS: (U) *CONTROL SYSTEMS, *TRAVELING WAVES, DYNAMICS, ELASTIC PROPERTIES, FEEDBACK, GLOBAL, INTERACTIONS, MODULATION, NONLINEAR SYSTEMS, SIZES(DIMENSIONS).

IDENTIFIERS: (U) WUAFOSR2304A4, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD A208 627 12/3

CARNEGIE-MELLON UNIV PITTSBURGH PA

(U) Singular and Bang-Bang Stochastic Control.

DESCRIPTIVE NOTE: Final rept. 30 Sep 85-30 Sep 88,

88 5P

PERSONAL AUTHORS: Shreve, Steven E.

CONTRACT NO. AFOSR-85-0360

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-89-0724

UNCLASSIFIED REPORT

ABSTRACT: (U) The proposal which formed the basis for this grant consisted of three parts: research on singular stochastic control, research on bang-band stochastic control, and the creation of a graduate text which would make these two topics widely accessible. Significant progress has been made in the two research areas, although a number of important questions remain. The proposed graduate text has been completed and a copy was provided to the Air Force Office of Scientific Research in December 1987. We discuss each of these three topics in turn. (KR)

DESCRIPTORS: (U) *STOCHASTIC CONTROL, PULSE MODULATION, AIR FORCE RESEARCH.

IDENTIFIERS: (U) WUAFOSR2304A1, PE61102F.

AD A208 626 20/7

NEW MEXICO UNIV ALBUQUERQUE

(U) Operation and Upgrading of the Beam Optics Test Stand.

DESCRIPTIVE NOTE: Final rept. 1 Nov 85-31 Mar 88,

FEB 89 87P

PERSONAL AUTHORS: Humphries, S., Jr

CONTRACT NO. AFOSR-86-0063

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR
TR-89-0707

UNCLASSIFIED REPORT

ABSTRACT: (U) This grant studied novel methods to focus high intensity neutral particle beams. The work directly impacts the space based neutral particle beam program. The goal was to investigate methods to correct aberrations in the final focusing lens of an NPB accelerator. The two unconventional beam optics techniques that were developed and investigated were: 1) biased grid arrays to correct particle orbits and 2) solenoid lenses with entrapped non-neutral electron distributions to correct spherical aberration.

DESCRIPTORS: (U) *OPTICS, *TEST STANDS, ARRAYS, BIAS, DISTRIBUTION, ELECTRONS, FOCUSING, GRIDS, LENSES, ORBITS, PARTICLES, SOLENOIDS.

IDENTIFIERS: (U) WUAFOSR2301A7, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 625 6/3

OREGON STATE UNIV NEWPORT OR HATFIELD MARINE SCIENCE CENTER

(U) Evidence for Chaos in Spike Trains of Neurons That Generate Rhythmic Motor Patterns.

DESCRIPTIVE NOTE: Rept. for 10 Jan 86-14 Jan 89,

88 12P

PERSONAL AUTHORS: Mpitsos, George J.; Burton, Robert M., Jr ; Creech, H. C.; Soinila, Seppo O.

CONTRACT NO. AFOSR-86-0076

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR TR 89-0709

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Brain Research Bulletin, v21 p529-538 1988.

ABSTRACT: (U) The findings presented here of work on the opisthobranch mollusc Pleurobranchaea californica indicate that some of the variability that has been observed in the activity of neurons during patterned motor activity may be attributable to low-dimensional chaos. We obtained long trains of action potentials (spikes) from these neurons, scanned them using adjacent temporal windows having equal widths, and converted the counts into frequency times series. The present findings are similar to those of previous work in which equal-interval time series were obtained by interpolation of the unequal interval spike trains. We discuss the implications of chaos and the difficulties in the application of extant dynamical tools to spike trains. An accompanying paper inquires into the ability of neural networks to read and transmit chaotic activity Keywords: Chaos; Fractals; Mollusc; Motor systems, Parallel processing; Self organization; Neurochemistry; Nerve transmission; Nerve impulses; Reprints. (KT)

DESCRIPTORS: (U) *MOTOR NEURONS, *NERVE IMPULSES, *NERVE

AD A208 625

AD-A208 625 CONTINUED

TRANSMISSION, CIRCADIAN RHYTHMS, DYNAMICS, FREQUENCY, INTERPOLATION, MOTOR REACTIONS, MOLLUSCA, NERVE CELLS, NEURAL NETS, NEUROCHEMISTRY, PARALLEL PROCESSING, PATTERNS, REPRINTS, SPIKES, WIDTH.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A1.

AD A208 625

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EV132L

AD A208 624 20/4

LEHIGH UNIV BETHLEHEM PA

(U) Three-Dimensional Vortex Interactions in Turbulent Boundary Layers.

DESCRIPTIVE NOTE: Final rept. 7 Jan 85-30 Nov 88,

APR 89 73P

PERSONAL AUTHORS: Smith, C. R.; Walker, J. D.

CONTRACT NO. F49620-85-C-0108

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR
TR-89-0689

UNCLASSIFIED REPORT

ABSTRACT: (U) The results and accomplishments of a combined analytical-experimental research program, aimed at understanding and modeling the three-dimensional vortex interactions that take place in turbulent boundary layers, are described. The central theme of the program is that hairpin vortices are the basic building block of boundary-layer turbulence and that many of the observed dynamic features of turbulent shear flows can be explained in terms of how hairpin vortices interact with the background shear, with each other and the viscous flow near solid walls. A basic intent of the program is to cross-compare detailed experimental flow visualization-imaging studies of well-defined three-dimensional hairpin vortices with computational studies of the behavior, evolution and induced effects of comparable vortices. Based on these investigations, a model of the dynamics of turbulent flows near a wall is proposed. Keywords: Turbulent boundary layer, Coherent structure, Vortex interactions, Hairpin vortices, Turbulence modeling. (EDC)

DESCRIPTORS. (U) *THREE DIMENSIONAL FLOW, *TURBULENT BOUNDARY LAYER, *VORTICES, BACKGROUND, BOUNDARY LAYER, COHERENCE, COMPUTATIONS, DYNAMICS, FLOW VISUALIZATION, INTERACTIONS, MODELS, MODULAR CONSTRUCTION, OPTICAL IMAGES, SHEAR PROPERTIES, THREE DIMENSIONAL, TURBULENCE, TURBULENT FLOW, VISCOUS FLOW, WALLS.

AD A208 624

AD-A208 624 CONTINUED

IDENTIFIERS: (U) Hairpin vortices, PE61102F, WUAFOSR2307A2.

AD A208 624

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 623 9/1

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF ELECTRICAL ENGINEERING

(U) Fast Digital Correlations and Transforms Using Finite Field Techniques.

DESCRIPTIVE NOTE: Final progress rept.,

DEC 79 9P

PERSONAL AUTHORS: Reed, I. S.

CONTRACT NO. AFOSR-75-2798

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR TR-89-0745

UNCLASSIFIED REPORT

ABSTRACT: (U) This research was principally in the following four areas--Finite fields in digital signal processing, transform decoders for correcting both errors and erasures of the Reed-Solomon code, xray 3-d reconstruction, and a fast two dimensional convolution by the polynomial transform. Keywords: Fast Fourier transforms, Recursive filters. (KR)

DESCRIPTORS: (U) *FAST FOURIER TRANSFORMS, *CORRELATION TECHNIQUES, CONVOLUTION, CORRELATION, DIGITAL SYSTEMS, HIGH RATE, RECURSIVE FILTERS, SIGNAL PROCESSING, TWO DIMENSIONAL, POLYNOMIALS, THREE DIMENSIONAL.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A6.

AD-A208 622 12/3

BROWN UNIV PROVIDENCE RI DIV OF APPLIED MATHEMATICS

(U) An Averaging Method for Stochastic Approximations with Constant Parameters: Small Parameter Values,

MAR 80 26P

PERSONAL AUTHORS: Kushner, H. J.

CONTRACT NO. AFOSR-76-3063

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-89-0744

UNCLASSIFIED REPORT

ABSTRACT: (U) Stochastic approximations with constant gain coefficients and dependent noise and nonlinear or even discontinuous dynamics have many applications in control, automata and communication theory. When the gain coefficient is small, an asymptotic theory is developed which gives much information on the character of the paths and errors. The method involves both averaging and stability ideas. The ideas are outlined. An example which illustrates the basic ideas and techniques is given. (KR)

DESCRIPTORS: (U) *NUMERICAL METHODS AND PROCEDURES, *STOCHASTIC PROCESSES, *APPROXIMATION(MATHEMATICS), ASYMPTOTIC SERIES, AUTOMATA, COEFFICIENTS, DYNAMICS, GAIN, INFORMATION THEORY, NOISE, PARAMETERS, STOCHASTIC PROCESSES.

IDENTIFIERS: (U) WUAFOSR2304A1, PE61102F.

AD A208 618 9/1 12/3

CALIFORNIA UNIV IRVINE

(U) Statistical Analysis of the LMS and Modified Stochastic Gradient Algorithms.

DESCRIPTIVE NOTE: Annual rept. 15 May 88-14 May 89,

MAY 89 23P

PERSONAL AUTHORS: Bershad, Neil J.

CONTRACT NO. AFOSR-86-0093

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR
TR-89-0701

UNCLASSIFIED REPORT

ABSTRACT: (U) During the period April 15 1989, the Air Force Office of Scientific Research supported research work on the stochastic behavior of the LMS and related adaptive algorithms has yielded results in two major areas: Digital Implementation of Stochastic Gradient Type adaptive Algorithms; and LMS and RLS Performance Comparison for Tracking a Chirped Sinusoid in Noise. Keywords: Mathematical models, Electrical engineering, Echo cancellation, Abstracts. (KR)

DESCRIPTORS: (U) *ALGORITHMS, *STATISTICAL ANALYSIS, ADAPTIVE SYSTEMS, ABSTRACTS, CANCELLATION, COMPARISON, ECHOES, ELECTRICAL ENGINEERING, GRADIENTS, MATHEMATICAL MODELS, STOCHASTIC PROCESSES, TRACKING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A6.

AD A208 618

AD-A208 613 20/3 12/5 23/3

PURDUE UNIV LAFAYETTE IN SCHOOL OF ELECTRICAL ENGINEERING

(U) Expert Systems for the Scheduling of Image Processing Tasks on a Parallel Processing System.

DESCRIPTIVE NOTE: Final rept.,

DEC 86 77P

PERSONAL AUTHORS: Weil, Francis J.

CONTRACT NO. F49620-86-K-0006

MONITOR: AFOSR
TR-89-0731

UNCLASSIFIED REPORT

ABSTRACT: (U) The algorithms used in image processing are becoming longer and more complex as researchers strive to create vision systems whose performance rivals that of the human's. The size and complexity of these algorithms, however, generally do not allow them to be run in 'real time' on any sequential (Von Neumann) machine. Image processing algorithms tend to be highly parallel in nature. One can hope, therefore, that the recent advances in parallel computing will bring significant speed-ups in the execution times of image processing algorithms. However, it is usually the case that image processing systems are extremely computationally intensive. Even with speed-ups brought about by parallel computers, there is a demand for an advisory system that optimizes the execution time of image processing algorithms. A reasonable goal for such a system is as follows. Given a list of all the subtasks that need to be run for a given image processing task, produce an initial schedule and configuration and then adjust the schedule and configuration during runtime based on the current configuration and intermediate processing results. The proposed work will proceed towards this goal on several fronts. Theses. (RH)

DESCRIPTORS: (U) *ALGORITHMS, *COMPUTERS, *IMAGE PROCESSING, *PARALLEL PROCESSING, *VISION, ADVISORY ACTIVITIES, CONFIGURATIONS, HUMANS, PARALLEL ORIENTATION, PROCESSING, REAL TIME, SCHEDULING, THESES, TIME.

IDENTIFIERS: (U) PE61102F.

AD-A208 613

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 590 12/2

COLUMBIA UNIV NEW YORK DEPT OF MATHEMATICS

(U) Differential Equations, Related Problems of Pade Approximations and Computer Applications.

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

88 62P

PERSONAL AUTHORS: Chudnovsky, D. V.; Chudnovsky, G. V.

CONTRACT NO. AFOSR-87-0117

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR
TR-89-0729

UNCLASSIFIED REPORT

ABSTRACT: (U) During the past period of the Grant, this work focused on the study of analytic, arithmetic and algorithmic properties of differential equations applied to solutions of problems in theoretical mathematics, mathematical and theoretical physics, numerical methods and computer science. Keywords: Graphs, Polynomials, Fractions. (KR)

DESCRIPTORS: (U) *DIFFERENTIAL EQUATIONS, ALGORITHMS, APPROXIMATION(MATHEMATICS), COMPUTER APPLICATIONS, COMPUTERS, GRAPHS, MATHEMATICS, NUMERICAL METHODS AND PROCEDURES, PHYSICS, POLYNOMIALS.

IDENTIFIERS: (U) WUAFOSR2304A4, PE61102F.

AD A208 590

AD-A208 589 7/4 8/10

NEW JERSEY INST OF TECH NEWARK

(U) Plastic Deformation of Granular Materials.

DESCRIPTIVE NOTE: Final rept. 1 Apr 88-31 Mar 89,

MAR 89 11P

PERSONAL AUTHORS: Pitman, E. B.

CONTRACT NO. AFOSR-88-0182

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR
TR-89-0723

UNCLASSIFIED REPORT

ABSTRACT: (U) The deformation of granular materials occurs in a variety of applications: soil dynamics; avalanch flows; grain flow in bins. Our goal in this project is to develop a more complete understanding of the mechanics of granular flow. The project consists of two distinct but related phases. One phase is a study of the mathematical structure of constitutive relations used to model the granular medium. The research here is primarily concerned with the stability and well posedness of the evolution equations governing flow. Most of our efforts have concentrated on the Critical State Theory of Soil Mechanics, a mathematically attractive theory which has some success in modeling soil deformations. In particular, the Critical State Theory is reasonably successful at modelling the deformation of so called Cam clay , a type of clay tested by the Cambridge soil mechanics group in the late 1950's. (MJM)

DESCRIPTORS: (U) *GRANULES, *PLASTIC DEFORMATION, *SOIL DYNAMICS, *SOIL MECHANICS, CLAY, DEFORMATION, EVOLUTION(GENERAL), MATHEMATICAL MODELS, MODELS, SOILS, THEORY.

IDENTIFIERS: (U) WUAFOSR2304A4, PE61102F.

AD A208 589

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD A208 588 6/11

WRIGHT STATE UNIV DAYTON OHIO DEPT OF CHEMISTRY

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

DESCRIPTIVE NOTE: Final technical rept. 1 Feb 87-30 Apr 89,

MAY 89 89P

PERSONAL AUTHORS: Serve, M. P.

CONTRACT NO. AFOSR-87-0108

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR TR-89-0771

UNCLASSIFIED REPORT

ABSTRACT: (U) Certain hydrocarbons, both acyclic and cyclic, have been shown to induce a nephrotoxic effect in male rats. There is a strong feeling that the renal damage may be related to the metabolic handling of the hydrocarbon by the animals. Both cis- and trans-decalin as well as other saturated cyclic molecules have shown a proclivity of inducing the nephrotoxicity. Tetralin and indan, because of the aromatic ring which exists as part their structures, introduces a structural difference when compared to other cyclic hydrocarbons which have produced the hyaline droplet nephrotoxicity. Male and female Fischer 344 rats were dosed intragastrically with tetralin or indan on an every other day regimen for 14 days. When compared with male control rats dosed with water, the male rat exposed to tetralin and indan exhibited increased cytoplasmic hyaline droplets in proximal convoluted tubular epithelial cells, which were indicative of toxic injury. Additionally, foci of cellular degeneration were present within proximal convoluted tubules. Exposed and control female Fischer 344 rats did not display any renal damage. Keywords: Nephrotoxicity; Cyclic compounds. (KT)

DESCRIPTORS: (U) *HYDROCARBONS, *KIDNEYS, ANIMALS, AROMATIC COMPOUNDS, CONTROL, CYCLES, CYCLIC COMPOUNDS, DAMAGE, EXPOSURE(HYDROCARBONS), FEMALES, HANDLING, MALES, METABOLISM, MOLECULES, RATS, RINGS, SATURATION, TOXICITY, WATER.

IDENTIFIERS: (U) WUAFOSR2312A5, PE61102F, *Cyclic hydrocarbons, *Acyclic hydrocarbons, *Nephrotoxins, *Nephrotoxicity.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 587 5/8 6/4 25/4

YALE UNIV NEW HAVEN CT DEPT OF PSYCHOLOGY

(U) Levels of Processing of Speech and Non-Speech.

DESCRIPTIVE NOTE: Annual technical rept. Mar 88-Mar 89,

APR 89 17P

PERSONAL AUTHORS: Samuel, Arthur G.

CONTRACT NO. AFOSR-86-0357

PROJECT NO. 2313

TASK NO. A6

MONITOR: AFOSR
TR-89-0770

UNCLASSIFIED REPORT

ABSTRACT: (U) The studies conducted examine both signal-dependent factors, and listener-dependent factors. The examinations of signal factors include experiments on perceptual degradation due to signal interruption at critical rates (approximately 4cps), and studies mapping the early levels of representation of speech. The data support the existence of two qualitatively different early processing stages; the first is relatively peripheral and subject to neural fatigue, while the second is central and subject to criterion shifts. The studies of listener-based factors include studies of perceptual restoration of deleted sounds (phonemes or musical notes), and studies of the perceptual effect of attentional allocation. The restoration experiments indicate similar architectures in the perceptual processing of speech and music. The attentional investigations demonstrate rather fine-tuned attentional control under high predictability conditions. Significant progress has been make in achieving the research objective of clarifying the properties of complex auditory pattern recognition. Keywords: Auditory signals/ perception degradation, Hearing speech/music, Information processing. (EDC)

DESCRIPTORS: (U) *AUDITORY PERCEPTION, *AUDITORY SIGNALS, *INFORMATION PROCESSING, *NERVOUS SYSTEM, *SPEECH, DEGRADATION, FATIGUE, HEARING, INTERRUPTION, MAPPING,

AD-A208 587 CONTINUED

MUSIC, PATTERN RECOGNITION, PERCEPTION, PHONEMES, PROCESSING, RATES, SIGNALS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A6.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 578 12/3

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Functional Occupation Measures and Ergodic Cost Problems for Singularly Perturbed Stochastic Systems,

APR 89 24P

PERSONAL AUTHORS: Kushner, Harold J.

REPORT NO. LCDS/CCS-89-6

CONTRACT NO. AFOSR-89-0015

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-89-0696

UNCLASSIFIED REPORT

Availability: Document partially illegible.

ABSTRACT: (U) Functional occupation measures are an extension to occupation measures on the path space of the usual definition of occupation measures for stochastic processes. They are used to get limit and approximation theorems for average cost per unit time problems for many types of controlled or uncontrolled random processes. This paper deals with diffusions reflected diffusions, and singularly perturbed controlled diffusions. There are extensions to wide bandwidth noise driven systems and to many other models. The method provides a convenient and powerful way of characterizing the processes associated with the weak limits of the occupation measures and with the sample limits of the average costs per unit time, as the various parameters of the problem go to their limits. The method can be used to get approximate optimality theorems and similar results for processes which are only approximated by jump diffusions and are of interest over a long time period. (KR)

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, CONTROL, COSTS, ERGODIC PROCESSES, LIMITATIONS, LONG RANGE(TIME), PERTURBATIONS, THEOREMS, TIME, DIFFUSION.

AD-A208 578 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 576 7/4

SRI INTERNATIONAL MENLO PARK CA

(U) Multiphoton Detection Techniques for F and F2.

DESCRIPTIVE NOTE: Annual technical rept. Apr 88-Mar 89,

APR 89 17P

PERSONAL AUTHORS: Faris, G. W.; Dyer, M. J.; Huestis, D. L.

REPORT NO. SRI-MP-89-106

CONTRACT NO. F49620-88-K-0003

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR
TR 89-0712

UNCLASSIFIED REPORT

ABSTRACT: (U) During the last year we have been performing experiments that will lead to the development of quantitative remote diagnostics for atomic and molecular fluorine, using ultraviolet multiphoton excitation followed by the detection of fluorescence or ionization. This report, describes the first demonstration of resonant multiphoton excitation of molecular fluorine and the construction of a new apparatus for high-sensitivity detection of atomic fluorine using two-photon absorption of 170-nm radiation from a narrow-band tunable ArF laser, Raman shifted in liquid nitrogen cooled HD. Keywords: Multiphoton excitation spectroscopy; Atomic fluorine, Molecular fluorine; Laser diagnostics. (jhd)

DESCRIPTORS: (U) *MOLECULAR SPECTROSCOPY, *FLUORINE, *ATOMIC SPECTROSCOPY, *TWO PHOTON ABSORPTION, DETECTION, DIAGNOSIS(GENERAL), EXCITATION, FLUORESCENCE, HIGH SENSITIVITY, IONIZATION, LASER APPLICATIONS, LASERS, MOLECULES, PHOTONS, RESONANCE RADIATION, ULTRAVIOLET RADIATION.

IDENTIFIERS: (U) *Multiphoton excitation.

AD A208 576

AD-A208 575 4/2

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF METEOROLOGY

(U) A Numerical Investigation of a Convectively Generated, Inertially Stable, Extratropical Warm-Core Mesovortex Over Land Part 1. Structure and Evolution,

DEC 88 50P

PERSONAL AUTHORS: Zhang, Da-Lin; Fritsch, J. M.

CONTRACT NO. AFOSR-88-0050

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR
TR-89-0603

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Monthly Weather Review, v116 n12 p2661-2687 Dec 88.

ABSTRACT: (U) A 36-h nested-grid numerical simulation of the life cycle of a convectively generated, inertially stable, warm-core mesovortex is presented. The vortex evolved from a mesoscale convective complex that developed from a squall line over Oklahoma during 7-8 July 1982. A modified version of the mesoscale hydrostatic model with a fine-mesh grid resolution of 25 km is utilized for this study. The model simultaneously incorporates parameterized convection and a grid-resolved convective scheme containing the effects of hydrostatic water loading, condensation (evaporation), freezing (melting) and sublimation. Genesis, intensification an maintenance of a low- to midtropospheric closed meso-B scale cyclone as well as the associated surface pressure perturbations, the evolution of moist convection, and the distribution and magnitude of total rainfall are simulated by the model. It is found that a propagating mesoscale vorticity disturbance, preexisting low-level frontal forcing and a convectively favorable environment ahead of the front help generate an organized area of upward motion wherein the vortex develops. However, it is the resolvable-scale latent heat release that appears to be directly responsible for producing the rotating MCS.

AD A208 575

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD A208 575 CONTINUED

Keywords: Reprints. (JHD)

DESCRIPTORS: (U) *CONVECTION(ATMOSPHERIC), *THUNDERSTORMS, *VORTICES, CONDENSATION, EVAPORATION, EVOLUTION(GENERAL), GRIDS, HYDROSTATIC PRESSURE, LAND AREAS, LIFE CYCLES, LOADS(FORCES), MESH, MOISTURE, HEAT OF VAPORIZATION, NUMERICAL ANALYSIS, OKLAHOMA, PERTURBATIONS, PRESSURE, RAINFALL, ATM, OSPHERE MODELS, REPRINTS, RESOLUTION, SUBLIMATION, DIGITAL SIMULATION, SURFACE PROPERTIES, WATER, LATENT HEAT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A1, MCS(Mesoscale Convective System), Mesovortex, Squall lines.

AD A208 574 4/2

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF METEOROLOGY

(U) Numerical Simulation of the Meso-Beta Scale Structure and Evolution of the 1977 Johnstown Flood. Part 3. Internal Gravity Waves and Squall Line,

APR 88 19P

PERSONAL AUTHORS: Zhang, Da-Lin; Fritsch, J. M.

CONTRACT NO. AFOSR-88-0050

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR TR-89-0602

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Atmospheric Science, v45 n7 p1251-1268, 1 Apr 88.

ABSTRACT: (U) The interaction between internal gravity waves and a squall line that developed early in the evolution of the 1977 Johnstown flood event is studied based on available surface observations and a three-dimensional model simulation of the flood-related mesoscale convective systems (MCSs). Several experimental simulations are carried out to investigate the mechanisms whereby gravity waves form and obtain energy. Both observations and model simulations of the wave/convection interaction fit certain theories of gravity wave propagation. Following the formation of the squall line, subsequent deep convection typically initiates behind a pressure trough associated with the line and ahead of or along the axis of the trailing ridge. The zero contours of vertical motion correspond closely to the axis of the surface pressure trough. Positive potential temperature perturbations correspond with descending motion occurring ahead of the trough while negative perturbations occur with increasing ascending motion towards the approaching ridge axis. The results indicate that physical interaction between deep convection and internal gravity waves can be simulated by numerical models if a compatible grid resolution, proper model physics and good

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 574 CONTINUED

initial conditions are incorporated. In particular, the apparent relationship between the gravity waves and the squall line suggests that preserving the components of layered internal gravity waves in the model initial conditions may be very important for successful model prediction of the timing and location of wave related MCSs. Reprints. (JHD)

DESCRIPTORS: (U) *GRAVITY WAVES, *THUNDERSTORMS, *FLOODING, *RAINFALL INTENSITY, *WEATHER FORECASTING, GRIDS, INTERACTIONS, INTERNAL WAVES, MATHEMATICAL MODELS, MOTION, NUMERICAL ANALYSIS, PERTURBATIONS, PHYSICAL PROPERTIES, POSITION(LOCATION), PREDICTIONS, PRESSURE, REPRINTS, RESOLUTION, RIDGES, SIMULATION, STORMS, SURFACE PROPERTIES, TEMPERATURE, THREE DIMENSIONAL, TIME, TROUGHS, VERTICAL ORIENTATION, WAVE PROPAGATION, GROUND LEVEL.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A1, Squall lines.

AD A208 574

AD-A208 573 4/2

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF METEOROLOGY

(U) Use of Four-Dimensional Data Assimilation by Newtonian Relaxation and Latent-Heat Forcing to Improve a Mesoscale Model Precipitation Forecast: A Case Study,

DEC 88 24P

PERSONAL AUTHORS: Wand, Wei; Warner, Thomas T.

CONTRACT NO. AFOSR-88-0050

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR TR-89-0601

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Monthly Weather Review, v116 n12 p2593-2616 Dec 88.

ABSTRACT: (U) A mesoscale model has been used in a study of special static- and dynamic-initialization techniques that improve a very-short-range forecast of the heavy convective rainfall that occurred in Texas, Oklahoma and Kansas during 9-10 Mary 1979, the SESAME IV study period. In this study, the model is initialized during the precipitation event. Two types of four-dimensional data assimilation (FDDA) procedures are used in the dynamic-initialization experiments in order to incorporate data during a 12-hour preforecast period. With the first type, FDDA by Newtonian relaxation is used to incorporate sounding data during the preforecast period. With the second FDDA procedure, radar-based precipitation-rate estimates and hourly raingage data are used to define a three-dimensional latent-hearing rate field that contributes to the diabatic heating term in the model's thermodynamic equation during the preforecast period. Combined use of either the preforecast or in-forecast latent heat forcing with the Newtonian relaxation alone. Even though both the experimental static and dynamic-initialization procedures produces considerably improved very short range precipitation forecasts, compared to the control, the experimental static-initialization procedure

AD A208 573

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 573 CONTINUED

that used latent-heat forcing during the first forecast hour did slightly better for this case. Reprints. (JHD)

DESCRIPTORS: (U) *CONVECTION(ATMOSPHERIC), *WEATHER FORECASTING, *ATMOSPHERE MODELS, *DIGITAL SIMULATION, *LATENT HEAT, SHORT RANGE(TIME), FOUR DIMENSIONAL, HEAT TRANSFER, HIGH RATE, KANSAS, OKLAHOMA, PRECIPITATION, RAINFALL, RELAXATION, REPRINTS, ATMOSPHERIC SOUNDING, TEXAS, THERMODYNAMIC PROPERTIES, THERMODYNAMICS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1.

AD-A208 572 12/1

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J HILL CENTER FOR THE MATHEMATICAL SCIENCES

(U) A RUTCOR Project on Discrete Applied Mathematics.

DESCRIPTIVE NOTE: Final rept. 1 Aug 85-30 Sep 88,

JAN 89 47P

PERSONAL AUTHORS: Hammer, Peter L.; Roberts, Fred S.

CONTRACT NO. AFOSR-85-0271

PROJECT NO. 2304

TASK NO. B1

MONITOR: AFOSR TR-89-0619

UNCLASSIFIED REPORT

ABSTRACT: (U) This project has been concerned with theoretical, algorithmic, and applied research in six areas of discrete applied mathematics. Work on graph theory and its applications has been concerned with graph coloring and and stability, special classes of graphs, and graphs and discrete optimization. Work on discrete optimization has also dealt with location problems, preprocessing and decomposition, approximation, and applications of combinatorial optimization to nonlinear problems. Our research on posets and other combinatorial structures and their applications has been concerned with linear extensions and ideals, graphs and posets, posets and discrete optimization, and other useful combinatorial structures. Our effort in the area of computational complexity and efficient algorithms has concentrated on foundations on computational complexity and heuristics. Work on applications of discrete mathematics to decisionmaking has involved group decisionmaking, measurement and decisionmaking, and multiple conclusion logic. Our work on large scale scheduling problems has concentrated on the STORM I and STORM II models for routing aircraft, the aircrew scheduling problem, and the single base aircrews staging problem. Among the many applications we have considered are frequency assignment, task scheduling and air crew scheduling, location of warehouses and communication centers, maintenance

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 572 CONTINUED

problems, communications over noisy channels, and expert systems (KR)

DESCRIPTORS: (U) *APPLIED MATHEMATICS, ADAPTERS, AIRCRAFT, ALGORITHMS, COLORING, COMBINATORIAL ANALYSIS, COMMUNICATION AND RADIO SYSTEMS, COMPUTATIONS, DECOMPOSITION, EFFICIENCY, FLIGHT CREWS, FREQUENCY ALLOCATION, GRAPHS, HEURISTIC METHODS, MAINTENANCE, MATHEMATICS, NONLINEAR SYSTEMS, OPTIMIZATION, SCHEDULING, STRUCTURES, THEORY, WAREHOUSES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304B1.

AD-A208 570 12/4

MARYLAND UNIV BALTIMORE

(U) Control and System Theory, Optimization, Inverse and Ill-Posed Problems.

DESCRIPTIVE NOTE: Final rept. 15 Sep 87-14 Sep 88,

SEP 88 10P

PERSONAL AUTHORS: Seidman, Thomas I.

CONTRACT NO. AFOSR-87-0350

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-89-0618

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report summarizes research activities in applied mathematics, including control of distributed systems, optimization, an inverse problems. The report summarizes results published in 23 journal articles. Results include a new method for computing solutions to ill-posed problems via optimal filtering and new results for the analysis and control of switching systems. (KR)

DESCRIPTORS: (U) *APPLIED MATHEMATICS, *CONTROL THEORY, DISTRIBUTION, FILTERS, INVERSION, OPTIMIZATION, SOLUTIONS(GENERAL), SWITCHING, SYSTEMS ANALYSIS

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD A208 569 25/5

THRALL (ROBERT M) AND ASSOCIATES HOUSTON TEX

(U) Workshop on Decision Information for Tactical Command and Control

DESCRIPTIVE NOTE: Final rept.,

77 3P

PERSONAL AUTHORS: Thrall, Robert M.

CONTRACT NO. F44620-76 C-0131

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR 89-0746

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *COMMAND AND CONTROL SYSTEMS, WORKSHOPS, TACTICAL COMMUNICATIONS, SYMPOSIA.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

(U) A208 569

AD-A208 568 12/4

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Routing and Singular Control for Queueing Networks in Heavy Traffic,

APR 89 51P

PERSONAL AUTHORS: Martins, Luiz F.; Kushner, Harold J.

REPORT NO. LCDS-89-9

CONTRACT NO. DAAL03-86-K-0171

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-89 0699

UNCLASSIFIED REPORT

ABSTRACT: (U) The problem of routing control in an open queueing network under conditions of heavy traffic and finite (scaled) buffers is dealt with. The operating statistics can be state dependent. The sequence of scaled controlled state processes converges to a singularly controlled reflected diffusion (with the associated costs), under broad conditions. Due to the nature of the controls, a 'scaling' method is introduced to get the convergence, since the actual sequence of processes does not necessarily converge in the Skorohod topology. Owing to finite buffers, an extension of the reflection mapping needs to be obtained. The optimal value functions for the physical processes converge to the optimal value function of the limit process, under broad conditions. Approximations to the optimal control for the limit process are obtained, as well as properties of the sequence of physical processes. The optimal or controlled (but not necessarily optimal) limit process can be used to approximate a large variety of functionals of the optimal or controlled (but not necessarily optimal) physical processes. (KR)

DESCRIPTORS: (U) *NETWORKS, *QUEUEING THEORY, *ROUTING, BUFFERS, CONTROL, DIFFUSION, FUNCTIONS, MAPPING, OPTIMIZATION, REFLECTION, SCALING FACTORS, SEQUENCES.

AD A208 568

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD A208 568 CONTINUED

TOPOLOGY, TRAFFIC.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1

AD-A208 567 12/1

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) A Uniformly Differentiable Approximation Scheme for Delay Systems Using Splines,

APR 89. 51P

PERSONAL AUTHORS: Ito, K.; Kappel, F.

REPORT NO. LCDS/CCS-89-8

CONTRACT NO. AFOSR-84-0398

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-89-0698

UNCLASSIFIED REPORT

ABSTRACT: (U) A new spline-based scheme is developed for linear retarded functional differential equations within the framework for semigroups on a certain Hilbert space formula. The approximating semigroups inherit in uniform way the characterization for differentiable semigroups from the solution semigroup of the delay systen (e.g., among other things the logarithmic sectorial property for the spectrum). The authors prove convergence of the scheme in state spaces. The uniform differentiability of the approximating semigroups enables us to establish error estimates including quadratic convergence for certain classes of initial data. They also apply the scheme for computing the feedback solutions to linear quadratic optimal control problems. (kr)

DESCRIPTORS: (U) *APPROXIMATION(MATHEMATICS), CONVERGENCE, DELAY, ERROR ANALYSIS, ESTIMATES, FEEDBACK, FORMULATIONS, HILBERT SPACE, QUADRATIC EQUATIONS, SOLUTIONS(GENERAL), SPLINES, LINEAR DIFFERENTIAL EQUATIONS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 487 20/3

MASSACHUSETTS INST OF TECH CAMBRIDGE CENTER FOR SPACE RESEARCH

(U) Superconductivity and Magnetism in Layered Materials.

DESCRIPTIVE NOTE: Final rept. 15 Oct 87-14 Oct 88,

MAY 89 13P

PERSONAL AUTHORS: Dresselhaus, M. S.; Dresselhaus, G.

CONTRACT NO. AFOSR-88-0021

PROJECT NO. 2306

TASK NO. C1

MONITOR: AFOSR
TR-89-0719

UNCLASSIFIED REPORT

ABSTRACT: (U) During the one year iod of this grant October 15, 1987-October 1 4, 1988, orts cn the Program Superconductivity and Magnet in Layered Materials were largely focused on introduction of our new program in high temperature superconductivity. We also completed studies of magnetic and superconducting graphite intercalation compounds. Superconductivity, Magnetism, Superconductors, Layered materials, Graphite, Intercalated compounds. (mjm)

DESCRIPTORS: (U) *SUPERCONDUCTORS, *LAMINATES, GRAPHITE, HIGH TEMPERATURE, LAYERS, MAGNETIC PROPERTIES, SUPERCONDUCTIVITY.

IDENTIFIERS: (U) WUAFOSR2306C1, PE61102F, INTERCALATION COMPOUNDS.

AD-A208 487

AD-A208 486 12/9 12/3

TEXAS UNIV AT AUSTIN DEPT OF COMPUTER SCIENCES

(U) Theoretical Analysis of Models for Texture.

DESCRIPTIVE NOTE: Final rept.,

MAR 80 5P

PERSONAL AUTHORS: Davis, Larry S.

CONTRACT NO. F49620-79-C-0043

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-89-0743

UNCLASSIFIED REPORT

ABSTRACT: (U) During the period covered by this contract, technical advances were made in the general area of describing image textures in terms of the spatial distribution of local features, such as edges, in the texture. The first contribution concerned the theoretical development of a minimal error one dimensional edge detector for image models which can be used to describe textures. The second contribution was a comparative classification study of texture statistics derived form grey level and edge cooccurrence matrices. The third contribution was the development of a new computational tool for analyzing textures, called a polarogram. The polarogram is a rich source of directionally sensitive texture statistics which are invariant to image orientation. This research was documented in seven reports and papers. (KR)

DESCRIPTORS: (U) *IMAGES, *SPATIAL DISTRIBUTION, *TEXTURE, CLASSIFICATION, COMPUTATIONS, INVARIANCE, MODELS, ORIENTATION(DIRECTION), SENSITIVITY, STATISTICS, THEORY, POLAROGRAPHIC ANALYSIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A2.

AD-A208 486

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 466 20/4

MASSACHUSETTS UNIV AMHERST DEPT OF CHEMICAL ENGINEERING

(U) Lagrangian Turbulence Near Walls: Structures and Mixing in Admissible Model Flows.

DESCRIPTIVE NOTE: Final rept. 1 Sep 87-31 Dec 88,

MAY 89 7P

PERSONAL AUTHORS: Ottino, J.M.

CONTRACT NO. AFOSR-87-0385

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR TR-89-0733

UNCLASSIFIED REPORT

ABSTRACT: (U) The general objective of work during this period was to bridge the gap between modern ideas from dynamical systems and chaos and more traditional approaches to turbulence. In order to reach this objective we conducted theoretical and computational work on two systems: (i) a perturbed Kelvin cat eyes flow, and (ii) prototype solutions of the Navier-Stokes equations near solid walls. The main results obtained are two-fold (a) we have been able to produce flows capable of producing complex distributions of vorticity, and (b) we have been able to construct flow fields, based on solutions of the Navier Stokes equations, which are capable of displaying both Eulerian and Lagrangian turbulence. (jhd)

DESCRIPTORS: (U) *TURBULENT FLOW, *BOUNDARY LAYER TURBULENCE, COMPUTATIONS, DISTRIBUTION, DYNAMICS, FLOW FIELDS, LAGRANGIAN FUNCTIONS, NAVIER STOKES EQUATIONS, PROTOTYPES, SOLUTIONS(GENERAL), THEORY, VORTICES, WALLS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A2, Chaos, Lagrangian turbulence, Eulerian turbulence.

AD-A208 466

AD-A208 433 16/2.1 20/11

MCDONNELL DOUGLAS MISSILE SYSTEMS CO ST LOUIS MO

(U) Chaotic Response of Aerosurfaces with Structural Nonlinearities.

DESCRIPTIVE NOTE: Annual technical rept. 1 Mar 88-28 Feb 89,

MAR 89 70P

PERSONAL AUTHORS: Hauenstein, Anthony J.; Laurenson, Robert M.

REPORT NO. MDC-ATN-E466-014

CONTRACT NO. F49620-88-C-0047

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR TR-89-0651

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Missouri Univ., Rolla.

ABSTRACT: (U) An analytical and experimental research activity is being performed to investigate the chaotic response behavior of aerosurfaces containing discrete structural nonlinearities. Chaos is the paradoxical emergence of random-like motion in completely deterministic nonlinear systems. This research is developing an understanding of an aerosurface containing discrete structural nonlinearities. The dynamic behavior of a rigid aerosurface has been investigated analytically and experimentally. The rigid surface analysis and test activities are to be continued. A flexible aerosurface will be designed and fabrication begun during the second year. The third year of the program will move to test and analysis of the flexible aerosurface. Studies have been performed for a long range of rigid aerosurface configurations and various root spring stiffnesses and nonlinearities. Test apparatus has been designed and fabricated to experimentally demonstrate the nonlinear behavior of a rigid aerosurface containing discrete

AD-A208 433

AD-A208 433 CONTINUED

structural nonlinearities. Wind tunnel testing for the rigid aerosurface configuration has been initiated and evaluation of the results of the wind tunnel tests is underway. Initial design and fabrication of the rigid aerosurface dynamic test setup was completed. (JHD)

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1.

AD-A208 432

MARYLAND UNIV COLLEGE PARK DEPT OF ELECTRICAL ENGINEERING

(U) Optically Controlled Devices and Ultrafast Laser Sources for Signal Processing.

DESCRIPTIVE NOTE: Final technical rept. 1 Dec 87-30 Nov 88,

FEB 89 46P

PERSONAL AUTHORS: Lee, Chi H.; Goldhar, Julius; Ho, P.-T.

CONTRACT NO. AFOSR-88-0083

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-89-0658

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes two significant achievements from this research: (1) successful development of a CW mode-locked Nd: glass laser system which is capable of delivering 0.5 ps pulses with 11 micron J/pulse at 400 Hz, 30 fs pulses with 70 nJ/pulse at 40C Hz. This is a world record at this wavelength, (2) natural and synthetic diamond photoconductive devices have been developed for high field (> MV/cm and high-speed (ps) applications. There are five (5) publications included here as appendices. (rh)

DESCRIPTORS: (U) *GLASS LASERS, *LASERS, *SIGNAL PROCESSING, HIGH RATE, SOURCES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 402 20/4

MCDONNELL DOUGLAS RESEARCH LABS ST LOUIS MO

(U) The Structure of Normal-Shock/Turbulent-Boundary-Layer Interactions Modified by Mass Removal.

DESCRIPTIVE NOTE: Final technical rept. 1 Jun 86-31 Dec 88.

FEB 89 55P

PERSONAL AUTHORS: Sajben, M.; Morris, M. J.; Kroutil, J. C.; Bogar, T. J.

REPORT NO. MDC-QA026

CONTRACT NO. F49620-86-C-0063

PROJECT NO. 2307

TASK NO. A4

MONITOR: AFOSR TR-89-0650

UNCLASSIFIED REPORT

ABSTRACT: (U) The effect of mass removal on nominally two-dimensional, normal-shock/turbulent-boundary-layer interactions was investigated experimentally. The flowfield had a freestream approach Mach number of 1.49 and a Reynolds number based on boundary layer momentum thickness of 14,600. Distributed mass removal was imposed over a length of approximately 40 initial displacement thickneses, the entire bleed zone being located immediately upstream of the shock. Detailed velocity field information was obtained for two flows, using a two component laser Doppler velocimeter system. The two time mean velocity components and the three Reynolds stress components were determined. Measurements were extended over both supersonic and subsonic regions. Surface pressure information was also obtained. The removed mass flow, averaged over the length of the bleed zone, was 2.5% and 8% of the freestream mass flow, for the two cases investigated. The data indicate that the mass removal initiates an oblique expansion wave at the leading edge of the bleed zone, increasing the Mach number of the normal shock. The expansion wave intersects the shock, initiating a weak shear layer in the subsonic flow. The

AD-A208 402 CONTINUED

boundary layer thickness remains approximately constant over the bleed zone. The streamwise velocity at the perforated plate is high, close to the freestream velocity. Turbulence intensity downstream of the bleed zone is comparable to the intensity of the approach boundary layer, in contrast to uncontrolled interactions in which the turbulence intensity is greatly amplified. Keywords: Transonic flow, Two dimensional flow, Mass transfer, Supersonic inlets. (EDC)

DESCRIPTORS: (U) *MASS TRANSFER, *SHOCK WAVES, *SUPERSONIC INLETS, *TRANSONIC FLOW, *TURBULENT BOUNDARY LAYER, BLEED SYSTEMS, BOUNDARY LAYER, DISPLACEMENT, DISTRIBUTION, DOWNSTREAM FLOW, EXPANSION, SUPERSONIC FLOW, FLOW FIELDS, FREE STREAM, INTENSITY, INTERACTIONS, LASER VELOCIMETERS, LAYERS, LEADING EDGES, LENGTH, LOW STRENGTH, MACH NUMBER, MASS, MASS FLOW, MOMENTUM, MOMENTUM TRANSFER, PRESSURE, REMOVAL, REYNOLDS NUMBER, SHEAR PROPERTIES, STRESSES, SUBSONIC CHARACTERISTICS, SUBSONIC FLOW, SUPERSONIC CHARACTERISTICS, SURFACE PROPERTIES, THICKNESS, TURBULENT FLOW, TWO DIMENSIONAL FLOW, VELOCITY.

IDENTIFIERS: (U) Expansion waves, Mass removal, PE61102F, WUAFOSR2307A4.

AD-A208 402

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 377 8/12 4/1

LAMONT GEOLOGICAL OBSERVATORY PALISADES N Y

(U) Cloud/Cryosphere Interactions.

DESCRIPTIVE NOTE: Final rept. Nov 85-Oct 88,

APR 89 46P

PERSONAL AUTHORS: Kukla, George; Robinson, David A.

CONTRACT NO. AFOSR-86-0053

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR
TR-89-0590

UNCLASSIFIED REPORT

ABSTRACT: (U) Major objectives included investigating cryospheric dynamics, particularly relationships and feedbacks between clouds and the cryosphere when snow cover is forming or dissipating, and assessing algorithms and climatologies used in A.F. operational snow and cloud cover products. Study results have led to increased understanding of: 1) seasonal and interannual variations in snow and cloud cover, 2) dynamics of the onset of melt season in arctic regions, 3) performance of A.F. nephanalyses in marginal cryosphere regions, and 4) performance of the A.F. SNODEP model. Project results include: 1) Cloud cover in the Arctic Basin has a late May early June maximum in extent and thickness, followed by a period of less extensive and thinner cover extending into early August. Cloud conditions are associated with the distribution of surface pressure and the flow of air into the Basin at the surface and aloft. 2) Over arctic lands and sea ice, the timing and duration of the snow melt season, which strongly influence surface mobility of personnel and machinery, vary geographically within a year and across the region from year to year. 3) Increased spring cloudiness and onset of the melt season over sea ice coincide, suggesting that both are related to northward transport of moist air into the Basin by synoptic disturbances, rather than one solely driving the other. Results over arctic lands are less conclusive. Varying conditions of snow pack, surface albedo, seasonal

AD-A208 377

AD-A208 377 CONTINUED

and latitudinal distribution of solar insolation reaching the top of the atmosphere are among other factors influencing melt. 4) A southward shift in the mid-winter snow line was found over the central U.S. in the past 50 years. (EDC)

DESCRIPTORS: (U) *CLOUDS, *SNOW, *PERMAFROST, AIR FLOW, ALBEDO, ALGORITHMS, ARCTIC OCEAN, ARCTIC REGIONS, BASINS(GEOGRAPHIC), CLIMATOLOGY, CLOUD COVER, DYNAMICS, FEEDBACK, HUMIDITY, MELTING, MOBILITY, PRESSURE, PRESSURE DISTRIBUTION, SEA ICE, SEASONS, SNOW COVER, SURFACE PROPERTIES, SURFACES, THICKNESS, TIME.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A1, *Cryosphere.

AD-A208 377

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 363 20/8 20/14 14/2

WASHINGTON UNIV SEATTLE

(U) Antiproton and Millimeter Wave Research.

DESCRIPTIVE NOTE: Final rept. 30 Jul 86-29 Mar 88,

JAN 89 3P

PERSONAL AUTHORS: Gabrielse, Gerald

CONTRACT NO. AFOSR-86-0250

PROJECT NO 2917

TASK NO. A6

MONITOR: AFOSR
TR-89-0657

UNCLASSIFIED REPORT

ABSTRACT: (U) The DOD Instrumentation Grant was used to purchase equipment for antiproton experiments and for the production of high frequency microwaves. The antiproton experiments are progressing very nicely. In particular, we have recently cooled antiprotons below 1 eV in energy. Before we started these experiments, the lowest energy antiprotons available had kinetic energies 5 million times higher. The purchased equipment was essential to the antiproton experiments and is being very heavily used. The final version of the millimeter microwave system is completed. It is working although there are still some problems remaining. (AW)

DESCRIPTORS: (U) *ANTIPROTONS, *MILLIMETER WAVES, *TEST EQUIPMENT, ENERGY, HIGH FREQUENCY, MICROWAVE EQUIPMENT, MICROWAVES, PROCUREMENT, PRODUCTION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A6.

AD-A208 363

AD-A208 327 5/7 12/9

UNIVERSITY OF SOUTHERN CALIFORNIA MARINA DEL REY
INFORMATION SCIENCES INST

(U) Research in Knowledge Delivery.

DESCRIPTIVE NOTE: Final technical rept. 1 Nov 86-30 Sep 88,

MAR 89 26P

PERSONAL AUTHORS: Hovy, Eduard H.; Mann, William C.

CONTRACT NO. F49620-87-C-0005

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR
TR-89-0609

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the research and development work done over four years toward the goal of automatically planning and generating fluent multisentence paragraphs of English text. The work consisted of three principal components, namely knowledge representation, grammar development, and text structuring. With respect to knowledge representation, a powerful technique of linking the generator with arbitrary applications was developed by using a very general underlying taxonomy of entities in the world and various specific domain-related taxonomies. As part of grammar development, the invertibility of the grammar in use by the project was investigated, with the eventual goal of developing a combined bidirectional parsing-generation system using the same grammar net-work. Finally, a text structure planner was developed and the whole system was successfully used to generate paragraphs in three different application domains. (kr)

DESCRIPTORS: (U) *GRAMMARS, *TEXT PROCESSING, ENGLISH LANGUAGE, TAXONOMY.

IDENTIFIERS: (U) Knowledge representation, PE61102F, WUAFOSR2304A2.

AD-A208 327

AD-A208 286 3/1

MICHIGAN UNIV ANN ARBOR HARRISON M RANDALL LAB OF PHYSICS

(U) Observing Primeval Galaxies and Dark Matter with LAIRTS.

DESCRIPTIVE NOTE: Final rept. 1 Feb 85-31 Aug 88,

DEC 88 7P

PERSONAL AUTHORS: Hegyi, Dennis J.

CONTRACT NO. AFOSR-85-0120

PROJECT NO. 2311

TASK NO. A1

MONITOR: AFOSR
TR-89-0575

UNCLASSIFIED REPORT

ABSTRACT: (U) Observations of the extragalactic background light have been made at three wavelengths using our CCD system with a large angular field of view on the McGraw-Hill 1.3 m telescope. Data has been obtained at high galactic latitudes to reduce complications resulting from foreground stars and galaxies and from infrared cirrus. Exposures from overlapping fields were obtained to check the internal consistency of the data. Also, a grid of scattering profiles was obtained in which a star was imaged at many different positions on an off the CCD to take account of scattering contributions. Because the fields contained so many foreground stars and galaxies, it was necessary to develop an automated technique using a matched filter to pick out these objects and to then subtract them from the data. This has been accomplished for fields consisting of one-quarter of a CCD field. Our data analysis has yielded an amplitude for the power spectrum which is about 2.5 times larger than calculated using a model with no galaxy luminosity evolution. Recently, Tyson has shown some clear evidence for galaxy luminosity evolution which while not quantitative qualitatively explains our data. Other work during this funding period has been on the nature of dark matter, speckle inteferametric resolution of the binary star system Mu Cassioppeiae, and a

AD-A208 286

AD-A208 286 CONTINUED

measurement of the temperature of the cosmic background radiation at 2.64 mm. (jhd)

DESCRIPTORS: (U) *BACKGROUND RADIATION, *EXTRATERRESTRIAL RADIATION, ANGLES, AUTOMATION, BACKGROUND, BINARY STARS, CONSISTENCY, DARKNESS, DATA REDUCTION, EVOLUTION(GENERAL), GALAXIES, GRIDS, HIGH LATITUDES, LIGHT, LUMINOSITY, MATCHED FILTERS, MEASUREMENT, POWER SPECTRA, PROFILES, LIGHT SCATTERING, THERMAL PROPERTIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2311A1.

AD-A208 286

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 275 20/4

WICHITA STATE UNIV KS DEPT OF MATHEMATICS AND STATISTICS

(U) Ideal Jet Flow in Two Dimensions.

DESCRIPTIVE NOTE: Final rept. 30 Sep 86-31 Jan 89,

JAN 89 3P

PERSONAL AUTHORS: Elcrat, A.

CONTRACT NO. AFOSR-86-0274

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR
TR-89-0411

UNCLASSIFIED REPORT

ABSTRACT: (U) This research has been concerned with two dimensional flows of an ideal fluid with concentrated regions of vorticity. The methods used involve ideas connected with conformal mapping and variational principles. (mjm)

DESCRIPTORS: (U) *JET FLOW, *VORTICES, CONFORMAL MAPPING, FLUIDS, TWO DIMENSIONAL, VARIATIONAL PRINCIPLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A9.

AD-A208 274 20/4 20/11

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG INTERDISCIPLINARY CENTER FOR APPLIED MATHEMATICS

(U) Modeling and Computational Algorithms for Parameter Estimation and Optimal Control of Aeroelastic Systems and Large Flexible Structures.

DESCRIPTIVE NOTE: Final rept. 30 Sep 85-30 Sep 88,

FEB 89 14P

PERSONAL AUTHORS: Burns, J. A.; Cliff, E. M.

CONTRACT NO. AFOSR-85-0287

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-89-0600

UNCLASSIFIED REPORT

ABSTRACT: (U) The basic goal of this project is the study of computational algorithms for control design of partial functional differential equations that model structural and fluid dynamic systems. We investigated several aspects of the development of computational algorithms for identification and control of distributed parameter systems. We also spent considerable effort on specific applications involving elastic, aeroelastic and viscoelastic systems. Progress was made on many of these problems. However, in this report we shall concentrate on the major accomplishments. (MJM)

DESCRIPTORS: (U) *AEROELASTICITY, *CONTROL SYSTEMS, *FLEXIBLE STRUCTURES, ALGORITHMS, COMPUTATIONS, DIFFERENTIAL EQUATIONS, DISTRIBUTION, ELASTIC PROPERTIES, ESTIMATES, FUNCTIONAL ANALYSIS, OPTIMIZATION, PARAMETERS, PARTIAL DIFFERENTIAL EQUATIONS, VISCOELASTICITY.

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

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 268 21/5 1/1

ASTRON RESEARCH AND ENGINEERING SUNNYVALE CA

(U) Demonstration of Oblique Detonation Wave for Hypersonic Propulsion.

DESCRIPTIVE NOTE: Final technical rept. 1 Aug 88-31 Jan 89,

MAR 89 118P

PERSONAL AUTHORS: Nakamura, Takashi; Schuh, Michael J.; Randall, Donald S.; Dahm, Thomas J.; Pratt, David T.

REPORT NO. ASTRON-7151-001

CONTRACT NO. F49620-88-C-0130

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR
TR-89-0659

UNCLASSIFIED REPORT

ABSTRACT: (U) The Oblique Detonation Wave Engine (ODWE) offers a number of advantages over the Supersonic Combustor Ramjet (SCRAMJET) for hypersonic aeropropulsion. The objective of this program is to obtain data on the stability of the Oblique Detonation Wave (ODW) and to assess the applicability of the ODW to hypersonic propulsion. The program consists of the basic study of the ODW phenomenon and the design study of the test facility (Phase I), and an indepth experimental study of the ODW in a ram cannon-type combustion tube with a hypervelocity projectile launched into the tube by a two-stage light-gas gun (Phase II). This Phase I report summarizes the results pertaining to the stability of the ODW and the experimental facility designs. It is concluded that ODW will be initiated and sustained in the test facility configuration and that the tests will generate data concerning key issues for the application of the ODW to hypersonic propulsion. Oblique, Detonation wave, Detonation, Hypersonic propulsion, Hypervelocity launcher, Ram accelerator. (mjm)

DESCRIPTORS: (U) *COMBUSTORS, *DETONATION WAVES,

AD-A208 268

AD-A208 268 CONTINUED

*SUPERSONIC COMBUSTION RAMJET ENGINES, CONFIGURATIONS, DATA PROCESSING, HYPERSONIC CHARACTERISTICS, HYPERSONIC VEHICLES, HYPERSONIC VELOCITY, HYPERVELOCITY PROJECTILES, LAUNCHERS, LIGHT GAS GUNS, PROPULSION SYSTEMS, STABILIZATION, STAGING, TEST FACILITIES.

IDENTIFIERS: (U) PE65502F, WUAFOSR3005A1, ODWE(Oblique Detonation Wave Engines).

AD-A208 268

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 262 7/4 11/2

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) 27Al and 29Si NMR (Nuclear Magnetic Resonance) Study of Sol-Gel Derived Aluminosilicates and Sodium Aluminosilicates.

88 7P

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

CONTRACT NO. AFOSR-85-0345

PROJECT NO. 2303

TASK NO. A3

MONITOR AFOSR TR-89-0253

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Materials Science, v23 p2908-2912 1988.

ABSTRACT: (U) The sol-gel process using metal alkoxides is being extensively explored as a method for the preparation of homogeneous multicomponent glasses In this context, such questions as homogeneity at the atomic level and structural differences between sol-gel and coventionally prepared materials are of great interest. Nuclear magnetic resonance (NMR) spectroscopy is a powerful technique for the study of multicomponent sol-gel systems. Solid state aluminum and silicon 29 NMR was used to examine the structures of aluminosilicates and sodium aluminosilicates prepared by the sol-gel method from metal alkoxides. In contrast to the borosilicate system, where B-O-Si bonds are not formed until heat treatment above 150 C, AL-O-Si formation appears complete upon gelation. Aluminium occupies tetrahedral (ALO4)(-) sites in the polymer network and octahedral (AL(H2O)6)(3+) (or similar) sites in the intersticies for charge balance. When sodium is added as a counter ion the octahedral aluminum is converted to tetrahedral aluminium in the oxide network. In gels of high aluminium content prepared from (Bu(s)O)2-AL-O-Si(OEt)3, some aluminum in five coordinate environments is also observed. All gels remain amorphous on heating to 800 C Reprints.

AD-A208 262 CONTINUED

DESCRIPTORS: (U) *ALUMINUM COMPOUNDS, *SILICATES, *SODIUM COMPOUNDS, *GLASS, ALKOXY RADICALS, ALUMINUM, ATOMIC ENERGY LEVELS, BALANCE, BORON OXIDES, CONVERSION, COORDINATES, ENVIRONMENTS, GELATION, GELS, HEAT TREATMENT, METAL COMPOUNDS, NETWORKS, NUCLEAR MAGNETIC RESONANCE, OXIDES, POLYMERS, REPRINTS, SPECTROSCOPY, MOLECULAR STRUCTURE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 238 20/12

SCIENTIFIC RESEARCH ASSOCIATES INC GLASTONBURY CT

(U) Numerical Modeling of Two-Terminal Quantum Well Devices.

DESCRIPTIVE NOTE: Final rept 1 Aug 88-31 Jan 89,

APR 89

PERSONAL AUTHORS: Grubin, H. L.; Kreskovsky, J. P.; Cahay, M. M.

REPORT NO. SRA-R89-910027-F

CONTRACT NO. F49620-88-C-0108

PROJECT NO 3005

TASK NO. A1

MONITOR: AFOSR
TR-89-0605

UNCLASSIFIED REPORT

ABSTRACT: (U) This report discusses in detail the results of a Phase I investigation of aluminum gallium arsenide/ gallium arsenide resonant tunneling devices (RTD) using the moment representation of the density matrix equation and the concept of a quantum potential. One dimensional numerical simulations of the density matrix equation (i.e., continuity and momentum-balance equations) and the Poisson's equation were performed. Our study constitutes the first attempt to solve numerically the moments of the density matrix equation. Our numerical simulations, while including the effect of momentum relaxation, show the occurrence of negative differential for a variety of RTD, with different barrier/well thicknesses and heights. The influence of the doping profile throughout the entire device on the current-voltage characteristics was also investigated. Additionally, we have studied the rectifying characteristic of the I-V curve of an asymmetric RTD (with different barrier heights), an interesting feature with potential device applications. (kr)

DESCRIPTORS: (U) *TUNNELONG(ELECTRONICS), *MATHEMATICAL MODELS, *QUANTUM THEORY, ALUMINUM GALLIUM ARSENIDE, GALLIUM ARSENIDES, BARRIERS, DOPING, ELECTRIC CURRENT, MOMENTS, MOMENTUM, NUMERICAL ANALYSIS, ONE DIMENSIONAL, POISSON EQUATION, PROFILES, RELAXATION, THICKNESS, VOLTAGE.

IDENTIFIERS: (U) PE61102F, WUAFOSR3005A1, *Resonant tunneling devices.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 199 12/1

TENNESSEE UNIV KNOXVILLE DEPT OF MATHEMATICS

(U) Special Year on Numerical Linear Algebra.

DESCRIPTIVE NOTE: Final rept. 1 Dec 87-1 Jan 89,

SEP 88

PERSONAL AUTHORS: Bradley, John S.

CONTRACT NO. AFOSR-88-0077

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-89-0379

UNCLASSIFIED REPORT

ABSTRACT: (U) During the period 1 Dec 87- 1 Jan 89 leading researchers and students in numerical algebra and related areas of scientific computation and computer science visited the University of Tennessee and Oak Ridge Laboratory. The theme for the year was the solution of numerical linear algebra problems on computers utilizing new parallel computer architectures. Major highlights included the 10th International Symposium on Numerical Algebra; a workshop on each of the three major research areas in the field: systems of equations, eigenvalue problems, and least squares computations; and a year-long research seminar series. Keywords: Problem solving, Symposia. (kr)

DESCRIPTORS: (U) +LINEAR ALGEBRA, +NUMERICAL ANALYSIS, ALGEBRA, COMPUTATIONS, COMPUTER ARCHITECTURE, COMPUTERS, EIGENVALUES, EQUATIONS, LABORATORIES, LEAST SQUARES METHOD, LINEARITY, PARALLEL PROCESSORS, PROBLEM SOLVING, STUDENTS, SYMPOSIA, TENNESSEE, UNIVERSITIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

AD-A208 199

AD-A208 129 21/3

ILLINOIS UNIV AT URBANA DEPT OF MECHANICAL AND INDUSTRIAL ENGINEERING

(U) Experimental and Numerical Studies of Laser Sustained Gas Plasmas.

DESCRIPTIVE NOTE: Final rept. 1 Feb 88-15 Mar 89,

APR 89

PERSONAL AUTHORS: Mazumder, Jyoti; Krier, Herman; Mertogul, Ayhan; Schwartz, Scott; Chen, Xiangli

REPORT NO. UILU-ENG-89-4005

CONTRACT NO. AFOSR-88-0129

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-89-0596

UNCLASSIFIED REPORT

ABSTRACT: (U) Laser propulsion is the production of high specific impulse rocket thrust using a high power laser as a remote energy source. Specific impulses in excess of 1000 seconds are achievable because propellant temperatures are very high and low molecular weight gases can be used. This report focuses on the energy conversion mechanisms of laser-sustained plasmas in pure flowing argon and argon/helium mixtures. Experiments at very high argon mass flux (55 kg/m2s) and pressure as high as 2.5 atmospheres have been performed. The results indicate that nearly all the laser power can be absorbed (>97%), and efficiencies approaching 50% can be obtained. Experiments with mixtures of argon and helium indicate that the high specific heat and thermal conductivity of the helium tends to allow for more of he absorbed energy to be retained rather than reradiated to the chamber walls. This despite the fact that the very high ionization energy of helium limits the global absorption to values below that for pure argon plasmas. Fundamental research concerning laser sustained plasmas such as the independent experimental determinations of electron number density and electron number density and electron

AD-A208 129

AD-A208 129 CONTINUED

temperature is required. This will allow the evaluation of the local thermal equilibrium which is needed in order to better interpret the spectroscopic and numerical results. Also required is the more accurate determination of downstream plasma exhaust gas temperature via Rayleigh scattering thermometry. This technique is impervious to plasma and laser irradiation interferences and to gas heat loss to the chamber walls, thus thermal efficiency calculations will be much more accurate than in the past. (jhd)

DESCRIPTORS: (U) *ION PROPULSION, *LASER PUMPING, *PLASMAS(PHYSICS), RADIATION ABSORPTION, ACCURACY, ARGON, CHAMBERS, COMPUTATIONS, DETERMINATION, EFFICIENCY, ELECTRON DENSITY, ELECTRON ENERGY, ENERGY CONVERSION, EXPERIMENTAL DATA, GASES, HEAT LOSS, HELIUM, HIGH ENERGY, HIGH POWER, HIGH TEMPERATURE, IONIZATION, IRRADIATION, LASER BEAMS, LIMITATIONS, MIXTURES, NUMERICAL ANALYSIS, POWER LEVEL, PROPELLANTS, PURITY, SPECIFIC HEAT, SPECTROSCOPY, THERMAL CONDUCTIVITY, THERMAL PROPERTIES, THERMAL STABILITY, WALLS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1, *Laser propulsion, *Laser produced plasmas.

AD-A208 129

AD-A208 120 20/11

CORNELL UNIV ITHACA N Y COLL OF ENGINEERING

(U) Nonlinear Dynamics and Control of Flexible Structures.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 87-30 Sep 88,

MAR 89

PERSONAL AUTHORS: Moon, Francis C.; Gergely, Peter; Thorp, James S.; Abel, John F.

CONTRACT NO. F49620-87-C-0011

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR TR-89-0595

UNCLASSIFIED REPORT

ABSTRACT: (U) Chaotic vibrations have been demonstrated in pinjointed truss structure and various factors involved, such as prestress (tension cables), member buckling, joint free-play and friction have been investigated. Modeling techniques have been developed through integration of finite and optimal controls, application of group theoretic concepts, and effective usage of computer graphics. Nonlinear dynamics, Control flexible structures, Chaotic vibrations. (mjm)

DESCRIPTORS: (U) *FLEXIBLE STRUCTURES, *NONLINEAR SYSTEMS, *VIBRATION, CABLES, COMPUTER GRAPHICS, CONTROL, DYNAMICS, FRICTION, METHODOLOGY, MODELS, OPTIMIZATION, TENSION, THEORY, TRUSSES.

IDENTIFIEPS: (U) PE61102F, WUAFOSR2302B1.

AD-A208 120

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 119 11/4

CERAMICS PROCESS SYSTEMS CORP CAMBRIDGE MA

(U) Highly Oriented Fiber Reinforced Ceramic Composites.

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-31 Jan 89,

MAR 89

PERSONAL AUTHORS: Lee, Ran-Rong; Hodge, James D.; Wei, Wen-Cheng J.; Halloran, John; Schutzberg, Frances

REPORT NO. CPS-89-004

CONTRACT NO. F49620-88-C-0104

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR TR-89-0531

UNCLASSIFIED REPORT

ABSTRACT: (U) Highly dense SiC-AlN alloys having unique microstructures and a fracture toughness up to 6 MPam 1/2 were successfully produced by pressureless sintering of commercially available SiC and AlN powders. Appropriate sintering aids, sintering temperatures, sintering period and sintering conditions were identified. The sintered SiC-AlN alloys can achieve a single phase solid solution after an appropriate thermal treatment. The lattice constants of the solid solution varied linearly with SiC/AlN ratio. Optimized annealing yielded decomposition of the solid solution and formed a unique microstructure, which was composed of equiaxed grains with modulated features, heavily faulted elongated grains and very clean grain boundaries. Ceramic composites, Aluminum nitride, Silicon carbide. (jes)

DESCRIPTORS: (U) *ALUMINUM COMPOUNDS, *CERAMIC MATERIALS, *COMPOSITE MATERIALS, *NITRIDES, *SILICON CARBIDES, ANNEALING, DECOMPOSITION, FRACTURE(MECHANICS), GRAIN BOUNDARIES, HEAT TREATMENT, MICROSTRUCTURE, OPTIMIZATION, POWDERS, PRESSURE, RATIOS, SINTERING, SOLID SOLUTIONS, TEMPERATURE, TOUGHNESS

IDENTIFIERS: (U) PE61102F, WUAFOSR3005A1, aluminum

AD-A208 119

AD-A208 119 CONTINUED

nitride.

AD-A208 119

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 025 9/1

MICHIGAN UNI/ ANN ARBOR DEPT OF CHEMICAL ENGINEERING

(U) Metal/Metallion System in Low Temperature Molten Salts

DESCRIPTIVE NOTE: Final rept. 1987-1988,

MAR 89

PERSONAL AUTHORS: Donahue, Francis M.; Simonsen, Leif; Moy, Russell; Mancini, Sara

CONTRACT NO. AFOSR-88-0079

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR TR-89-0623

UNCLASSIFIED REPORT

ABSTRACT: (U) Potential arrests on open circuit following passivation of aluminum electrodes and cathodic stripping immediately following passivation were studied in acidic low temperature molten salt solutions (1-methyl-3-ethylimidazolium chloride, MEIC, and aluminum chloride binaries). A model of 'classes' of charge transfer processes which could be respon[illegible]le for the processes occurring during open circuit [illegible]y and cathodic stripping were proposed. El[illegible]emistry, Electrolyte, Molten salt, Aluminum, Zinc [illegible]

DESCRIPTORS: (U) *CHARGE TRANSFER, *ELECTROCHEMISTRY, ALUMINUM, ARRESTING(PROCESS), CIRCUITS, DECAY, ELECTRODES, ELECTROLYTES FUSED SALTS, LOW TEMPERATURE, MELTS, PASSIVITY, SALTS, ZINC.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A1.

AD-A208 025

AD-A208 024 20/2

NATIONAL HELLENIC RESEARCH FOUNDATION ATHENS (GREECE) THEORETICAL AND PHYSICA L CHEMISTRY INST

(U) Excited Molecules and Clusters in Solid Media. Hydrogen and Tetrahydrogen in Ionic Crystals,

OCT 88

PERSONAL AUTHORS: Nicolaides, C. A.; Valtazanos, P.; Bacalis, N. C.

CONTRACT NO. AFOSR-87-0348

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-89-0577

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v151 n1.2 p22-26, 7 Oct 88.

ABSTRACT: (U) We present accurate results from full CI calculations on ground and excited states of H2 and (H2)2 embedded in AgF and RbI solids. It is found that the effect of these crystals on the spectra and on the energy surface characteristics is considerable. This finding suggests that, with a suitable selection of solid media, it may become possible to manipulate substantially the electronic spectroscopy and the energy storage and dissipation of certain classes of molecules and clusters. During the past few years, research in our Institute has dealt with the structure and properties of chemically bound excited clusters (CBEC). The existence of this class of species and the development of a theory which makes prediction and accurate calculations feasible, was first proposed in relation to tetrahydrogen, (H2)2, and polyhydrogen, (H2)n, and to the rare gas dihydrides. Recently, this theory - called the maximum ionicity excited state (MIES) theory - was applied to the prediction of the (H2O)2 CBEC. Reprints. (jes)

DESCRIPTORS: (U) *CRYSTALS, ACCURACY, CLUSTERING, COMPUTATIONS, ELECTRONICS, ENERGY, ENERGY STORAGE, HYDROGEN, IONIC CRYSTALS, MEDIA, MOLECULES, PREDICTIONS,

AD-A208 024

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A208 024 CONTINUED

REPRINTS, SELECTION, SOLIDS, SPECTRA, SPECTROSCOPY, SURFACE PROPERTIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

AD-A208 023 7/3

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF CHEMISTRY

(U) Birch Reduction of the Dichlorocarbene Adduct of poly(1,1-dimethyl-1-sila-cis-pent-3-ene)(C12C-1): Synthesis and Characterization of poly(1,1-dimethyl-3,4-methylene-1-sila-cis-pent-3-ene) (CH2-1),

89

PERSONAL AUTHORS: Zhou, Qingshan; Weber, William P.

CONTRACT NO. AFOSR-89-0007

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-89-0589

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Polymer Bulletin, v21 p173-177 1989.

ABSTRACT: (U) Birch reduction of the dichlorocarbene adduct of poly (1,1-dimethyl-1-sila-cis-pent-3-ene) (C12C-I) yields poly(1,1-dimehtyl-3,4-methylene-1-sila-cis-pent-3-ene) (CH2-I) which has been characterized by 1H, 13C and 29Si NMR spectroscopy as well as by elemental analysis. The molecular weight distribution of Ch2-I has been determined by GPC and its thermal stability by TGA. Its glass transition temperature was obtained by DSG. Keywords: Reduction, Dichlorocarbene, Adducts, Carbenes, Chlorine compounds, Silanes, Reprints. (MJM)

DESCRIPTORS: (U) *CARBENES, *CHLORINE COMPOUNDS, *SILANES, *METHYL RADICALS, DISTRIBUTION, GLASS, MOLECULAR WEIGHT, REPRINTS, SPECTROSCOPY, SYNTHESIS(CHEMISTRY), THERMAL STABILITY, TRANSITION TEMPERATURE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, pentene/poly dimethyl methylene silacis-

AD-A208 022 7/4

CORNELL UNIV ITHACA NY LAB OF ATOMIC AND SOLID STATE PHYSICS

(U) A Source for Producing Alkali Ion Beams for Low-Energy Surface Scattering Spectroscopies.

APR 89

PERSONAL AUTHORS: PEALE, D. R.; ADLER, D. L.; LITT, B. R.; COOPER, B. H.

CONTRACT NO. AFOSR-88-0069, $NSF-DMR85-16616

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-89-0578

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Review of Scientific Instruments, v60 n4 p730-734 Apr 89.

ABSTRACT: (U) We present the design and performance of an alkali ion source which is the injection stage of an ion beam system for surface scattering experiments in the range of 10eV to 10keV. In order to maximize emitter lifetimes, emphasis was placed on obtaining low phase space beams which minimize current losses in later stages of the optics. The source is based on a commercially available solid state beta-eucryptite emitter, uses two stages of extraction for independent control of extracted current and final beam energy, and has a modified Pierce confinement electrode to control space charge spreading inside the source. Results of computer ray tracing are included to illustrate the operation of this source. Tests with K+ ions at 500eV have produced beams which, in the range of 600-700 nA, were space-charge limited in transport through the remainder of the system. Beam currents measured more than 1 m downstream of the source are nearly independent of the emitter surface temperature over a range of 1023 to 1142 C. Reprints. (MJM)

DESCRIPTORS: (U) *ALKALI METAL COMPOUNDS, *ION BEAMS, *POTASSIUM, COMPUTERS, CONFINEMENT(GENERAL), CONTROL, CURRENTS, ELECTRODES, EMITTERS, ENERGY, EXTRACTION,

AD-A208 022

AD-A208 022 CONTINUED

INJECTION, ION SOURCES, LIFE SPAN(BIOLOGY), LOSSES, LOW ENERGY, OPTICS, RAY TRACING, REPRINTS, SCATTERING, SPECTROSCOPY, SURFACE TEMPERATURE, SURFACES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 937 17/5 12/5 6/4

WORCESTER POLYTECHNIC INST MASS DEPT OF ELECTRICAL ENGINEERING

(U) Application of Multi-Channel Hough Transform to Stereo Vision.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-30 Oct 89,

MAR 89

PERSONAL AUTHORS: Nasrabadi, Nasser M.

CONTRACT NO. AFOSR-89-0037

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR
TR-89-0615

UNCLASSIFIED REPORT

ABSTRACT: (U) A major issue in any stereo vision system is the correspondence problem. In this report a feature-based stereo vision technique is described where curve-segments are used as the feature primitives in the matching process. The local characteristics of the curve-segments are extracted by the Generalized Hough Transform (R-table) representation of the curve-segment. The left image and the right image are first filtered by using several Laplacian of a Gaussian operator of different widths (channels). Curve-segments are extracted by a tracking algorithm and their centroids are obtained. At each channel the Generalized Hough Transform of each curve-segment in the left and the right image is evaluated. This is done by calculating the R-table representation of each curve-segment using the centroid of the curve-segment as the reference point. The R-table, is used as a local feature vector in representing the distinctive characteristics of the curve-segment. Initial node assignments are formed between the left curve-segments and the right curve-segments if they satisfy the epipolar constraint and their R-tables satisfy a similarity measure. The epipolar constraint on the centroids of the curve-segment and the channel size is used to limit the searching space in the right image. (RH)

AD-A207 937 CONTINUED

DESCRIPTORS: (U) *ALGORITHMS, *CHANNELS, *IMAGES, *MATCHING, *TRACKING, *VISION, NODES, SIZES(DIMENSIONS).

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A7.

AD-A207 936 20/12 9/1

WISCONSIN UNIV-MADISON DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Vortices in Long Josephson Junctions.

DESCRIPTIVE NOTE: Final rept. 15 Nov 85-14 Nov 88,

FEB 89

PERSONAL AUTHORS: Nordman, James E.; Beyer, James B.

CONTRACT NO. AFOSR-86-0025

PROJECT NO. 2305

TASK NO. C3

MONITOR: AFOSR
TR-89-0422

UNCLASSIFIED REPORT

ABSTRACT: (U) This research involved the study of the properties of long Josephson junction structures and the electronic device possibilities suggested by these structures. A large part of the work involved fabrication and modeling. A particular effort was made to build and to understand the basic operating mechanisms of a type of superconducting transistor, the vortex flow transistor. The thin film fabrication techniques were developed using niobium and lead superconductors. (JHD)

DESCRIPTORS: (U) *JOSEPHSON JUNCTIONS, *SUPERCONDUCTORS, ELECTRONIC EQUIPMENT, FABRICATION, LEAD(METAL), METHODOLOGY, NIOBIUM, STRUCTURES, THIN FILMS, TRANSISTORS, VORTICES, ELECTRIC CURRENT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305C3, Vortex flow transistors.

AD-A207 930 3/1

ARIZONA UNIV TUCSON

(U) A Deep Optical Infrared Survey.

DESCRIPTIVE NOTE: Final rept. 1 Feb 85-31 Jul 88,

MAR 89 3P

PERSONAL AUTHORS: Lebofsky, Marcia J.

CONTRACT NO. AFOSR-85-0101

PROJECT NO. 2311

TASK NO. A1

MONITOR: AFOSR
TR-89-0435

UNCLASSIFIED REPORT

ABSTRACT: (U) This grant was awarded to develop the necessary hardware to carry out a deep sky survey at the near-infrared wavelength of 2 microns. The grant was also to cover an initial operating period after which funding would be sought from other sources to finish the survey. The survey strategy consists of placing a near-infrared array with a silicon charged coupled readout (CCD) at the focus of a transit telescope on Kitt Peak, Arizona. Keywords: Infrared astronomy; Infrared detectors; Charged coupled devices. (jhd)

DESCRIPTORS: (U) *ASTRONOMY, *INFRARED RADIATION, *SURVEYS, ARRAYS, CHARGE COUPLED DEVICES, FREQUENCY, INFRARED DETECTORS, INFRARED OPTICAL SYSTEMS, NEAR INFRARED RADIATION, SILICON, SKY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2311A1, Infrared astronomy, Infrared sources(Astronomy).

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 929 21/8.2 21/2

GEORGIA INST OF TECH ATLANTA SCHOOL OF AEROSPACE ENGINEERING

(U) Investigation of the Flame-Acoustic Wave Interaction during Axial Solid Rocket Instabilities.

DESCRIPTIVE NOTE: Final rept. 1 Feb 86-31 Jan 89,

MAR 89

PERSONAL AUTHORS: Zinn, B. T.; Hegde, U. G.; Jagoda, J. I. ; Daniel, B. R.

CONTRACT NO. AFOSR-84-0082

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR TR-89-0599

UNCLASSIFIED REPORT

ABSTRACT: (U) The major objectives of the program were (i) to determine the characteristics of solid propellant gas phase flames in rocket motors experiencing axial instabilities and (ii) to determine the validity of state of the art solid propellant response models. The program was divided into two tasks in order to achieve these objectives. In Task I, the response of sidewall stabilized premixed flames to longitudinal, standing acoustic waves (which simulate the oscillations encountered in unstable rocket motors) was studied. A premixed flame was chosen for this first phase as it eliminated the need to deal with difficulties arising from the presence of diffusion processes in the flame (these were studied in Task II of the program) while providing a flame possessing many important features of actual solid propellant flames. A theoretical model of the unsteady behavior of such flames, based upon actual solid propellant response modes, was developed. Solid propellant rocket engines, Combustion instability, Premixed flames, Diffusion flames, Acoustic driving, Damping. (mjm)

DESCRIPTORS: (U) *ACOUSTIC WAVES, *COMBUSTION STABILITY, *FLAMES, *SOLID PROPELLANT ROCKET ENGINES, *SOLID PROPELLANTS, ACOUSTICS, DAMPING, DIFFUSION, MIXING, MODELS, OSCILLATION, RESPONSE, ROCKET ENGINES, STABILIZATION, STANDING WAVES, THEORY, VALIDATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1.

AD-A207 929

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 928 20/4 12/1

DAYTON UNIV OH RESEARCH INST

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

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

MAR 89

PERSONAL AUTHORS: Krishnamurthy, L.

REPORT NO. UDR-TR-89-29

CONTRACT NO. F49620-88-C-0040

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-89-0591

UNCLASSIFIED REPORT

ABSTRACT: (U) The research reported herein addresses a theoretical investigation of a free, turbulent round jet issuing into a quiescent ambient, and deals with asymptotic analysis for farfield development and subgrid-scale turbulence modeling and with computational considerations for a large-eddy simulation. Higher-order asymptotic analysis of the fully developed downstream region has uncovered new information for the stress- and pressure-function solutions in the exterior region. The analytical predictions of the centerline decay of the mean axial velocity and those of the radial distributions of the axial and radial mean-velocity components and the shear- and normal - stress components compare well with available experimental data and provide the needed farfield boundary conditions for the large-eddy computations. The numerical considerations for the latter examine the construction of hybrid-difference methods that preserve weak but persistent unsteady features, the two-dimensional jet, and dual-variable algorithm for simulating incompressible three-dimensional flows. Asymptotic structure, Farfield development, Free jet, Large Eddy simulation, Round jet, Subgrid scale turbulence, Turbulence modeling. (mjm)

AD-A207 928

AD-A207 928 CONTINUED

DESCRIPTORS: (U) *EDDIES(FLUID MECHANICS, *JET FLOW, *MATHEMATICAL PREDICTION, ASYMPTOTIC SERIES, BOUNDARIES, DISTRIBUTION, DOWNSTREAM FLOW, EXPERIMENTAL DATA, EXTERNAL, INCOMPRESSIBLE FLOW, MEAN, MODELS, REGIONS, SIMULATION, STRESSES, THEORY, THREE DIMENSIONAL FLOW, TURBULENCE, TWO DIMENSIONAL FLOW, VELOCITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

AD-A207 928

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 927 12/2

FLORIDA UNIV GAINESVILLE CENTER FOR MATHEMATICAL SYSTEM THEORY

(U) Mathematical Techniques for System Realization and Identification.

DESCRIPTIVE NOTE: Final rept. 1 Jul 87-30 Apr 88,

JUN 88

PERSONAL AUTHORS: Kalman, Rudolf E.

CONTRACT NO AFOSR-87-0249

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-89-0598

UNCLASSIFIED REPORT

ABSTRACT: (U) Research emphasized algebraic systems theory and the identification of systems for noisy data. Identification, which is based on mathematical (primarily algebraic) ideas has been the area of our main effort. Much work at has been in preparation of re-analyses of published data and exposition of new methods of analysis of noisy data. Research on basics aspects of algebraic system theory has also been active. This research contributes to the study of identification, because it is concerned with deep results about system properties in the exact, that is, noise-free case. (jhd)

DESCRIPTORS: (U) *DATA REDUCTION, *IDENTIFICATION SYSTEMS, *NOISE REDUCTION, *NUMERICAL METHODS AND PROCEDURES, IDENTIFICATION, MATHEMATICAL ANALYSIS, SYSTEMS ANALYSIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A207 927

AD-A207 925 20/12 9/1

UTAH UNIV SALT LAKE CITY DEPT OF PHYSICS

(U) Fluxons and Order in Long Josephson Junctions.

DESCRIPTIVE NOTE: Final rept. 15 Nov 85-14 Nov 88,

FEB 89

PERSONAL AUTHORS: Symko, Orest G.

CONTRACT NO. AFOSR-86-0020

PROJECT NO. 2305

TASK NO. C3

MONITOR: AFOSR
TR-89-0604

UNCLASSIFIED REPORT

ABSTRACT: (U) Studies have been made of fluxon dynamics, instabilities, and noise in long overlap type Josephson junctions made out of of Niobium Nitride and Niobium. Noise and fluctuations measurements were performed in the voltage state of the junctions biased in a magnetic field. We observed telegraph noise due to fluxon fluctuations between two energy states determined by the geometry of the junction and the external magnetic field bias. The studies covered life-times of these states, metastability, thermal and quantum mechanical tunneling, and effects of dissipation. At certain bias points of the junction we found chaotic behavior which was preceded by period-doubling bifurcation. Also negative resistance regions were observed; they can be used for amplification. These observations were supported by computer modeling using a perturbed sine-Gordon equation. Fluxon motion in long Josephson junctions provides an excellent system for studies of non-linear phenomena and it has a variety of applications to superconducting electronics. Keywords: Josephson junctions; Superconducting electronics; Fluxons; Period doubling bifurcation; Sine gordon equation; Noise, Fluctuations. (jhd)

DESCRIPTORS: (U) *JOSEPHSON JUNCTIONS, *NEGATIVE RESISTANCE CIRCUITS, BIAS, COMPUTERIZED SIMULATION, DYNAMICS, ELECTRONICS, EXTERNAL, GEOMETRY, MAGNETIC FIELDS, MECHANICAL PROPERTIES, NIOBIUM, NIOBIUM COMPOUNDS.

AD-A207 925

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 925 CONTINUED

NITRIDES, NOISE(ELECTRICAL AND ELECTROMAGNETIC, NONLINEAR SYSTEMS, QUANTUM ELECTRONICS, QUANTUM THEORY, SUPERCONDUCTIVITY, THERMAL PROPERTIES, TUNNELING, VOLTAGE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305C3, Sine Gordon equation, *Fluxons.

AD-A207 924 12/2 20/6 20/11

TEXAS A AND M UNIV COLLEGE STATION DEPT OF MATHEMATICS

(U) Computations of Optimal Controls and Designs for Distributed Systems in Optics and Elasticity.

DESCRIPTIVE NOTE: Final project rept. 1 Jan-31 Dec 88,

MAR 89

PERSONAL AUTHORS: Chen, Goong; Zhou, Jianxin

CONTRACT NO. AFOSR-88-0091

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-89-0593

UNCLASSIFIED REPORT

ABSTRACT: (U) The boundary element methods are studied for a variety of partial differential equations in optics and elasticity, including the Helmholtz equation on an exterior domain, the eigenvalue problem for the Laplacian, the elastostatic Timoshenko plate and 3-dimensional elastostatic solid mechanics. Numerical software has been accumulated and computer graphics has been successfully developed. (jhd)

DESCRIPTORS: (U) *NUMERICAL METHODS AND PROCEDURES, *PARTIAL DIFFERENTIAL EQUATIONS, BOUNDARIES, COMPUTATIONS, COMPUTER GRAPHICS, COMPUTER PROGRAMS, CONTROL, DISTRIBUTION FUNCTIONS, EIGENVALUES, ELASTIC PROPERTIES, EXTERNAL, NUMERICAL ANALYSIS, OPTICS, OPTIMIZATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1, Boundary element methods, Helmholtz equation.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 923 20/11

CARNEGIE-MELLON UNIV PITTSBURGH PA

(U) Some Mathematical Problems in Continuum Mechanics.

DESCRIPTIVE NOTE: Final technical rept. 30 Sep 85-29 Sep 88

SEP [illegible]

PERSONAL AUTHORS: Hrusa, William J.

CONTRACT NO. AFOSR-85-0307

PROJECT NO. 2304

TASK NO. AJ

MONITOR: AFOSR
TR-89-0594

UNCLASSIFIED REPORT

ABSTRACT: (U) Efforts were devoted to the mathematical analysis of problems arising in continuum mechanics. Most of the problems considered were dynamic and involved nonlinear partial differential equations of integrodifferential equations. Specific areas of study include viscoelasticity, thermoelasticity. Specific work includes: Construction of models on global existence and asymptotic stability for several associated initial value problems; nonlinear thermoelasticity when heat conduction is governed by Cattaneo's relation rather than Fourier's law; and results concerning local existence in three spatial dimensions and formation of singularities in one spatial dimension in nonlinear thermoelasticity. (jhd)

DESCRIPTORS: (U) *CONTINUUM MECHANICS, *THERMOELASTICITY, ASYMPTOTIC SERIES, DIFFERENTIAL EQUATIONS, INTEGRAL EQUATIONS, MATHEMATICAL ANALYSIS, NONLINEAR DIFFERENTIAL EQUATIONS, NONLINEAR SYSTEMS, PARTIAL DIFFERENTIAL EQUATIONS, SPATIAL DISTRIBUTION, STABILITY, THERMAL CONDUCTIVITY, VISCOELASTICITY.

IDENTIFIERS: (U) WUAFOSR2304AJ, PE61102F.

AD-A207 910 20/9 14/2

STANFORD UNIV CA HIGH TEMPERATURE GASDYNAMICS LAB

(U) Fundamental Processes in Partially Ionized Plasmas.

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

AUG 88

PERSONAL AUTHORS: Kruger, C. H.

CONTRACT NO. AFOSR-86-0225

PROJECT NO. 2917

TASK NO. A6

MONITOR: AFOSR
TR-89-0613

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this program has been to provide modern plasma sources and data acquisition capability for the ongoing research program on Fundamental Processes in Partially Ionized Plasmas. Under this Grant Stanford has acquired, installed, and characterized a 50kW induction plasma torch system and associated diagnostic, and has modernized the data acquisition capability through micro-computer systems. This new equipment has had a very favorable effect on the experimental capability and has already contributed to the research output. (JHD)

DESCRIPTORS: (U) *IONIZATION, *PLASMAS(PHYSICS) DATA ACQUISITION, MICROCOMPUTERS, OUTPUT, SOURCES, COMPUTER APPLICATIONS, PLASMA DEVICES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A6, Partially ionized plasmas.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 908 9/5

CITY COLL NEW YORK INST FOR ULTRAFAST SPECTROSCOPY AND LASERS

(U) Subpicosecond Optical Digital Computation Using Conjugate Parametric Generators.

DESCRIPTIVE NOTE: Final rept. Dec 87-Nov 88,

MAR 89

PERSONAL AUTHORS: Alfano, Robert; Eichmann, George; Dorsinville, Roger; Li, Yao

REPORT NO. RF-447242

CONTRACT NO. AFOSR-88-0039

PROJECT NO. 2305

TASK NO. B4

MONITOR: AFOSR TR-89-0647

UNCLASSIFIED REPORT

ABSTRACT: (U) Fundamental optical nonlinear processes based on X3 of different materials: organic polymers and liquids, and semiconductors were investigated for size and speed. Ultrafast optical logic devices, switches, and processes based on these nonlinear optical materials were designed, built, and tested. Keywords: Ultrafast technology, Optical computation, Phase conjugation, Nonlinear optics. (JHD)

DESCRIPTORS: (U) *OPTICAL CIRCUITS, *LOGIC DEVICES, COMPUTATIONS, DIGITAL SYSTEMS, HIGH RATE, NONLINEAR SYSTEMS, OPTICAL EQUIPMENT, OPTICAL MATERIALS, OPTICAL PROCESSING, OPTICS, ORGANIC COMPOUNDS, PARAMETRIC ANALYSIS, POLYMERS, SEMICONDUCTORS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B4, Conjugate parametric generators, Ultrafast technology, Nonlinear optics, Phase conjugation.

AD-A207 908

AD-A207 888 12/1

COLUMBIA UNIV NEW YORK DEPT OF MATHEMATICS

(U) Differential Equations, Related Problems of Pade Approximations and Computer Applications.

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

DEC 88

PERSONAL AUTHORS: Chudnovsky, D. V.; Chudnovsky, G. V.

CONTRACT NO. AFOSR-87-0117

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR TR-89-0624

UNCLASSIFIED REPORT

ABSTRACT: (U) Work focused on the study of analytic, arithmetic and algorithmic properties of differential equations applied to solutions of problems in theoretical mathematics, mathematical and theoretical physics, numerical methods and computer science. Work in the area of effective approximation methods in diophantine geometry, differential equations and computer realizations have progressed in several directions. In diophantine approximations the relationship is studied between complex-analytic and arithmetic (p-adic) properties of linear differential equations using Pade approximations methods. Another part of our work is aimed at complete determination of all (linear) differential equations having arithmetic sense. In many cases it is shown that all these equations arise from Geometry (are variations of period structures of algebraic manifolds). This work of ours is closely connected with the study of the arithmetic properties of classical constants of analysis. The common analytic method in all these studies is the method of Pade approximations to solutions to special linear differential equations. (jhd)

DESCRIPTORS: (U) *COMPUTER APPLICATIONS, *LINEAR DIFFERENTIAL EQUATIONS, *NUMERICAL METHODS AND PROCEDURES, ALGEBRA, ALGORITHMS, APPROXIMATION(MATHEMATICS),

AD A207 888

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 888 CONTINUED

ARITHMETIC, COMPUTERS, CONSTANTS, DIFFERENTIAL EQUATIONS, MATHEMATICAL ANALYSIS.

IDENTIFIERS: (U) WUAFOSR2304A4, PE61102F, Pade approximation, Diophantine approximations, Manifolds(Mathematics).

AD-A207 888

AD-A207 886 7/2 7/4

SRI INTERNATIONAL MENLO PARK CA

(U) Metastable Negative Ions and Ion Pair Formation.

DESCRIPTIVE NOTE: Final rept. 1 Oct 85-15 Oct 88, JAN 89

PERSONAL AUTHORS: Peterson, James R.

REPORT NO. SRI-MP-89-015

CONTRACT NO. F49620-85-K-0017

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR TR-89-0614

UNCLASSIFIED REPORT

ABSTRACT: (U) Experimental work was directed primarily toward determining properties (energies, lifetimes, autodetachment and photodetachment) of metastable autodetaching negative ions, including He2, Ca-, He-, and vibrationally detaching OH-. Also explored were the dissociative decay mechanisms and pathways of the lower Rydberg states of HeH, NeH, NeD, H3, D3, H2D, OH, and O2, using two translational spectroscopic methods. In addition, work was devoted to understanding the mechanisms that could control the behavior of Cs-seeded H- ion sources developed for high energy neutral beam production. Metastable negative ions, Rydberg states, Helium, Hydrogen, Neon, Hydroxide. (MJM)

DESCRIPTORS: (U) *HELIUM, *HYDROGEN, *HYDROXIDES, *IONS, *PHOTOCHEMICAL REACTIONS, ANIONS, CHEMICAL DISSOCIATION, DECAY, DISSOCIATION, ION SOURCES, METASTABLE STATE, NEON.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A7, LPN-SRI-PYU-8767.

AD-A207 886

AD-A207 878 12/3

ARIZONA STATE UNIV TEMPE

(U) On Selecting the Largest Success Probability under Unequal Sample Sizes.

89

PERSONAL AUTHORS: Abughalous, Mansour M.; Miescke, Klaus J.

CONTRACT NO. AFOSR-85-0347

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-89-0612

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Statistical Planning and Inference, v21 p53-68 1989.

ABSTRACT: (U) Let Pi1, Pi2,...,Pik be k > or = 3 independent binomial populations, from which Xi proportional to B(ni, pi), i=1,...,k, respectively, have been observed. The problem under concern is to find that population which is associated with the largest of the unknown 'success probabilities' pi,...,pk. Under the 0-1 loss, some linear loss which occurs in gambling, and a general monotone, permutation invariant loss, interesting properties of Bayes rules are studied for priors which are permutation invariant, as well as for priors which are not invariant but have a (DT)-posterior density with respect to some symmetric measure. Examples of independent beta-priors are included. Keywords: Selection of the largest success probability, Rankin Bernoulli trials with unequal sample sizes, Bayes selection rules, Reprints. (JHD)

DESCRIPTORS: (U) *SELECTION, *STATISTICAL SAMPLES, *PROBABILITY, BAYES THEOREM, GAMBLING, INVARIANCE, LOSSES, MONOTONE FUNCTIONS, PERMUTATIONS, POPULATION, REPRINTS, BINOMIALS, SYMMETRY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A207 878

AD-A207 875 17/5

MASSACHUSETTS UNIV AMHERST DEPT OF COMPUTER AND INFORMATION SCIENCE

(U) Recognizing 3 D Objects from 2D Images Using Structural Knowledge Base of Genetic Views.

DESCRIPTIVE NOTE: Final rept. 1 Oct 85-31 Aug 88,

AUG 88

PERSONAL AUTHORS: Hanson, Allen R.

CONTRACT NO. AFOSR-86-0021

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR
TR-89-0617

UNCLASSIFIED REPORT

ABSTRACT: (U) Model-based object recognition is an essential task for mobile robotics and assembly. Given an image of a scene containing one or more objects from unknown viewpoints, the goal is to efficiently recognize those objects for which there is sufficient evidence. At the University of Massachusetts, we are developing a model-based object recognition system which is capable of recognizing objects from a large data base of models and from arbitrary viewpoints. Contents: Overview; Extraction of Straight Lines; The View Sphere for Curved Surfaces; Reconstruction of Surfaces From Multiple Views; Predictions and the Prediction Hierarchy Compiler. (FR)

DESCRIPTORS: (U) *OPTICAL DETECTION, *PATTERN RECOGNITION, *IMAGE PROCESSING, *OPTICAL IMAGES, COMPILERS, CURVATURE, DATA BASES, HIERARCHIES, MATHEMATICAL PREDICTION, ROBOTS, SPHERES, SURFACES, TWO DIMENSIONAL, THREE DIMENSIONAL, GEOMETRIC FORMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A7, *Computer vision, *Object recognition, Views(Optics), Three dimensional objects, Knowledge bases.

AD-A207 875

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 874 22/2

CSA ENGINEERING INC PALO ALTO CA

(U) Admittance Modeling of Structures with Active Controls.

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

MAY 88

PERSONAL AUTHORS: Smith, Kevin E.

REPORT NO. CSA-88-05-08

CONTRACT NO. F49620-88-C-0024

PROJECT NO. D822

TASK NO. F1

MONITOR: AFOSR
TR-89-0611

UNCLASSIFIED REPORT

ABSTRACT: (U) There are few methods available for analyzing structures or structures with controls that have high-modal densities and/or unmodelable excitations (these are essential characteristics of large space structures). Admittance models do not require that a structure be described in modal coordinates or that excitations be characterized as determinate functions of space. Methods have been developed for the analytical and experimental modeling of actuators and combining them with structural models. A scheme for optimal design of controller impedance using only measured admittance functions was derived and tested. The necessary elements for a hardware demonstration of the theory have been identified. A scheme for design and testing of a structure for verification of the equivalent excitation and structural modification equations has been developed. Large space structures, Control systems, Admittance models, Transient response, Random excitation, Unmanned spacecraft. (jes)

DESCRIPTORS: (U) *CONTROL SYSTEMS, *UNMANNED SPACECRAFT, ACTUATORS, ADMITTANCE, CONTROL, COORDINATES, DEMONSTRATIONS, EQUATIONS, EXCITATION, FUNCTIONS, IMPEDANCE, MATHEMATICAL MODELS, MODELS, MODIFICATION, OPTIMIZATION, RESPONSE, SPACECRAFT, STRUCTURAL PROPERTIES,

AD-A207 874 CONTINUED

STRUCTURES, TRANSIENTS.

IDENTIFIERS: (U) PE61102F, WUAFOSRD822F1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 873 6/4

ILLINOIS UNIV AT URBANA COORDINATED SCIENCE LAB

(U) Perceptual Structure and Shape from Texture.

DESCRIPTIVE NOTE: Final rept. 15 May 88-14 Mar 89,

MAR 89

PERSONAL AUTHORS: Ahuja, Narendra

CONTRACT NO. AFOSR-88-0219

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR
TR-89-0616

UNCLASSIFIED REPORT

ABSTRACT: (U) There were two major objectives of our research under grant AFOSR-88 -0219. The first of our research concerned perceptual grouping. The goal here is to segment an image into its perceptual components or segments. Such perceptual structure may exist at a range of resolutions. In the second part of our research we were concerned with a computational theory for an integrated representation of texture that takes into account many relevant aspects of texture, rather than just the properties of the texture elements at one level of resolution addressed in the past work. We have made progress towards both of the above mentioned objectives. We have extended our integration approach for perceptual grouping to extract perceptual structure in gray level images. Analogous to the original approach which was applied to dot patterns, the extended approach infers the structure by integrating evidence from region boundaries and region interiors. A large region considered homogeneous may contain regions deemed homogeneous at their own scales. The evidence for region interior is derived by using the multiscale region detector we developed earlier for the shape-from-texture problem. Region borders are also extracted at multiple resolutions, using a nonisotropic edge operator. In integrating the region interior and border information, the region boundary is forced to be smooth using explicit constraints to that effect. (jes)

AD-A207 873

AD-A207 873 CONTINUED

DESCRIPTORS: (U) *ANATOMOY, *IMAGES, COMPUTATIONS, GRAY SCALE, INTEGRATED SYSTEMS, INTEGRATION, INTERNAL, PERCEPTION, REGIONS, TEXTURE, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A7.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 872 20/6 20/4

ARIZONA UNIV TUCSON

(U) Nonlinear Behavior in Optical and Other Systems.

DESCRIPTIVE NOTE: Final rept. 1 Jun 84-30 Sep 86,

SEP 86

PERSONAL AUTHORS: Newell, Alan C.

CONTRACT NO. AFOSR-83-0227

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-87-1886

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *NONLINEAR SYSTEMS, *OPTICS, *FLUID DYNAMICS, TURBULENCE, PARTIAL DIFFERENTIAL EQUATIONS, OPTICAL WAVEGUIDES, KERR MAGNETOOPTICAL EFFECT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1, Chaos, Solitons.

AD-A207 872

AD-A207 871 4/2

NORTHWEST RESEARCH ASSOCIATES INC BELLEVUE WA

(U) Propagation and Saturation of Nonlinear Inertia-Gravity Waves in the Atmosphere.

DESCRIPTIVE NOTE: Final rept. 15 Feb 86-14 Feb 89,

APR 89

PERSONAL AUTHORS: Dunkerton, Timothy J.

REPORT NO. NWRA-CR-89-R044

CONTRACT NO. F49620-86-C-0026

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR
TR-89-0626

UNCLASSIFIED REPORT

ABSTRACT: (U) Inertia gravity waves play a significant role in the transport of momentum, heat, and constituents in the terrestrial atmosphere. This transport process is subgrid scale in general circulation models and must be parameterized. A generalized parameterization scheme is developed in which a gravity wave is subject to localized breaking that creates turbulent mixing and retards amplitude growth. The effect of turbulence localization on turbulent viscosity, diffusivity and mean flow acceleration is described for the convectively unstable case. Possible generalizations to Kelvin-Helmholtz breaking are suggested. Numerical simulations at high resolution illustrate the evolution to small scales characteristic of convective instability. (JHD)

DESCRIPTORS: (U) *ATMOSPHERIC MOTION, *GRAVITY WAVES, ACCELERATION, AMPLITUDE, CIRCULATION, CONVECTION(ATMOSPHERIC), FLOW, GROWTH(GENERAL), HIGH RESOLUTION, KINETIC ENERGY, MEAN, MIXING, MOMENTUM, NUMERICAL ANALYSIS, STABILITY, TRANSPORT, TURBULENCE, TURBULENT FLOW, VISCOUS FLOW, WAVES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A1, *Turbulent mixing, Kelvin Helmholtz instability.

AD-A207 871

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 870 7/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Boron Trifluoride Mediated Reaction of 1,9-Dihalopentacyclo(5.4.0.0(2,6).0(3,10).0(5,9)undecane-8,11-diones with Ethyl Diazoacetate: A Novel Synthetic Entry into the Cyclopent(a)indene Ring System.

88

PERSONAL AUTHORS: Marchand, Alan P.; Reddy, G. M.; Watson, William H.; Nagl, Ante

CONTRACT NO AFOSR-88-0132

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-89-0580

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organic Chemsitry, v53 n25 p5969-5971 1988.

ABSTRACT: (U) Reaction of 1,9-dibromo- or 1,9-dichloropentacyclo(5.4.0.02 6.03,10.05,9) undecane-8,11-diones (4 or 5, respectively) with ethyl diazoacetate in the presence of boron trifluoride etherate results in the formation of ethyl 2-bromo- (or ethyl 2-chloro-) 4-hydroxy-3(3aH)-oxo-8,8a-dihydrocyclopent(a)inden-5-carboxylate (6 (42%) and 7 (40%), respectively). A mechanism that accounts for the course of each of the rearrangements 4 yields 6 and 5 yields 7 is suggested. Keywords: Pentacycloundecanediones, Lewis acid, Catalyzed rearrangement, Ethyl diazoacetate, Cage molecules, Diones, Cyclic compounds, Reprints. (MJM)

DESCRIPTORS: (U) *BORON COMPOUNDS, *CYCLIC COMPOUNDS, ETHERS, FLUORIDES, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, fluoride/boron tri, diones/dihalopentacyclo.

AD-A207 870

AD-A207 869 7/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Synthesis of 4,4,8,8,11,11-Hexanitropentacyclo(5.4.0.0(2,6).0(3.10).0(5,9)-undecane.

89

PERSONAL AUTHORS: Marchand, Alan P.; Dave, Paritosh R.; Rajapaksa, D.; Arney, Benny E., Jr.; Flippen-Anderson, Judith L.

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-89-0585

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organic Chemsitry, v54 n7 p1769-1771 1989.

ABSTRACT: (U) The synthesis of the title compound (1) has been accomplished in seven steps by starting with the readily available 4,4,11,11-bis(ethylenedioxy) pentacyclo(5.4.0.02,6.03,10.05,9)-undecane-9-one (2). Thus, 2 was converted into the corresponding oxime, 3 (79%). The oximino group in 3 then was subjected to oxidative bromination with N-bromosuccinimide, thereby affording the corresponding exo-8-nitro derivative, 4 (62%). Sodium borohydride reduction of the C-Br bond in 4 afforded 5 (84%), which was converted subsequently into the corresponding 8,8-dinitro derivative, 6 (83%). Acid promoted hydrolysis of the ethylene ketal moiety in 6 afforded 7 (50%), which was converted subsequently into the corresponding dinitrodioxime, 8 (75%). Oxidative nitration of 8 afforded 1 (19%). The structure of 1 was established unequivocally by single crystal X-ray structural analysis. Keywords: Hexanitropentacycloundecane; Synthesis (chemistry); X ray structure; Cyclic compounds: Decanes; Hexanes; Reprints. (MJM)

DESCRIPTORS: (U) *CYCLIC COMPOUNDS, *DECANES, *HEXANES, *SYNTHESIS(CHEMISTRY), BROMINATION, CHEMISTRY, HYDROLYSIS,

AD-A207 869

AD-A207 869 CONTINUED

OXIDATION, OXIMES, REDUCTION, REPRINTS, SODIUM BOROHYDRIDES, X RAYS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, undecane/hexanitropentacyclo.

AD-A207 868 7/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) The Structures of Three Strained Cage Molecules,

89

PERSONAL AUTHORS: Watson, William H.; Nagl, Ante

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-89-0584

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Acta Crystallographica, vC45 p263-267 1989.

ABSTRACT: (U) The nearly perpendicular orientation of the phenyl ring relative to the four atom cyclohexane plane is virtually identical in both (II) and (II'); the respective dihedral angles are 84.2 and 83.0 (2). The analogous angle is 110.0 (1) for (I). If one considers that the shapes of these three molecules may be defined by three wedges meeting at a common vertex (C1) and represented by a plane through each of the cyclohexane and phenyl rings and a plane through the carboxyl group, the three molecules are nearly identical in terms of the relative orientation of these planes. Owing to the geometrical isomerism, of course, the electronic distribution within two of these 'wedges' will be reverse. Keywords: Cyclic compounds; Decanes, Phosphonates; Reprints. (MJM)

DESCRIPTORS: (U) *CARBOXYL GROUPS, *CYCLIC COMPOUNDS, *CYCLOHEXANES, *PHOSPHONATES, ATOMS, DECANES, DIHEDRAL ANGLE, DISTRIBUTION, ELECTRONICS, MOLECULES, ORIENTATION(DIRECTION), PHENOLS, REPRINTS, RIGHT ANGLES, RINGS, WEDGES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A207 867 7/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Pressure Effect on the Product Distribution in Competing Reactions: Formation of a Bis Diels-Alder Adduct Via an Aromatizable Intermediate.

FEB 89

PERSONAL AUTHORS: Srivastave, S.; Marchand, A. P.; Vidyasagar, V.; Flippen-Anderson, J. L.; Gilardi, R.

CONTRACT NO. AFOSR-84-0085

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-89-0583

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organic Chemistry, v54 n1 p247-249, 2 Feb 89.

ABSTRACT: (U) The endo mono-adduct of cyclopentadiene with methyl p-benzoquinone does not react with excess diene even if it is well purified (if it is not, aromatization intervenes). However, at pressures of 700-800 MPa (7-8 kbar), the second cycloaddition step overtakes this reaction, and two bis-adducts are formed in a 4:1 ratio. Their configurations were determined by means of X-ray diffraction of derivatives to be endo, anti, endo and endo, anti, exo, respectively. A semicarbazone derivative of the main bis-adduct also could be prepared at high pressure only. The observations again demonstrate the usefulness of high pressure even in routine synthetic transformations. Keywords: High pressure reactions; Diels Alder reaction; Cyclopentadiene; X ray structures; Cyclic compounds; Pentadienes; Reprints. (MJM)

DESCRIPTORS: (U) *CYCLIC COMPOUNDS, *CYCLOPENTENES, *PENTADIENES, DISTRIBUTION, HIGH PRESSURE, PRESSURE, REPRINTS, STRUCTURES, TRANSFORMATIONS, X RAYS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, cyclopentadiene.

AD-A207 867

AD-A207 866 20/4

ARIZONA UNIV TUCSON DEPT OF AEROSPACE AND MECHANICAL ENGINEERING

(U) Experimental and Numerical Investigation of Coherent Structures in Turbulent Wake Flows.

DESCRIPTIVE NOTE: Final scientific rept. 6 Feb 85-5 Aug 88,

APR 89

PERSONAL AUTHORS: Champagne, Frank H.

CONTRACT NO. AFOSR-85-0146

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR TR-89-0568

UNCLASSIFIED REPORT

ABSTRACT: (U) Large scale coherent structures have been observed in two-dimensional wakes behind bluff bodies as well as non-vortex shedding bodies. There is a strong indication that these large scale structures are related to the two-dimensional instability modes of the slowly diverging mean wake flow. The Orr-Sommerfeld equation admits two solution modes for the two-dimensional plane wake. These are the sinuous mode with antisymmetric streamwise fluctuations and the varicose mode with symmetric streamwise fluctuations. The wake response to controlled sinuous and varicose types of disturbance waves was investigated. Sinuous disturbances at several amplitudes and frequencies were introduced to the wake of a flat plate by oscillating a small trailing edge flap. The Strouhal numbers of the disturbance waves were specially chosen so that the downstream location of the neutral point was well within the range of measurements. The streamwise variation of the half width of the wake an the centerline deficit was dependent on the amplitude level and showed dramatic deviations, starting near the neutral point, at large forcing levels from the well known square root behavior of the unforced case. The measured coherent Reynolds stresses were observed to change sign in the neighborhood of the neutral point as

AD-A207 866

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 866 CONTINUED

predicted from linear stability theory. The extent of the validity of linear stability theory was investigated. The wake was also forced with a sinuous disturbance of lower Strouhal number that was amplified over the entire range of measurements. (edc)

DESCRIPTORS: (U) *TURBULENT FLOW, *WAKE, AMPLITUDE, BLUNT BODIES, COHERENCE, FLAPS(CONTROL SURFACES), FREQUENCY, LINEARITY, MEAN, MEASUREMENT, MOMENTUM TRANSFER, NEUTRAL, NUMERICAL ANALYSIS, OSCILLATION, PLATES, POSITION(LOCATION), RESPONSE, SOLUTIONS(GENERAL), SQUARE ROOTS, STABILITY, STRESSES, STRUCTURAL PROPERTIES, STRUCTURES, SYMMETRY, THEORY, TRAILING EDGES, TWO DIMENSIONAL, VARIATIONS, WAVES, WIDTH.

IDENTIFIERS: (U) Instability, divergent flow, Sinuous disturbances, Strouhal number, Linear stability theory, Disturbance waves, PE61102F, WUAFOSR2307A2.

AD-A207 866

AD-A207 860 7/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Cycloaddition of Anion Derived Homophthalic Anhydride to cis,cisoid,cis-Tricyclo(6.3.0.0(2,6))undeca-4,9-diene-3,11-dione. Aromatization as a Driving Force for Intramolecular Sigmatropic Hydrogen Transfer,

89

PERSONAL AUTHORS: Marchand, Alan P.; Annapurna, Pendri; Watson, William H.; Nagl, Ante

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-89-0582

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Chemical Society. Chemical Communication, p281-282 1989.

ABSTRACT: (U) Reaction of the anion derived from homophthalic anhydride with cis, cisoid, cis-tricyclo-(6.3.0.0 2,6) undeca-4,9=diene 3,11-dione proceeds via initial Diels-Alder cycloaddition followed by intramolecular dyotropic hydrogen migration with concomitant aromatization. The structure of the reaction product (formed in 42% yield) was established via single crystal X ray structural analysis. Keywords: Dyotropic hydrogen shift, Reaction mechanism, Homophthalic anhydride, Diels Alder, Cycloaddition, X ray structure, Anhydrides, Dienes, Reprints. (MJM)

DESCRIPTORS: (U) *ANHYDRIDES, *CYCLIC COMPOUNDS, *DIENES, ANIONS, FORCE(MECHANICS), HYDROGEN, MIGRATION, REPRINTS, RESPONSE, SHIFTING, X RAYS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, dione/ undecatricyclo.

AD-A207 860

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 859 7/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) 2,3:6,7-Bis(2'3'-quinolino)pentacyclo(6.5.0.0(4,12).0(5,10).0(9,13)tridecane.

88

PERSONAL AUTHORS: Marchand, Alan P.; Annapurna, Pendri; Flippen-Anderson, Judith L.; Gilardi, Richard; George, Clifford

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-89-0581

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Tetrahedron Letters, v29 n51 p6681-6684 1988.

ABSTRACT: (U) The title compound was synthesized by two sequential Friedlander condensations between prentacyclic bis(ketoester) and ortho-aminobenzaldehyde. The dihedral angle between two the quinoline rings is 76.4; the nonbonded N...N interatomic distance is 4.32 A. Reprints, Molecular clefts, X ray structure, Friedlander condensation, Decanes, Quinolines. (MJM)

DESCRIPTORS: (U) *DECANES, *QUINOLINES, CONDENSATION, DIHEDRAL ANGLE, REPRINTS, RINGS, X RAYS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, tridecane/bis 2,3-quinolopentacyclo.

AD-A207 859

AD-A207 858 7/3

NORTH TEXAS STATE UNIV DENTON DEPT OF CHEMISTRY

(U) Lewis Acid Promoted Reactions of Substituted Pentacyclo(5.4.0.0(2,6).0(3,10).0(5,9)undecane-8,11-diones with Ethyl Diazoacetate.

89

PERSONAL AUTHORS: Marchand, Alan P.; Annapurna, Pendri; Reddy, S. P.; Watson, William H.; Nagl, Ante

CONTRACT NO. AFOSR-88-0132

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-89-0586

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organic Chemistry, v54 n1 p187-193 1989.

ABSTRACT: (U) As part of a program designed to explore the synthesis and chemistry of novel functionalized polycyclic cage molecules, we recently reported the results of a study of the Lewis acid promoted reaction of pentacyclo-(5.4.0.0 2,6.0 3,10.0 5,9) undecane-8,11-dione (PCUD-8,11-dione, 1) with ethyl diazoacetate (EDA). A single, substituted pentacyclo(6.5.0.0 4,12.0 5,10.0.9,13) tridecane, 2(Scheme I), was isolated form the reaction of 1 with 2 equiv of EDA in the presence of boron trifluoride etherate. The structure of 2 was established via single-crystal X-ray structural analysis. In an effort to extend this reaction to synthesize new derivatives of the pentacyclo(5 .0.0 4,11.0 5,9.0 8,12) dodecane ring system, we have undertaken a study of the corresponding boron trifluoride promoted reaction of unsymmetrically substituted PCUD-8,11-diones (i.e., 3 and 4, Scheme II) with 1 equiv of EDA. Keywords: Reprints, Decanes, Cyclic compounds, Acetates. (MJM)

DESCRIPTORS: (U) *ACETATES, *CYCLIC COMPOUNDS, *DECANES, BORON COMPOUNDS, CHEMISTRY, DODECANE, ETHERS, FLUORIDES, REPRINTS, RINGS, SINGLE CRYSTALS, STRUCTURAL ANALYSIS, SYNTHESIS, X RAYS.

AD-A207 858

AD-A207 858 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, diones/ pentacycloundecane.

AD-A207 852 12/1

IOWA STATE UNIV AMES DEPT OF MATHEMATICS

(U) Numerical Solution of Ill Posed Problems in Partial Differential Equations.

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 84-30 Jun 88,

JUN 88

PERSONAL AUTHORS: Levine, Howard A.

CONTRACT NO AFOSR-84-0252

PROJECT NO. 2304

TASK NO. AJ

MONITOR: AFOSR TR-89-0607

UNCLASSIFIED REPORT

ABSTRACT: (U) This project is concerned with several questions conern ing the existence, uniqueness, continuous data dependence and numerical computation of solutions of various ill posed problems in partial differential equations. Several problems involving reaction diffusion equations with and without convection terms present were studied. In the latter case the ability of finite element approximate solutions to reproduce the continuous time dynamics was investigated. In the former case, a convective diffusion equation with a semilinear source in the boundary conditions was analyzed. A fairly complete picture of the dynamics was obtained. With the source term in the equation, computations revealed a rich structure which has been partially analyzed theoretically. Several problems for reaction diffusion equations in unbounded regimes were also investigated. It was shown that under certain conditions in the rate law all nonzero solutions blow up in finite time, while for other conditions in the rate law, solutions damp out. It was shown that a potential well theory is possible for certain hyperbolic problems in which a nonlinear boundary condition is prescribed and not possible in certain cases when forcing term in the differential equation is singular. Numerical experiments performed on the wave equation with a singular forcing

AD-A207 852 CONTINUED

term have down that when quenching occurs, the time and exact derivatives blow up in finite time. The nature of the blowup was studied computationally. (jhd)

DESCRIPTORS: (U) *NUMERICAL METHODS AND PROCEDURES, *PARTIAL DIFFERENTIAL EQUATIONS, BOUNDARIES, COMPUTATIONS, CONVECTION, DIFFUSION, DYNAMICS, FINITE ELEMENT ANALYSIS, HYPERBOLAS, NONLINEAR SYSTEMS, NUMERICAL ANALYSIS, POTENTIAL THEORY, QUENCHING, RESPONSE, SOLUTIONS(GENERAL), TIME, WAVE EQUATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304AJ, *Ill posed problems, Existance theorems, Uniqueness theorems.

AD-A207 848 12/9 5/8 6/4

HARVARD UNIV CAMBRIDGE MA

(U) Components of High-Level Vision: A Cognitive Neuroscience Analysis and Accounts of Neurological Syndromes.

DESCRIPTIVE NOTE: Annual rept. Dec 87-Dec 89,

FEB 89

PERSONAL AUTHORS: Kosslyn, Stephen M.

REPORT NO. TR-89-1

CONTRACT NO. AFOSR-88-0012

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR TR-89-0628

UNCLASSIFIED REPORT

ABSTRACT: (U) High-level visual processes make use of stored information, and are invoked during object identification, navigation, tracking, and visual mental imagery. The present work has revolved around a theory of the component processing subsystems used in high-level vision. This theory was developed by considering neuroanatomical, neurophysiological, and computational constraints. The theory has led to three kinds of empirical work: First, specific claims associated with individual processing subsystems have been tested. For example, the analysis of the representation of spatial relations led to the prediction that two subsystem are used to encode this information, and a set of experiments was conducted that provided support for this distinction. Second, predictions from the theory as a whole have been formulated, and some of these predictions are now being tested. And third, the subsystems have been implemented in a running computer simulation model, which has been used to generate predictions about specific neurological syndromes. The model can be damaged in a variety of ways, and its performance on a set of tasks then observed. The experiments conducted to data and predictions from the computer model are summarized in this report. In addition,

AD-A207 848 CONTINUED

the most common dysfunctions of vision following brain damage are reviewed, and accounts are offered by reference to the simulation model. Keywords: Neuropsychology, Spatial orientation. (aw)

DESCRIPTORS: (U) *COMPUTERIZED SIMULATION, *NEUROLOGY, *INFORMATION PROCESSING, *VISION, *PSYCHOPHYSIOLOGY, IDENTIFICATION, MENTAL ABILITY, MODELS, NAVIGATION, OPTICAL IMAGES, ORIENTATION(DIRECTION), SIGNS AND SYMPTOMS, SPATIAL DISTRIBUTION, TRACKING, VISUAL DEFECTS, BRAIN DAMAGE.

IDENTIFIERS: (U) WUAF05R2313A4, PE61102F, *Neuropsychology, Spatial orientation.

AD-A207 847 7/3

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES

(U) Addition of Dichlorocarbene to Poly(1,1-dimethyl-1-sila-cis-pent-3-ene) and Poly(1,1-dimethyl-1-silia-cis (and trans)-pent-3-ene. Characterization of Microstructures by 13C and 29Si NMR.

88

PERSONAL AUTHORS: Loker, K. B.; Loker, D. P.

CONTRACT NO. AFOSR-86-0042

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-89-0588

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Micromolecules, v22 n3 p1300-1306 1989.

ABSTRACT: (U) Dichlorocarbene generated under phase transfer catalysis conditions was added to poly(1,1-dimethyl-1-sila-cis-pent-3-ene) (I). Catalytic isomerization of I by photochemically generated phenylthio radicals gave poly(1,1-dimethyl-1-sila-cis (and trans)-pent-3-ene) (II). Dichlorocarbene was also added to II. The microstructures of these dichlorocarbene adduct polymers were characterized by 1H, 13C, and 29Si NMR. Their thermal stabilities were determined by thermogravimetric analysis. They were found to be considerably less stable than the starting polymers I or II. These dichlorocarbene adduct polymers slowly undergo spontaneous depolymerization at room temperature. The mechanisms of this process is considered. Keywords: Dichlorocarbene adduct, Decomposition, Microstructure, Carbenes, Polymers, Silanes, Reprints. (MJM)

DESCRIPTORS: (U) *CARBENES, *CATALYTIC CRACKING, *MICROSTRUCTURE, *SILANES, CATALYSIS, DECOMPOSITION, DEPOLYMERIZATION, ISOMERIZATION, POLYMERS, REPRINTS, ROOM TEMPERATURE, THERMAL STABILITY, THERMOGRAVIMETRIC ANALYSIS, TRANSFER.

AD-A207 848

AD-A207 847

AD-A207 847 CONTINUED

IDENTIFIERS: (U) WUAFOSR2303B2, PE61102F, carbene/ dichloro, pentene/dimethyl sila-.

AD-A207 846 7/2 7/4

TEXAS UNIV AT AUSTIN DEPT OF PHYSICS

(U) Hydrogen Adsorption at Nb(100): Photoemission Evidence of Two-Stage Exchange Involving Subsurface States,

88

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

CONTRACT NO. AFOSR-86-0109

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR TR-89-0569

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Surface Science Letters, v204 pL713-L720 1988.

ABSTRACT: (U) Temperature dependent properties of electronic states resulting from hydrogen adsorption of Nb(100) surfaces have been studied by photoemission spectroscopy using synchrotron radiation. The most prominent hydrogen induced feature in photoemission spectra exhibits a temperature dependence that requires contributions from two distinct states. Analysis of the photon energy dependent cross section of the hydrogen induced features suggests that hydrogen chemisorption sites are located below the surface. These results have important consequences for kinetic models that attempt to account for hydrogen uptake by Nb. Keywords: Surface chemistry, Structure, Electronics properties, Surfaces, Niobium, Reprints. (MJM)

DESCRIPTORS: (U) *HYDROGEN, *NIOBIUM, *SURFACE CHEMISTRY, ADSORPTION, CHEMISORPTION, ELECTRONIC STATES, ELECTRONICS, EXCHANGE, KINETICS, MODELS, PHOTOELECTRIC EMISSION, RADIATION, REPRINTS, SITES, SPECTRA, SPECTROSCOPY, STAGING, SYNCHROTRONS, TEMPERATURE, THERMAL PROPERTIES.

IDENTIFIERS: (U) WUAFOSR2303A2, PE61102F, niobium(100).

AD-A207 847

AD-A207 846

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 840 15/5

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Instrumentation Requirements for the Princeton University Electric Propulsion Laboratory Research Program.

DESCRIPTIVE NOTE: Final rept. 1 Aug 86-30 Jul 88.

JUL 88

PERSONAL AUTHORS: Kelly, A. J.

CONTRACT NO. AFOSR-86-0287

PROJECT NO. 2917

TASK NO. A1

MONITOR: AFOSR TR-89-0567

UNCLASSIFIED REPORT

ABSTRACT: (U) DoD Instrumentation Grant AFOSR 86-0287 has provided total funding of $53,475 distributed over a two-year time interval: $34,790 for year one (8/1/86 thru 7/31/87) and $18,685 for the final year (8/1/87 thru 7/30/88). This report summarizes all expenditures that have been made under this grant. Keywords: Oscilloscopes, Tektronix, Thyratron, Procurement. (JES)

DESCRIPTORS: (U) *PROCUREMENT, *LOGISTICS, INSTRUMENTATION, OSCILLOSCOPES, REQUIREMENTS, THYRATRONS, TIME INTERVALS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A1.

AD-A207 817 20/5

NATIONAL HELLENIC RESEARCH FOUNDATION ATHENS (GREECE) THEORETICAL AND PHYSICA L CHEMISTRY INST

(U) On the Stability of Excited Tetrahydrogen,

88

PERSONAL AUTHORS: Metropoulos, A.; Nicolaides, C. A.

CONTRACT NO. AFOSR-85-0327

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-89-0579

UNCLASSIFIED REPORT

Availability: Document partially illegible.

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physics B: Atomic and Molecular Opt. Physics, v21 pL77-L81 1988.

ABSTRACT: (U) We report on a minimum of the A'A' excited state of the H4 cluster in a Cs trigonal pyramidal geometry, which can support at least one vibrational level. This minimum is near an avoided crossing with the ground 'A' state. The non-adiabatic matrix elements of their vibronic coupling along a possible dissociation coordinate are also calculated. Keywords: Tetra hydrogen; Examiners; Reprints. (KT)

DESCRIPTORS: (U) *MOLECULERMOLECULE INTERACTIONS, *MOLECULAR VIBRATION, * HYDROGEN, COORDINATES, COUPLING(INTERACTION), DISSOCIATION, LEVEL(QUANTITY), REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3, *Tetrahydrogen.

AD-A207 816 7/2 7/4

OKLAHOMA STATE UNIV STILLWATER DEPT OF CHEMISTRY

(U) A Perturbation-Trajectory Method for the Study of Gas-Surface Collision Dynamics,

83

PERSONAL AUTHORS: Jezercak, Michael; Agrawal, Paras M.; Thompson, Donald L.; Raff, Lionel M.

CONTRACT NO. AFOSR-86-0043

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-89-0535

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl of Chemical Physics, v90 n6 p3363-3372, 15 Mar 89.

ABSTRACT: (U) A perturbation trajectory method for determining the dynamics of gas surface collision processes is described. The method is based upon the assumption that the motions of Q zone atoms are unaffected by the collision process at the lattice surface. This assumption leads to a P-zone Hamiltonian that incorporates the effects of Q-zone motion in terms of time-varying P-zone-Q-zone interactions. The collision dynamics of the P zone are determined from an ensemble of stoichastic trajectories using this coupled Hamiltonian. The method is applied to three systems: (1) collinear inelastic atomic collisions with a ten-atom chain, (2) the inelastic scattering and absorption of NO on a Ag(111) surface, and (3) the collision and subsequent surface reactions of SiH2 on a Si(111) surface. Comparison of the perturbation results with those obtained using the full system Hamiltonian shows that under certain conditions the perturbation procedure yields very accurate results with a significant reduction in computational requirements. In general, the accuracy of the perturbation calculations increases as the incident-to-lattice-atom mass ratio decreases. A decrease in the strength of the interaction between the incident molecule and the Q zone, the incident translational energy, or the lattice temperature also improves the accuracy of the perturbation treatment. The method is therefore best suited to the study of inelastic, light-molecule collisions with heavy-atom surfaces at low temperature. Comparisons with previously reported gas-surface studies that employ a Langevin approximation are also given. Keywords: Nitrogen oxide, Silicon hydride, Silicon, Reports, Reprints. (MJM)

DESCRIPTORS: (U) *GAS SURFACE INTERACTIONS, *HYDRIDES, *NITROGEN OXIDES, *SILICON, *SILVER, ABSORPTION, ACCURACY, ATOMS, COLLISIONS, COMPUTATIONS, COUPLING(INTERACTION), DYNAMICS, ELASTIC PROPERTIES, ENERGY TRANSFER, GAS DYNAMICS, GASES, HAMILTONIAN FUNCTIONS, INELASTIC SCATTERING, INTERACTIONS, LINEARITY, LOW TEMPERATURE, PARTICLE COLLISIONS, PERTURBATIONS, REPRINTS, REQUIREMENTS, STRENGTH(GENERAL), SURFACES, TRAJECTORIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3, silicon hydride.

OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 814 20/6

CARNEGIE-MELLON UNIV PITTSBURGH PA

(U) Radon Transform Analysis of a Probabilistic Method for Image Generation.

DESCRIPTIVE NOTE: Annual rept. no. 2, 1 Apr 88-31 Mar 89,

APR 89

PERSONAL AUTHORS: Berger, Marc A.

REPORT NO. $AFOSR-87-0137

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR
TR-89-0606

UNCLASSIFIED REPORT

ABSTRACT: (U) The research performed for this grant over the past year involved affine iterated function system (IFS) encoding and IFS mixing for digital images. This relates to a technique of Michael Barnsley's for generating fractal and other images by randomly iterating affine transformations of the plane into itself. By this technique an image is both generated and represented as the long-term probability distribution for a 2-D or 3-D Markov chain. The encoding involves finding an affine 'collage' of the image, whereby it is identified as a convex combination of affinely scaled versions of itself. This permits some remarkable data compression. The mixing involves a merging of IFS's so as to produce images with combined textures. It ties in with the encoding in that a broader class of images can then be efficiently encoded, and there are more degrees of freedom in the encoding search. The mathematical methods used involve stochastic optimization, computational geometry, the Radon transform, dynamical systems and ergodic theory for Markov chains. Keywords: Encoding, Image compression, Image processing, Markov chain. (MJM)

DESCRIPTORS: (U) *CODING, *IMAGE PROCESSING, *MARKOV PROCESSES, COMPRESSION, COMPUTATIONS, DATA COMPRESSION, DEGREES OF FREEDOM, DIGITAL SYSTEMS, DYNAMICS, ERGODIC PROCESSES, GEOMETRY, IMAGES, LONG RANGE(TIME), NUMERICAL

AD-A207 814

AD-A207 814 CONTINUED

METHODS AND PROCEDURES, OPTIMIZATION, PROBABILITY, PROBABILITY DISTRIBUTION FUNCTIONS, SEARCHING, STOCHASTIC PROCESSES, TEXTURE, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A9.

AD-A207 814

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 812 12/1 9/3

ECODYNAMICS RESEARCH ASSOCIATES INC ALBUQUERQUE NM

(U) Design Optimization of Systems Governed by Partial Differential Equations. Phase 1.

DESCRIPTIVE NOTE: Final rept. Aug 88-Jan 89,

MAR 89

PERSONAL AUTHORS: Roache, Patrick J.

REPORT NO. ERA-89-3

CONTRACT NO. F49620-88-C-0124

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-89-0571

UNCLASSIFIED REPORT

ABSTRACT: (U) The results of the Phase I study on 'Design Optimization of Systems Governed by Partial Differential Equations' are presented. The optimization algorithm used is the Pironneau-Polak method of feasible directions with Armijo step size. This algorithm, and related ones are uniquely applicable to practical engineering and science problems whose constraints are defined implicitly in terms of possibly discontinuous functionals of the solution to te PDE's. The objective (cost) and constraint functions are evaluated by execution, from the optimization code, of a separate (and complex) user-oriented PDE code; gradients are determined numerically. Feasibility is convincingly demonstrated by the design optimization of several practical laser electrode problems. Keywords: Shape optimization, Laser components, Adaptive grids, Partial differential equations. (JHD)

DESCRIPTORS: (U) *NUMERICAL METHODS AND PROCEDURES, *PARTIAL DIFFERENTIAL EQUATIONS, ADAPTIVE SYSTEMS, ALGORITHMS, CODING, COSTS, ELECTRODES, GRIDS, LASER COMPONENTS, LASERS, OPTIMIZATION, SHAPE, SIZES(DIMENSIONS)

AD-A207 812 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1, Pironneau Polak method, Armijo step size.

AD-A207 812

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 811 20/4 20/13

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) The Heat Transfer and Fluid Dynamics of Concave Surface Curvature.

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

APR 88

PERSONAL AUTHORS: Bradshaw, P.; Johnston, J. P.; Moffat, R. J.

CONTRACT NO. AFOSR-86-0073

PROJECT NO. 2307

TASK NO. A4

MONITOR: AFOSR TR

UNCLASSIFIED REPORT

ABSTRACT: (U) This project investigated the mechanisms responsible for the known increases in shear stress and convective heat transfer when a turbulent boundary layer flows over a concave wall compared to a similar flow over a flat wall. The effects of grid-generated Free-Stream Turbulence (FST level< or = 7.5%) were also examined for flat and concave-wall TBL's. The work was conducted in a large scale boundary layer using low-speed water flow. Momentum thickness Re was = 1400. Surface heat transfer rate was measured with a constant temperature metal surface and by use of a liquid crystal surface. Temperature profiles were obtained by miniature thermocouple probe down to y+ = 3 and all three velocity components by a 3-D, laser velocimeter down to y+ = 7. Heat transfer and wall shear stress were both found to be augmented by curvature and free-stream turbulence applied separately, but the combined effect of curvature and FST is not simply the sum of the individual effects. In the case of wall stress, the effects of curvature are much larger than FST effects once the flow develops downstream. The nature of the interaction is being investigated using a working hypothesis based on the ideas of active (Reynolds stress producing) and inactive can stimulate only a limited increase (order 25%) in wall friction coefficient. However, for the moderate levels of FST used in this study, no such saturation process exists to limit the increase in surface heat transfer rate. (edc)

DESCRIPTORS: (U) *BOUNDARY LAYER FLOW, *CONVECTION(HEAT TRANSFER), *SHEAR STRESSES, *TURBULENT BOUNDARY LAYER, *TURBULENT FLOW, AUGMENTATION, BOUNDARY LAYER, COEFFICIENTS, CONCAVE BODIES, CURVATURE, FLUID DYNAMICS, FREE STREAM, FRICTION, GRIDS(COORDINATES), HEAT TRANSFER, HYPOTHESES, LASER VELOCIMETERS, LIQUID CRYSTALS, LOW VELOCITY, METALS, MINIATURIZATION, MOMENTUM, MOMENTUM TRANSFER, PROBES, PROFILES, RATES, SATURATION, SURFACE TEMPERATURE, SURFACES, TEMPERATURE MEASURING INSTRUMENTS, THERMOCOUPLES, THICKNESS, TURBULENCE, WALLS, WATER FLOW.

IDENTIFIERS: (U) FST(Free Stream Turbulence), PE61102F, WUAFOSR2307A4.

AD-A207 811

AD-A207 811

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 810 20/11

WISCONSIN UNIV-MADISON DEPT OF MATHEMATICS

(U) Modelling, Information, Processing, and Control.

DESCRIPTIVE NOTE: Final scientific rept. 30 Sep 85-29 Sep 88,

JAN 89

PERSONAL AUTHORS: Russell, David L.

CONTRACT NO. AFOSR-85-0263

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-89-0527

UNCLASSIFIED REPORT

ABSTRACT: (U) Research was conducted in identification and control of distributed parameter systems, particularly damping mechanisms in distributed elastic systems, modeling of flexible structures, control of systems with nonlinear behavior and control of systems with solitary waves. A thorough analysis if damping mechanisms in elastic systems was carried out, including common classical forms of damping, and led to a new model of damping (spatial hysteresis) which correctly models observed asymptotic behavior in the frequency domain. More recent work focused on transfer function methods for infinite dimensional linear systems. Papers included Some remarks on transfer function methods for infinite dimensional linear systems; Spectral and asymptotic properties of linear elastic systems with internal damping; and Frequency/period estimation and adaptive rejection of periodic disturbances. (jhd)

DESCRIPTORS: (U) *FLEXIBLE STRUCTURES, *MATHEMATICAL MODELS, ADAPTIVE SYSTEMS, ASYMPTOTIC SERIES, CONTROL SYSTEMS, DAMPING, DISTRIBUTION, ELASTIC PROPERTIES, HYSTERESIS, INTERNAL, LINEAR SYSTEMS, LINEARITY, NONLINEAR SYSTEMS, PARAMETERS, REJECTION, SPATIAL DISTRIBUTION, SPECTRA, TRANSFER FUNCTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A207 810

AD-A207 807 12/5

COMPUTER COMMAND AND CONTROL CO PHILADELPHIA PA

(U) An Intelligent Mathematical Modelling System - Mathmodel.

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-31 Mar 89,

MAR 89

PERSONAL AUTHORS: Lock, X. Ge.; Prywes, N.

CONTRACT NO. F49620-88-C-0116

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR
TR-89-0530

UNCLASSIFIED REPORT

ABSTRACT: (U) A system, called MATHMODEL was developed by X. Ge in his research at the University of Pennsylvania. It is a very complex and large multi-phase system. It consists of 142 modules and 60,000 lines of PL/1 code. MATHMODEL is based on an old (1984) version of MODEL system, which automatically translates equational specifications into highly efficient programs in PL/1. Computer Command and Control Company (CCCC) has a much more advanced and reliable version of MODEL that generates programs in several languages (PL/1, C and Ada) and that runs on several computers (IBM and Digital). It also generates programs that can be executed in parallel on distributed computers. Most important, CCCC's MODEL contains many more operations useful in mathematical modelling (e.g. matrix algebra, relational algebra, etc.) This version is much more reliable and robust and is well documented. The project has merged MATHMODEL's capabilities with those of CCCC's MODEL and has transformed MATHMODEL into a greatly more effective tool for mathematical modelling than any system developed to date. (fr)

DESCRIPTORS: (U) *COMPUTERIZED SIMULATION, *MATHEMATICAL MODELS, *COMPUTER PROGRAMMING, DISTRIBUTED DATA PROCESSING, EFFICIENCY, MATRICES(MATHEMATICS), SPECIFICATIONS, PARALLEL PROCESSING, ARTIFICIAL

AD-A207 807

AD-A207 807 CONTINUED

INTELLIGENCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR3005A1, *MATHMODEL computer program, PL/1 programming language

AD-A207 804 6/1

OKLAHOMA STATE UNIV STILLWATER

(U) Electron Redistribution in Mixed Valence Cytochrome Oxidase Following Photolysis of Carboxy-Oxidase,

88

PERSONAL AUTHORS: Harmon, H. J.

CONTRACT NO. AFOSR-84-0264

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-89-0621

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Bioenergetics and Biomembranes, v20 n6 p735-748 1988.

ABSTRACT: (U) The transport of electrons in the oxidase is frequently viewed as unidirectional except when energy-dependent reverse electron transport occurs. In this communication, electron redistribution between redox centers in nonliganded mixed valence oxidase will be demonstrated. Absorbance changes at 446 nm in purified cytochrome oxidase following flash photolysis of carboxy-oxidase poised in the mixed valence state at +220 mV show biphasic kinetics. One phase corresponds to CO recombination to ferrous cytochrome a3 with an energy of activation of 9 kcal/mol; the second phase is 3-5 times faster with an energy of activation of 9.15 kcal/mol. Following flash photolysis at approximately -60 C, cytochromes a and c and the 840-nm CUA species are observed to undergo reduction as electrons from ferrous unliganded cytochrome a3 equilibrate with the equipotential redox centers of the oxidase; as CO recombines with ferrous cyochrome a3, these centers are oxidized and the mixed valence carboxy-oxidase is regenerated. Electron redistribution between centers of the oxidase in the forward and reverse directions occurs faster than does the binding of CO. Keywords: Cytochrome oxidase; Carboxy cytochrome oxidase, CO recombination, Mixed valence, Cytochrome c, Electron transport. Reprints, Copper. (KT)

AD-A207 804 CONTINUED

DESCRIPTORS: (U) *CYTOCHROME OXIDASE, *ELECTRON TRANSPORT, ACTIVATION, BLOOD PROTEINS, COPPER, DISTRIBUTION, ELECTRONS, FLASHES, ORIENTATION(DIRECTION), OXIDATION REDUCTION REACTIONS, PHOTOLYSIS, REPRINTS, VALENCE, ABSORPTION, REACTION KINETICS, RECOMBINATION REACTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5, Carboxy oxidase, Flash photolysis, Electron redistribution.

AD-A207 803 12/3

ILLINOIS UNIV AT URBANA COORDINATED SCIENCE LAB

(U) Solutions to a Class of Nonstandard Stochastic Control Problems with Active Learning.

DEC 88

PERSONAL AUTHORS: Basar, Tamer

CONTRACT NO. AFOSR-84-0056

MONITOR: AFOSR
TR-89-0597

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in IEEE Transactions on Automatic Control, v33 n12 p1122-1129 Dec 88.

ABSTRACT: (U) We formulate and solve a dynamic stochastic optimization problem of a nonstandard type, whose optimal solution features active learning. The proof of optimality and the derivation of the corresponding control policies is an indirect one, which relates the original single-person optimization problem to a sequence of nested zero-sum stochastic games. Existence of saddle points for these games implies the existence of optimal policies for the original stochastic control problem, which, in turn, can be obtained from the solution of a nonlinear deterministic optimal control problem. The paper also studies the problem of existence of stationary optimal policies when the time horizon is infinite and the objective function is discounted. Keywords: Stochastic control, Optimality, Estimation, Filtering. (sdw)

DESCRIPTORS: (U) *LEARNING, *STOCHASTIC CONTROL, *STOCHASTIC PROCESSES, CONTROL, DYNAMICS, OPTIMIZATION, POLICIES, SOLUTIONS(GENERAL), STATIONARY.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 737 12/2

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Wavefront Propagation for Reaction-Diffusion Systems of PDE,

MAR 89

PERSONAL AUTHORS: Ceremade, G. B.; Evans, L. C.; Souganidis, P. E.; Barles, G.

REPORT NO. LCDS/CCS-89-3

CONTRACT NO. N00014-83-K-0542, DAAL03-86-K-0074

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-89-0574

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Sponsored in part by Grants AFOSR-ISSA-86-0078, NSF-DMS86-01532, NSF-DMS86-01258 and NSF-DMS86-57464. Prepared in cooperation with Maryland Univ., College Park and Paris-9 Univ. (France).

ABSTRACT: (U) The theory of viscosity solutions for Hamilton-Jacobi equations is used to study the asymptotic behavior of solutions to certain systems of reaction-diffusion PDE. Our principal result characterizes the region of convergence of the solution to an unstable rest point as the set where the solution of an appropriate Hamilton-Jacobi equation is positive. Keywords: Partial Differential equations; Wave front propagation. (jhd)

DESCRIPTORS. (U) *PARTIAL DIFFERENTIAL EQUATIONS, *WAVE PROPAGATION, *WAVEFRONTS, ASYMPTOTIC SERIES, SOLUTIONS(GENERAL), THEORY, VISCOSITY.

IDENTIFIERS: (U) Hamilton Jacobi equations.

AD-A207 737

AD-A207 736 12/2

BROWN UNIV PROVIDENCE RI LEFSCHETZ CENTER FOR DYNAMICAL SYSTEMS

(U) Representation of Shift Invariant Operators on L2 by H at Infinity Transfer Functions: An Elementary Proof, a Generalization to L Rho and a Counterexample for L at Infinity,

MAR 89

PERSONAL AUTHORS: Weiss, George

REPORT NO. LCDS-CCS-89-5

CONTRACT NO. F49620-86-C-0111

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR TR-89-0573

UNCLASSIFIED REPORT

ABSTRACT: (U) An elementary proof is given of the well known fact that shift invariant operators on (L-sq)/0, infinity) are represented by transfer functions which are bounded and analytic on the right open half-plane. Proved is a generalization to Banach space-valued L superscript p functions, where 1 < or = p < infinity. The result no longer holds for p = infinity. (JHD)

DESCRIPTORS: (U) , TRANSFER FUNCTIONS, OPERATOR(MATHEMATICS).

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1, infinity transfer functions.

AD-A207 736

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 725 12/4

RUTGERS - THE STATE UNIV NEW BRUNSWICK N J

(U) Regulation of Nonlinear and Generalized Linear Systems.

DESCRIPTIVE NOTE: Final rept 15 Jul 85-14 Jul 88,

SEP 88

PERSONAL AUTHORS: Sontag, Eduardo D.

CONTRACT NO. AFOSR-85-0247

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-89-0529

UNCLASSIFIED REPORT

ABSTRACT: (U) Research during the grant period can be classified into these areas: Equilinearization, Sampling and Discrete Time Controllability, Input/Output Equations, Input/Output Stability, Families of Systems, Image Processing and Robotics, Nonlinear Stabilization, Computational Complexity in Control, and Neural Networks and Piecewise Linear Control. The report describes the progress achieved in each of these.

DESCRIPTORS: (U) *OPERATIONS RESEARCH, *LINEAR SYSTEMS, *NONLINEAR SYSTEMS, COMPUTATIONS, CONTROL, EQUATIONS, IMAGE PROCESSING, INPUT OUTPUT PROCESSING, NEURAL NETS, ROBOTICS, SAMPLING, STABILITY, STABILIZATION, LINEARITY, TIME.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

AD-A207 724 12/2

MARYLAND UNIV COLLEGE PARK

(U) Theoretical Investigations of Chaotic Dynamics.

DESCRIPTIVE NOTE: Final rept. 1 Dec 86-30 Nov 88,

NOV 88

PERSONAL AUTHORS: Yorke, James

CONTRACT NO. AFOSR-87-0110

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-89-0572

UNCLASSIFIED REPORT

ABSTRACT: (U) Ten papers have been published: Pseudo-orbit shadowing in the family of tent maps; Is every approximate trajectory of some process near an exact trajectory of a nearby process? Noise reduction in dynamical systems; Using dynamic embedding methods to analyze experimental data; Period halving for x sub H+1 = MF (sub N) where F has negative Schwarzian derivative; Numerical orbits of chaotic processes represent true orbits; A procedure for finding numerical trajectories on chaotic saddles; Antimonotonicity: Concurrent creation and annihilation of periodic orbits; Accessible saddles on fractal basin boundaries. Analysis of a procedure for finding numerical trajectories close to chaotic saddle hyperbolic sets. (jhd)

DESCRIPTORS: (U) *MATHEMATICAL ANALYSIS, .

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A4, *Chaos.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 718 12/2

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF MATHEMATICAL SCIENCES

(U) Large Scale Function Minimization.

DESCRIPTIVE NOTE: Final scientific rept. 15 Jul 85-14 Oct 88.

OCT 88

PERSONAL AUTHORS: Nash, Stephen G.

CONTRACT NO. AFOSR-85-0222

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR TR-89-0532

UNCLASSIFIED REPORT

ABSTRACT: (U) Several new optimization techniques suitable for parallel computers have been developed and have been tested on an Intel hypercube. On a number of nonlinear problems, the algorithms tested have demonstrated dramatic speed-ups over their sequential counterparts. The fact that these speedups are better than can be attributed to parallelism done suggest that they may lead to improved sequential methods.

DESCRIPTORS: (U) *FUNCTIONS, *NONLINEAR SYSTEMS, *PARALLEL ORIENTATION, ALGORITHMS, COMPUTERS, OPTIMIZATION, SEQUENTIAL ANALYSIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A8, Newton method.

AD-A207 715 20/11 8/5 20/4

CALIFORNIA UNIV BERKELEY

(U) Nonlinear Stability in Fluid and Plasma Dynamics.

DESCRIPTIVE NOTE: Final technical rept.,

FEB 89

PERSONAL AUTHORS: Marsden, Jerrold E.

CONTRACT NO. F49620-87-C-0118

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR TR-89-0533

UNCLASSIFIED REPORT

ABSTRACT: (U) This report presents a block diagonalization theorem which is designed to study the stability and bifurcation of rotating systems, or more generally, of relative equilibria. The context of the discussion is the energy-momentum method of mechanical systems with symmetry. Crucial special cases of the block diagonalization theorem for uniformly rotating system, including general nonlinear elasticity and geometrically exact rods. The purpose here is to abstract these examples and prove a general geometric theorem. These general results will be important for rotating gravitational fluid masses as well. (jhd)

DESCRIPTORS: (U) *ELASTIC PROPERTIES, *MECHANICAL COMPONENTS, *ROTATION, DYNAMICS, GEOMETRY, NONLINEAR SYSTEMS, PLASMAS(PHYSICS), RODS, STABILITY, THEOREMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A9, Block diagonalization rheorem.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 629 12/4

WASHINGTON STATE UNIV PULLMAN

(U) Rapidly Convergent Algorithms for Nonsmooth Optimization.

DESCRIPTIVE NOTE: Final scientific rept. 15 Jul 83-14 Jun 88.

DEC 88

PERSONAL AUTHORS: Mifflin, Robert

CONTRACT NO. AFOSR-83-0210

PROJECT NO. 2304

TASK NO. A*

MONITOR: AFOSR TR-89-0592

UNCLASSIFIED REPORT

ABSTRACT: (U) The research supported by this grant has continued the development of efficient methods for solving optimization problems involving implicitly defined functions that are not everywhere differentiable. Research on a rapidly convergent algorithm for the constrained single variable case where generalized derivatives are known has been completed. Significant process has been made in extending this work to the n-variable case via the definition of better than linear convergence. Safeguarding techniques have been developed which ensure first order convergence on problems with semismooth functions, but do not prevent better than linear convergence on piecewise second order smooth functions. For the constrained case a scale-free automatic penalty technique has been devised. A new stable method for solving certain quadratic programming problems has been developed which includes a technique for resolving degeneracy. (JHD)

DESCRIPTORS: (U) *ALGORITHMS, *CONVERGENCE, *OPTIMIZATION, EFFICIENCY, FUNCTIONS, PROBLEM SOLVING, QUADRATIC PROGRAMMING, STABILITY, VARIABLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1, *Nonsmooth optimization.

AD-A207 629

AD-A207 624 7/3 7/6

CALIFORNIA STATE UNIV SACRAMENTO DEPT OF CHEMISTRY

(U) Synthesis of Primary-Alcohol-Terminated Polyepichlorohydrin with Molecular Weight of 4000 to 12000.

DESCRIPTIVE NOTE: Final technical rept. 1 Jun 87-31 Jan 89,

MAR 89

PERSONAL AUTHORS: Kim, C. S.; Fish, Richard; Curb, Phil; Youn, Chung; Kho, Lily

CONTRACT NO. AFOSR-87-223

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-89-0477

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Hornet Foundation, Inc., Sacramento, CA, Rept. No. 2692.

ABSTRACT: (U) Previous studies of cationic polymerization of epichlorohydrin (ECH) indicate that the commonly used initiator systems, Lewis acid alcohol or tertiary oxonium salt alcohol complexes give polyepichlorohydrin (PECH) whose average molecular weight is less than 4000 and the terminal groups are sterically hindered secondary alcohols. In our study, a novel pseudo-living polymerization system of epichlorohydrin has been developed, using 1,4-butanediltriflate (BDT) as the initiator. The advantages of BDT as the initiator are: (1) There are no head groups on the polymeric chains because BDT is difunctional, and (2) the tail groups (triflate esters) of the polymeric chains can be converted to a variety of functional groups. Our experimental results demonstrate that telechelic PECH having molecular weights in the range of 4000 - 15000 and with different functional groups can be synthesized. For example, the end-groups of PECH can be phenoxide groups or 1-hydroxybutyl groups; these have been characterized by UV, FTIR and NMR studies. Furthermore, PECH with different

AD-A207 624

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 624 CONTINUED

alcohol structures and the functionalities of two and four have been synthesized. Telechelic polymerization, Epichlorohydrin, Initiator, Molecular weight, 1,4-Butaneditriflate, Kinetic studies, End groups. (mjm)

DESCRIPTORS: (U) *ALCOHOLS, *POLYMERS, *CHLORINE COMPOUNDS, ACIDS, CATIONS, CHAINS, ESTERS, KINETICS, MOLECULAR WEIGHT, POLYMERIZATION, SECONDARY, STRUCTURES, TAIL ASSEMBLIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, epichlorohydrin/poly.

AD-A207 624

AD-A207 623 11/4

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG MATERIALS RESPONSE GROUP

(U) Investigation and Modeling of Damage Growth in Composite Laminates.

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

SEP 88

PERSONAL AUTHORS: Reifsnider, K. L.; Stinchcomb, W. W ; Bakis, C. E.; Yih, H. R.; Shalev, Doron

CONTRACT NO. AFOSR-85-0087

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFOSR TR-88-1253

UNCLASSIFIED REPORT

ABSTRACT: (U) Damage initiation and growth has been studied in several material systems and two notched geometries, revealing generic characteristics of damage development and its relationship to microstructure. Stress redistribution has been studied with photoelastic methods and simulated analytically. Adiabatic thermoelastic methods for strain field analysis under dynamic loading have been developed and the first micromechanical formulation of that problem has been achieved. A formulation of the singular stress problem in the boundary layer near a hole in composite laminates has been completed. And a brief study of the applicability of chaos theory to damage development representation was conducted. A critical element model of remaining strength and life of notched laminates has been constructed and validated.

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *LAMINATES, ADIABATIC CONDITIONS, BOUNDARY LAYER, DAMAGE, DISTRIBUTION, DYNAMIC LOADS, GROWTH(GENERAL), MICROSTRUCTURE, MODELS, PHOTOELASTICITY, STRESSES, THERMOELASTICITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B2.

AD-A207 623

AD-A207 610 12/4

WISCONSIN UNIV-MADISON

(U) Computation and Theory in Nonlinear Optimization.

DESCRIPTIVE NOTE: Final rept. 15 Jan-14 Nov 88,

NOV 88

PERSONAL AUTHORS: Papadopoulos, Gregory M.

CONTRACT NO. AFOSR--88-0090

PROJECT NO. 2304

TASK NO. A

MONITOR: AFOSR
TR-89-0534

UNCLASSIFIED REPORT

ABSTRACT: (U) Researchers have made substantial progress in the decomposition of large-scale nonlinear problems for accelerated convergence. A Newton method for nonsmooth equations has been developed and conditions for its convergence determined. The original proposal suggested work in the general area of large-scale optimization: in particular, methods for decomposition based on the so-called Bundle method, decomposition of large-scale nonlinear problems, including parameter optimization in networks of queues, and accelerating the convergence of bundle-type methods, including developing the theory base in areas such as implementable second-order models of functions to be optimized. A particular area of work suggested as a major topic of investigation was the development of a computationally implementable and efficient Newton-type algorithm for nonsmooth problems. (jhd)

DESCRIPTORS: (U) *NONLINEAR ANALYSIS, *OPTIMIZATION, BUNDLES, CONVERGENCE, DECOMPOSITION, NETWORKS, PARAMETERS, QUEUEING THEORY, THEORY, COMPUTATIONS.

IDENTIFIERS: (U) WUAFOSR2304A8, PE61102F.

AD-A207 405 7/2

TEXAS TECH UNIV LUBBOCK DEPT OF CHEMISTRY

(U) Intermolecular Potential Energy Function, Second Virial Coefficients, and Oligomer Properties of Hydrogen Fluoride,

NOV 81

PERSONAL AUTHORS: Redington, Richard L.

PROJECT NO. 2303

TASK NO. D9

MONITOR: AFOSR
TR-89-0481

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v75 n9 p4417-4421, 1 Nov 81.

ABSTRACT: (U) Six recently intermolecular potential energy functions for HF-HF interactions are examined and used to calculate classical second virial coefficients curves. Order of magnitude differences exist among the six B(T) curves and none of them decreases with temperature as rapidly as an experimental curve determined in the 19.5-56 C range. The HF3 potential of Klein, McDonald, and O'Shea appears to give the best overall description of HF-HF interactions and this function is used to calculate properties of several higher (HF) oligomers. The resulting low energy conformations are cyclic, and the hexamer has a puckered, nonrigid structure. The calculated hydrogen bond energies, F...F distances, and the puckered, nonrigid hexamer structure all agree well with the available experimental information. Reprints. (jes)

DESCRIPTORS: (U) *CHEMICAL BONDS, *MOLECULE MOLECULE INTERACTIONS, ENERGY, EXPERIMENTAL DATA, FUNCTIONS, GRAPHS, HYDROGEN BONDS, HYDROGEN FLUORIDE, LOW ENERGY, POLYMERS, POTENTIAL ENERGY, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303D9.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 404 7/4 20/9

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Surface Plasmon Study of Monolayer-Bilayer Transition in Poly-4-BCMU and Poly-3-BCMU Polydiacetylene Langmuir-Blodgett Films.

89

PERSONAL AUTHORS: Huang, X.; Burzynski, R.; Prasad, P. N.

CONTRACT NO. F49620-87-C-0042

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-89-0471

UNCLASSIFIED REPORT

ABSTRACT: (U) Surface plasmon wave spectroscopy was successfully used to study the monolayer-bilayer transition in poly-4-BCMU and poly-3-BCMU polydiacetylene Langmuir-Blodgett films. The linear refractive index and the thickness were obtained for the monolayer yellow and bilayer red forms of poly-4-BCMU. Surface plasmon coupling using resonance enhancement was found to sufficiently enhance the Raman scattering, so Raman spectra of the monolayer films could be obtained with a relatively small laser intensity of a few milliwatts. The differences in the c(doubles bond)c and c(triple bond)c vibrational stretching frequencies of the monolayer yellow and the bilayer films were observed arising from the difference in the effective conjugation ofr the two forms. Electrochemistry; Plasmon waves; Reprints. (jhd)

DESCRIPTORS: (U) *ELECTROCHEMISTRY, *ACETYLENES, *PLASMONS, BONDING, COUPLING(INTERACTION), FILMS, INTENSITY, LASERS, LAYERS, LIGHT SCATTERING, OPTIMIZATION, RAMAN SPECTRA, REFRACTIVE INDEX, REPRINTS, RESONANCE, SPECTROSCOPY, THICKNESS, RED(COLOR), YELLOW(COLOR).

IDENTIFIERS: (U) Acetylene/Poly-3-BCMU polydi, Acetylene/Poly-4-BCMU polydi, Langmuir Blodgett films.

AD-A207 404

AD-A207 266 12/1

KENT STATE UNIV OH DEPT OF MATHEMATICAL SCIENCES

(U) Investigations in Improved Iterative Methods for Solving Sparse Systems of Linear Equations.

DESCRIPTIVE NOTE: Final rept. 1 Oct 79-30 Jun 80,

AUG 80

PERSONAL AUTHORS: Varga, R. S.

CONTRACT NO. F49620-79-C-0175

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-89-0514

UNCLASSIFIED REPORT

ABSTRACT: (U) This research conducted by the principal investigator during the period October 1, 1979 to June 30, 1980, resulted in the following research articles which have either appeared in print, or have been accepted in refereed mathematical journals, in this period: Inequalities for polynomials with a prescribed zero; Theorems of Stein-Rosenberg Type; On the Enestrom-Kakeya Theorem and Its Sharpness; Bounds for incomplete polynomials vanishing at both endpoints of an interval; Hermite-Birkhoff interpolation in the n-th roots of urity; Remarks on some conjectures of G.G. Lorentz; On incomplete polynomials. II; Interpolation in the roots of unity: an extension of a Theorem of J. L. Walsh; On the sharpness of some upper bounds for spectral radii of S.O. R. iteration matrices; An extension of the Enestrom-Kakeya Theorem and its sharpness; Lacunary trigonometric interpolation on equidistant nodes. Keywords: Bibliographies. (kr)

DESCRIPTORS: (U) *INTERPOLATION, *ITERATIONS, *POLYNOMIALS, BIBLIOGRAPHIES, LINEAR ALGEBRAIC EQUATIONS, MATHEMATICS, PERIODICALS, TRIGONOMETRY.

IDENTIFIERS: (U) WUAFOSR2304A3, PE61102F.

AD-A207 266

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 218 7/2 7/4

NORTH CAROLINA STATE UNIV AT RALEIGH DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) Molecular Beam Epitaxial Growth of Hg(1-x)CdxTe.

DESCRIPTIVE NOTE: Final rept.,

JUN 80

PERSONAL AUTHORS: Moazed, K. L.

CONTRACT NO. AFOSR-78-3721

PROJECT NO. 2306

TASK NO. C2

MONITOR: AFOSR
TR-89-0492

UNCLASSIFIED REPORT

ABSTRACT: (U) The 11-Vi compound hg1-cCdxTe is a material of considerable interest as a semi-conductor for optical devices, particularly in the infrared spectral regions. Solid solutions appear to exist for all values of x, and for values of x between about 0.2 and 1.0 the material behaves as a semiconductor with a variable bandgap between 0.05ev(x=0.2) and 1.53ev(x=1) at room temperature. Mercury Cadmium Tellurides. (MJM)

DESCRIPTORS: (U) *CADMIUM TELLURIDES, *EPITAXIAL GROWTH, *MERCURY COMPOUNDS, INFRARED SPECTRA, MOLECULAR BEAMS, OPTICAL EQUIPMENT, SOLID SOLUTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306C2, mercury cadmium tellurides.

AD-A207 218

AD-A207 216 20/5 4/1 7/4

LA JOLLA INST CA

(U) Low-Energy Atomic Collisions.

DESCRIPTIVE NOTE: Final scientific rept. 1 Jun-30 Sep 80,

OCT 80

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

CONTRACT NO. AFOSR-80-0244

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-89-0504

UNCLASSIFIED REPORT

ABSTRACT: (U) A description of charge-transfer studies of HC1+ in Xe using a merging beams technique is given. Absolute and relative cross sections were obtained for collision energies from 0.01 to 870eV. The goal of this experimental program was to study selected chemi-ionization and ion-molecule reactions by merging-beams techniques to better understand the dynamics of such collisions and to provide data to assist in the formulation of theory. The relative energy of the reactants for these studies was varied from threshold to 10 or 20 eV. These studies give a clearer picture of the role played by the kinetic and internal energy of reactants at low relative energies. This is important for the development of advanced Air Force systems that require communication through either a naturally or artificially ionized atmosphere, for the development of propulsion systems for the Air Force, and for advancing the technology of lasers. (jhd)

DESCRIPTORS: (U) *CHARGE TRANSFER, *COLLISIONS, *HYDROGEN CHLORIDE, *XENON, AIR FORCE, ATMOSPHERES, ATOMS, CHEMICAL REACTIONS, CROSS SECTIONS, DYNAMICS, ENERGY, FORMULATIONS, INTERNAL, IONIZATION, IONS, KINETIC ENERGY, LASERS, LOW ENERGY, MOLECULES, PARTICLE COLLISIONS, PICTURES, PROPULSION SYSTEMS, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A4.

AD-A207 216

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 188 6/7 6/1 20/15

FLORIDA INST OF TECH MELBOURNE DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Investigation of Radio Frequency/Microwave Effects Upon the Central Nervous System.

DESCRIPTIVE NOTE: Final rept.,

JUN 80

PERSONAL AUTHORS: Shelton, W. W.

CONTRACT NO. AFOSR-79-0110

PROJECT NO. 2312

TASK NO. D9

MONITOR: AFOSR
TR-89-0519

UNCLASSIFIED REPORT

ABSTRACT: (U) A study to determine the effect of pulsed electromagnetic energy upon brain calcium behavior was undertaken. An innovative approach for loading the cerebral tissues with radiocalcium was introduced. Intraventricular injections through the skull placed Ca-45 solution directly into the right lateral ventricle. Two hours later companion frontal lobe samples were placed in separate glass breakers containing physiologic solution for a 20 min exposure to pulsed electromagnetic energy. An efflux value was calculated for each sample. A second experimental procedure involved whole-body irradiation of the animals two hours following the intraventricular injections. Animals were then irradiated with pulsed electromagnetic energy at a power density of 10 mW/cm squared, a pulse repetition frequency of 16 Hz, and carrier frequency of 2.45 GHz. Following exposure, frontal lobe and parieto-occipital tissue samples were taken and analysed for radioactivity. Statistical treatment of the first sets of experiments failed to reveal any perturbation in calcium efflux behavior. Data from the second set is still being evaluated. Keywords: Radiation effects. (kt)

DESCRIPTORS: (U) *CALCIUM, *ELECTROMAGNETIC RADIATION, *MICROWAVES, *RADIATION EFFECTS, ANIMALS, BRAIN, CARRIER

AD-A207 188

AD-A207 188 CONTINUED

FREQUENCIES, CENTRAL NERVOUS SYSTEM, CEREBRUM, ELECTROMAGNETIC PULSES, PHYSIOLOGY, PULSE RATE, RADIOACTIVITY, RADIOFREQUENCY, SKULL, SOLUTIONS(GENERAL), STATISTICS, TISSUES(BIOLOGY), WHOLE BODY IRRADIATION, NEUROCHEMISTRY.

IDENTIFIERS: (U) WUAFOSR2312D9, PE61102F.

AD-A207 188

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 187 12/1 20/4 7/4

RENSSELAER POLYTECHNIC INST TROY NY DEPT OF MATHEMATICAL SCIENCES

(U) Numerical Methods for Singularly Perturbed Differential Equations with Applications.

DESCRIPTIVE NOTE: Final rept.,

MAY 80

PERSONAL AUTHORS: Flaherty, Joseph E.

CONTRACT NO. AFOSR-75-2818

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-89-0520

UNCLASSIFIED REPORT

ABSTRACT: (U) During the course of this grant algorithms were developed and analyzed for the numerical solution of singularly-perturbed (or stiff) initial value and boundary value problems for ordinary differential equations and initial-boundary value problems for partial differential equations. These general purpose methods have been applied to a wide variety of problems arising in several disciplines, including optimization and optimal control, nonlinear oscillations, chemical reactions, and hydrodynamic stability. Keywords: Computations, Plane poiseville flow, Viscous flow. (kr)

DESCRIPTORS: (U) *PERTURBATION THEORY, *VISCOUS FLOW, BOUNDARY VALUE PROBLEMS, CHEMICAL REACTIONS, COMPUTATIONS, CONTROL, DIFFERENTIAL EQUATIONS, HYDRODYNAMICS, NONLINEAR SYSTEMS, NUMERICAL METHODS AND PROCEDURES, OPTIMIZATION, OSCILLATION, PARTIAL DIFFERENTIAL EQUATIONS, STABILITY.

IDENTIFIERS: (U) WUAFOSR2304A3, PE61102F, *Poiseuille flow, Initial value problems.

AD-A207 187

AD-A207 186 21/2

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF APPLIED MECHANICS AND ENGINEERING SCIENCES

(U) Fundamental Combustion Studies Related to Air-Breathing Propulsion.

DESCRIPTIVE NOTE: Final rept. 1 Jul 77-1 Jun 81,

SEP 81

PERSONAL AUTHORS: Williams, F. A.

CONTRACT NO. AFOSR-77-3362

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-89-0497

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall objective has been to develop further basic knowledge in combustion that will be useful for improving efficiencies and operating characteristics of propulsion system. Insufficient understanding of the basic mechanisms and processes involved in advanced air breathing combustors, lack of realistic guidelines for predicting characteristics of propulsion devices and of external burning, and a deficiency in methods of combustor design with acceptable pollutant emissions motivated the initiation of this research on advancing understanding of the combustion of fuels in air. (MJM)

DESCRIPTORS: (U) *AIR BREATHING ENGINES(UNCONVENTIONAL), *COMBUSTION, *PROPULSION SYSTEMS, AIR BREATHING, COMBUSTORS, EMISSION, FUELS, POLLUTANTS.

IDENTIFIERS: (U) WUAFOSR2308A2, PE61102F.

AD-A207 186

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 185 7/2 7/4

BOSTON UNIV MA

(U) Fluorescence Probes of Spectroscopic and Dynamical Aspects of Molecular Photoionization

DESCRIPTIVE NOTE: Final rept. 1 Jul 84-30 Jun 88,

NOV 88

PERSONAL AUTHORS: Poliakoff, Erwin D.

CONTRACT NO. AFOSR-84-0261

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-89-0473

UNCLASSIFIED REPORT

ABSTRACT: (U) Studies have been made of vibrationally resolved aspects of sh ape resonant excitation in the photoionization of N(2)O. This experiment was performed by generating dispersed fluorescence spectra from electronically excited photoions. These results are the first vibrationally resolved results on a polyatomic shape resonance. In vibrationally resolved measurements, different internuclear configurations are probed by sampling alternative vibrational levels of the ion. As a result, the continuum electron behavior can mapped out most clearly, and the qualitative aspects of the electron ejection can be understood clearly. A central motivation for studying polyatomic shape resonances is that alternative vibrational modes may be explored, revealing facets that are nonexistent for diatomic systems, which are the only systems that have been characterized previously. Nitrogen oxides. (MJM)

DESCRIPTORS: (U) *NITROGEN OXIDES, *PHOTOIONIZATION, APES, BEHAVIOR, DIATOMIC MOLECULES, DISPERSING, EJECTION, ELECTRONS, EXCITATION, FLUORESCENCE, MOLECULES, MOTIVATION, POLYATOMIC MOLECULES, PROBES, RESONANCE, SAMPLING, SHAPE, SPECTRA, VIBRATION.

IDENTIFIERS: (U) WUAFOSR2301A4, PE61102F.

AD-A207 185

AD-A207 161 11/6

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF MATERIALS SCIENCE AND ENGINEE RING

(U) High Temperature Oxidation Studies on Alloys Containing Dispersed Phase Particles and Clarification of the Mechanism of Growth of SiO2.

DESCRIPTIVE NOTE: Final rept. 15 Aug 85-31 Dec 88,

FEB 89 29P

PERSONAL AUTHORS: Yan, R.; Munn, B.; Simkovich, G.

CONTRACT NO. AFOSR-85-0298

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR
TR-89-0392

UNCLASSIFIED REPORT

ABSTRACT: (U) In most binary transition metal alloys, additions of Cr are used to promote the formation of a protective cr203 layer. Once formed, this layer acts as a barrier between the metal and its environment and, thereby, prolongs service life of the alloy. The ability to form such a layer depends upon a complex interaction of variables; the most influential being the concentration of Cr present in the alloy. In fact, there is a critical concentration of Cr, below which a complete, protective CR203 scale will not form. Under the severe conditions employed in this investigation, upwards of 18 weight percent Cr is required to form a protective layer in the binary Ni-Cr and Fe-Cr alloys. (JES)

DESCRIPTORS: (U) *BINARY ALLOYS, *OXIDATION, *TRANSITION METALS, ADVERSE CONDITIONS, CHROMIUM ALLOYS, DISPERSIONS, HIGH TEMPERATURE, INTERACTIONS, IRON ALLOYS, LAYERS, LIFE EXPECTANCY(SERVICE LIFE), NICKEL ALLOYS, PARTICLES, SILICON DIOXIDE, VARIABLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A2.

AD-A207 161

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 140 7/4 20/5

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Raman Study of Solid State Reactions.

DESCRIPTIVE NOTE: Final rept. 1 Sep 79-31 Aug 80,

AUG 80 11P

PERSONAL AUTHORS: Prasad, Paras N.

CONTRACT NO. F49620-79-C-0229

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-89-0503

UNCLASSIFIED REPORT

ABSTRACT: (U) The mechanisms and the reaction dynamics of several solid state reactions were investigated. The thermal rearrangement reaction of methyl-p-dimethylaminobenzene sulfonate (MSE) in pure crystal to form the product p-trimethylammonium benzene sulfonate Zwitterion (ZWT) was investigated during this period. Detailed studies of the phonon spectra as well as the internal vibration spectra were made as a function of the percentage rearrangement using polycrystalline samples as well as single crystals in different orientations. Solid state photodimerization of two modifications of trans-cinnamic acids in pure crystal was investigated. Also, the topotactic transformation reaction of iodobenzoyl peroxide was investigated. This reaction is thermally enhanced and yields a number of products. An important aspect of a dynamical model is to determine specificity in phonon induction of solid state reactions. In order that a large population of selective and coherent vibrational excitation can be achieved to study its effect on reactivity it is necessary that vibrational relaxation be slow. The dephasing of a localized internal vibration of the naphtalene crystal was investigated by studying the temperature dependence of the line width, the line shape and the line frequency. (AW)

DESCRIPTORS: (U) *SOLID STATE CHEMISTRY, *VIBRATIONAL SPECTRA, *CHEMICAL REACTIONS, *ORGANIC COMPOUNDS,

AD-A207 140

AD-A207 140 CONTINUED

COHERENCE, CRYSTALS, DYNAMICS, EXCITATION, FREQUENCY, INTERNAL, LINE SPECTRA, MODELS, MODIFICATION, PHONONS, POLYCRYSTALLINE, POPULATION, PURITY, RAMAN SPECTRA, REACTION KINETICS, REACTIVITIES, RELAXATION, RESPONSE, SAMPLING, SHAPE, SINGLE CRYSTALS, VIBRATION, WIDTH, THERMOCHEMISTRY, PHOTOCHEMICAL REACTIONS, DIMERS, SULFONATES, BENZENE, AMINES, METHYL RADICALS, AMMONIUM COMPOUNDS, NAPHTHALENES, PEROXIDES, RAMAN SPECTROSCOPY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3, Sulfonate/methyl-p-dimethylaminobenzene, Zwitterion, Photodimerization, Cinnamic acids, Peroxide/iodobenzoyl.

AD-A207 140

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 139 20/13

NATIONAL BUREAU OF STANDARDS GAITHERSBURG MD
THERMODYNAMICS DIV

(U) Thermodynamics of High Temperature Materials.

DESCRIPTIVE NOTE: Final rept. 1 Oct 78-30 Sep 79,

SEP 79 14P

PERSONAL AUTHORS: Abramowitz, Stanley

CONTRACT NO. AFOSR-79-0012

PROJECT NO. 2308

TASK NO. B1

MONITOR: AFOSR
TR-89-0506

UNCLASSIFIED REPORT

ABSTRACT: (U) Heat capacity, electrical resistivity, total hemispherical emittance of carbon composite (supplied by AFML), and palladium, radiance temperature at melting point of palladium, heat of fusion of niobium measured. Electrical system of pulse interferometer for thermal expansion and system for thermal diffusivity completed. Enthalpy measurements to 1200 K on Silicon nitride made. Analysis of silicon carbide completed and enthalpy measurements made to 770 K. Computer codes for direct sum technique to assess effect of vibrational thermodynamic functions completed and tested. Vibrational assessments for two silicon fluoride bromide species completed. Direct sum programs for thermodynamic functions for several Hund's coupling cases completed. (JES)

DESCRIPTORS: (U) *THERMODYNAMICS, CARBON, COMPUTER PROGRAMS, COUPLING(INTERACTION), DIFFUSIVITY, ELECTRICAL EQUIPMENT, ELECTRICAL RESISTANCE, EMITTANCE, ENTHALPY, FUNCTIONS, HEMISPHERES, HIGH TEMPERATURE, INTERFEROMETERS, MATERIALS, MEASUREMENT, MELTING POINT, NIOBIUM, PALLADIUM, PULSES, RADIANCE, SILICON CARBIDES, SILICON NITRIDES, SPECIFIC HEAT, TEMPERATURE, TEST AND EVALUATION, THERMAL EXPANSION, THERMAL PROPERTIES, VIBRATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308B1.

AD-A207 139

AD-A207 138 7/4 7/2

PITTSBURGH UNIV PA DEPT OF CHEMISTRY

(U) Measurement of Rate Constants of Elementary Gas Reactions of Importance to Upper Atmosphere and Combustion Systems.

DESCRIPTIVE NOTE: Final rept. 1 Jul 79-31 Aug 80,

AUG 80 9P

PERSONAL AUTHORS: Kaufman, Frederick

CONTRACT NO. F49620-79-C-0155

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-89-0505

UNCLASSIFIED REPORT

ABSTRACT: (U) Fortunately, a parallel research investigation on collosional relaxation of highly excited hydrogen chloride and hydrogen fluoride, formerly supported by the Advanced Research Projects administration, and a great scientific research and development interest to AFOSR was able to be continued with modest support from this contract and has provided valuable information on relaxation rate measurements for HCl (v= 1 to 7) colliding with a large number of other molecules and some preliminary rate measurements for HF (v= 1 to 7). The present report will therefore be subdivided into two sections dealing with these two topics, but it must be kept in mind that this is essentially a progress report covering the initial 14-months building up period of a major project. (mjm)

DESCRIPTORS: (U) *GASES, *HYDROGEN CHLORIDE, *HYDROGEN FLUORIDE, *CHEMICAL REACTIONS, COMBUSTION, CONSTANTS, MEASUREMENT, MOLECULES, RATES, RELAXATION, UPPER ATMOSPHERE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

AD-A207 138

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 137 6/5 6/13 6/11

BRIGHAM YOUNG UNIV PROVO UTAH DEPT OF MICROBIOLOGY

(U) Effect of Chemical Mutagens on Herpes Virus - Induced Cellular Transformation and Testing for Mutagenesis in Mouse Cells.

DESCRIPTIVE NOTE: Final rept. 1 Jun 79-31 May 80,

MAY 80 14P

PERSONAL AUTHORS: Johnson, F. B.

CONTRACT NO. F49620-79-C-0116

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR
TR-89-0522

UNCLASSIFIED REPORT

ABSTRACT: (U) Assays which detect quantitative increases of morphological transformation in 3T3 cells were employed to detect transformation by seven temperature sensitive mutants of herpes simplex type 2 virus. It was determined that all seven mutants caused transformation at the non-permissive temperature. Mutant A8 (293) caused formation of the most foci an appeared to be a more sensitive indicator of transformation in comparative experiments (31 foci per million cells compared to four foci per million cells for ultraviolet-irradiated wild type virus). Mutagenesis experiments using THO cells as indicator cells suggested that even after metabolic activation of the test chemicals this cell system does not provide an adequately sensitive test for mutagenesis. In additional experiments, further information was obtained which showed enhancement of transformation by hydrazine and 1,2-dimethylhydrazine of cells exposed to irradiated virus. Significant enhancement occurred in these in vitro tests only when the cells were exposed to the ch.·ical 24 hours prior to virus infection. (kt/aw)

DESCRIPTORS: (U) *HERPETIC VIRUSES, *PHYSIOLOGICAL EFFECTS, *MUTAGENS, *MUTATIONS, ACTIVATION, CELLS(BIOLOGY), CHEMICALS, HYDRAZINES, IN VITRO ANALYSIS, INDICATORS, IRRADIATION, METABOLISM, MICE, MORPHOLOGY, SENSITIVITY,

AD-A207 137

AD-A207 137 CONTINUED

TEMPERATURE, TEST AND EVALUATION, TEST EQUIPMENT, TEST METHODS, TRANSFORMATIONS, VIRUS DISEASES, VIRUSES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A5.

AD-A207 137

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 136 7/2

BATTELLE MEMORIAL INST COLUMBUS OH COLUMBUS LABS

(U) Kinetics of Ni(CO)4 Formation.

DESCRIPTIVE NOTE: Final rept. 1 Oct 76-30 Sep 80,

NOV 80 43P

PERSONAL AUTHORS: Redmon, Lynn T.

CONTRACT NO. F49620-77-C-0004

PROJECT NO. 2301

TASK NO. A5

MONITOR: AFOSR
TR-89-0509

UNCLASSIFIED REPORT

ABSTRACT: (U) The interaction of Carbon Monoxide with a nickel (100) surface was examined theoretically via semi-empirical calculations. The energetics of nickel clusters (of 1 to 18 atoms0 interacting with 1 to 3 CO molecules were examined. A model for the high coverage regime of CO on Ni(100) was developed. Studies with this model suggested that nickel dicarbonyl might be the desorbing species initially formed in the carbonylation process. Preliminary transition state calculations of an empirical nature indicated a large activation energy requirement for formation via a nickel monocarbonyl intermediate. Bonding of a single CO (low coverage regime) was examined on (100), (110), and (111) surfaces of nickel. In general, sites allowing multiple coordination were preferred. Nickel. (MJM)

DESCRIPTORS: (U) *CARBON MONOXIDE, *INTERACTIONS, *NICKEL, *TRANSITIONS, ACTIVATION ENERGY, CLUSTERING, COMPUTATIONS, ENERGETIC PROPERTIES, ENERGY CONSUMPTION, SURFACES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A5.

AD-A207 136

AD-A207 131 6/4 5/8

KANSAS UNIV LAWRENCE

(U) Demodulation Processes in Auditory Perception.

DESCRIPTIVE NOTE: Final rept. 1 Dec 87-30 Nov 88, annual rept. 1 Dec 87-30 Nov 88,

JAN 89 29P

PERSONAL AUTHORS: Feth, Lawrence L.

CONTRACT NO. AFOSR-87-0091

PROJECT NO. 2313

TASK NO. A6

MONITOR: AFOSR
TR-89-0468

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Ohio State Univ. Research Foundation, Columbus, OH.

ABSTRACT: (U) The overall goal of this project is to understand the ability of the human listener to extract information from complex, time-varying sounds such as speech, music or other environmentally important signals. Specifically, we are interested in the listener's ability to process modulations of frequency and amplitude which are thought to carry the information in such signals. To that end we have devised a signal-processing model that calculates the Envelope-Weighted Average of the Instantaneous Frequency (EWAIF) for complex, time-varying signals. We initiated a series of experiments to test the performance of the new EWAIF model. Listeners were asked to discriminate between two frequency modulated tones. Testing of normal listeners in the frequency glide vs multiple-step transition task has indicated that the normal ear has a temporal window of approximately 7 to 10 msec. Further, these results appear to indicate that the critical band, thought to be ubiquitous in peripheral processing, has no effect on the listeners' discriminations of sub-critical, critical or supra-critical bandwidth swept frequency signals. (AW)

DESCRIPTORS: (U) *AUDITORY PERCEPTION, *DEMODULATION,

AD-A207 131

AD-A207 131 CONTINUED

AUDIO TONES, EAR, FREQUENCY, FREQUENCY MODULATION, MODELS, MUSIC, PROCESSING, SIGNAL PROCESSING, SIGNALS, SOUND, SPEECH, TIME, VARIATIONS, AMPLITUDE MODULATION, DISCRIMINATION.

IDENTIFIERS: (U) WUAFOSR2313A6, PE61102F.

AD-A207 130 6/11

MICHIGAN STATE UNIV EAST LANSING DEPT OF PEDIATRICS/ HUMAN DEVELOPMENT

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

DESCRIPTIVE NOTE: Final rept. 15 Feb 86-28 Feb 89,

MAR 89 24P

PERSONAL AUTHORS: Trosko, James E.

CONTRACT NO. AFOSR-86-0084

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR TR-89-0455

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall goal of this grant has been to study the mechanisms by which non-genotoxic chemicals act. Specifically, the working hypothesis has been that chemical modulation of gap junctions could lead to many toxic endpoints, such as teratogenesis, tumor promotion, immune-reproductive- and neuro-toxicities. To test this hypothesis, we set up several aims: a) to develop new methods to measures to measure gap junction function (Fluorescence Recovery After Photo-bleaching and scrape-loading/dye transfer); b) to test if several known model non-genotoxic chemicals inhibit intercellular communication in several cell types; and c) to study the biochemical mechanisms by which various chemicals inhibit intercellular communication. Results of this 3 year study have produced a) three new validated in vitro methods to measure gap junction; b) produced overwhelming evidence that known non-genotoxic teratogens, tumor promoters, neuro-, and reproductive-toxicants can inhibit gap junction function; c) evidence suggesting several biochemical mechanisms by which these chemicals act; and d) helped develop a new theoretical framework for a biologically-based risk assessment model system. (AW)

DESCRIPTORS: (U) *CELLS(BIOLOGY), *CYTOCHEMISTRY, *TOXIC AGENTS, *TOXICITY, BIOCHEMISTRY, CHEMICAL REACTIONS,

AD-A207 130 CONTINUED

CHEMICALS, FLUORESCENCE, HYPOTHESES, INHIBITION, MODULATION, NEOPLASMS, RECOVERY, TERATOGENIC COMPOUNDS, RISK.

IDENTIFIERS: (U) WUAFOSR2312A5, PE61102F, *Gap junctional intercellular communication, *Intercellular communication, Gap junctions, *Nongenotoxic chemicals.

AD-A207 130

AD-A207 129 5/8

VIRGINIA UNIV CHARLOTTESVILLE DEPT OF PSYCHOLOGY

(U) Perceptual Constraints on Understanding Physical Dynamics.

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

FEB 89 35P

PERSONAL AUTHORS: Proffitt, Dennis R.; Gilden, David L.

CONTRACT NO. AFOSR-88-0238

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR TR-89-0452

UNCLASSIFIED REPORT

ABSTRACT: (U) When making dynamical judgements, people can make effective use of o nly one salient dimension of information present in the event. People do not make dynamical judgements by deriving multidimensional quantities. Thus, the adequacy of dynamical judgements depends on the degree of dimensionality that is both 1) inherent in the physics of the event, and 2) presumed to be present by the observer. Support for this proposal was found in studies of people's dynamical understandings of 1) wheels, 2) volume displacements (Archimedes Principle), 3) the surface orientation of liquids, and 4) collisions. Additional support was found in a review of the 'Intuitive Physics' literature. Finally, studies of apparent motion indicate that the basic representation of object motions is not dynamical. Keywords: Motion perception; Naive physics; Cognition; Dynamics; Intuitive physics. (JHD)

DESCRIPTORS: (U) *DYNAMICS, *PERCEPTION, *PHYSICS, COGNITION, DISPLACEMENT, JUDGEMENT(PSYCHOLOGY), MOTION, PHYSICAL PROPERTIES, QUANTITY, SIZES(DIMENSIONS), VOLUME.

IDENTIFIERS: (U) WUAFOSR2313A4, PE61102F, Archimedes principle.

AD-A207 129

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 128 11/2

MATERIALS RESEARCH SOCIETY PITTSBURGH PA

(U) Symposium: Better Ceramics Through Chemistry III. Volume 121.

DESCRIPTIVE NOTE: Final rept. 1 Apr 88-31 Mar 89,

AUG 88 5P

PERSONAL AUTHORS: Brinker, C. J.; Clark, David E.; Ulrich, Donald R.

CONTRACT NO. AFOSR-88-0145

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-89-0444

UNCLASSIFIED REPORT

ABSTRACT: (U) This third Materials Research Society MRS symposium on Better Ceramics Through Chemistry was held April 5-9, 1988 in Reno, Nevada. It was intended to unite chemists and physicists with ceramists and material scientists in order to synthesize new and better ceramic materials by solution routes involving molecular precursors. Principal topics included sol-gel routes for preparing oxides, powder processing, and non-oxides. This symposium was distinguished from the prior ones by emphasizing thin film formation, high T sub C superconductors, and in-situ methods of characterization. Keywords: Thin films; Thick films; Ceramics; Nuclear magnetic resonance; Zeolite gel composits. (KT)

DESCRIPTORS: (U) *CERAMIC MATERIALS, *CHEMICAL ENGINEERING, CHEMISTRY, MOLECULES, NEVADA, NUCLEAR MAGNETIC RESONANCE, OXIDES, POWDERS, PRECURSORS, PROCESSING, SOLUTIONS(GENERAL), SUPERCONDUCTORS, SYMPOSIA, SYNTHESIS, THICK FILMS, THIN FILMS.

IDENTIFIERS: (U) WUAFOSR2303A3, PE61102F.

AD-A207 127 5/8

SOUTH CAROLINA UNIV COLUMBIA DEPT OF PSYCHOLOGY

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

DESCRIPTIVE NOTE: Final rept. 1 Jan 87-30 Dec 88,

FEB 89 23P

PERSONAL AUTHORS: Engle, Randall W.

CONTRACT NO. AFOSR-87-0069

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR TR-89-0464

UNCLASSIFIED REPORT

ABSTRACT: (U) This article describes a research program addressing several issues about the role of individual differences in working memory and reading comprehension. The studies show a strong positive relationship between measures of working memory capacity and higher level measures of comprehension. More importantly, this relationship does not require that the working memory measure be a form of the comprehension measure. At least one variable known to be important in simple word span, word length, is also important to the complex working memory measures used here and elsewhere and this has important implications for theories about the link between working memory and higher level tasks, at least those of a verbal nature. (sdw)

DESCRIPTORS: (U) *COMPREHENSION, *MEMORY DEVICES, *READING, ADDRESSING, CAPACITY(QUANTITY), LENGTH, WORDS(LANGUAGE).

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

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 121 12/3

MASSACHUSETTS UNIV AMHERST DEPT OF MATHEMATICS AND STATISTICS

(U) Nonparametric Test of Independence for Censored Data.

DESCRIPTIVE NOTE: Final rept.,

JUN 80 6P

PERSONAL AUTHORS: Korwar, Ramesh

CONTRACT NO. F49620-79-C-0105

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR
TR-89-0491

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: See also AD-A090 330.

ABSTRACT: (U) In an effort to widen the area of applicability of the self-consistent estimator of a bivariate survival distribution developed earlier to more complex situations, the following situation of double censoring was considered. The Nonparametric Estimation of a Bivariate Survivorship Function with Doubly Censored Data: Frequently are doubly censored-that is, some of the data may be censored on the left (late entries) some on the right (losses) while some others may be uncensored (deaths). Keywords: Computations, Iterations. (kr)

DESCRIPTORS: (U) *BIVARIATE ANALYSIS, *NONPARAMETRIC STATISTICS, COMPUTATIONS, CONSISTENCY, PROBABILITY DISTRIBUTION FUNCTIONS, ESTIMATES, SURVIVAL(GENERAL).

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5, Self consistent estimators, *Censored data, Doubly censored data.

AD-A207 121

AD-A207 120 7/4 21/2 21/4

DEPARTMENT OF ENERGY BARTLESVILLE OK BARTLESVILLE ENERGY TECHNOLOGY CENTER

(U) Thermodynamics of Organic Compounds.

DESCRIPTIVE NOTE: Final rept. 1 Oct 79-30 Sep 80,

80 28P

PERSONAL AUTHORS: Good, W. D.

CONTRACT NO. AFOSR-ISSA-80-00004

PROJECT NO. 2308

TASK NO. B1

MONITOR: AFOSR
TR-89-0513

UNCLASSIFIED REPORT

ABSTRACT: (U) This research program consists of an integrated and interrelated effort of basic and applied research in chemical thermodynamics and thermochemistry. Knowledge of variation of physical and thermodynamic properties with molecular structure is used to select compounds for study that because of high ring strain or unusual steric effects may have good energy characteristics per unit volume or per unit mass and thus be useful in the synthesis of high energy fuels. These materials are synthesized, and their thermodynamic properties are evaluated. In cooperation with researchers at Wright-Patterson Air Force Base, ramjet fuels currently in use are subjected to careful thermodynamic evaluation by measurements of heat capacity, enthalpy of combustion and vapor pressure. Keywords: Ramjet fuels; Ring compounds; Combustion; Enthalpy; Hydrocarbons; High energy fuels. (KT)

DESCRIPTORS: (U) *FUELS, *HIGH ENERGY, *THERMOCHEMISTRY, *THERMODYNAMIC PROPERTIES, CHEMICALS, COMBUSTION, CYCLIC COMPOUNDS, ENERGY, ENTHALPY, HYDROCARBONS, MASS, MOLECULAR STRUCTURE, ORGANIC COMPOUNDS, RAMJET ENGINES, RINGS, SPECIFIC HEAT, SYNTHESIS, TEST AND EVALUATION, THERMODYNAMICS, VAPOR PRESSURE, VOLUME.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308B1, Ring conpounds,

AD-A207 120

AD-A207 120 CONTINUED

*High energy fuels, Ramjet fuels.

AD-A207 115 12/2

WASHINGTON UNIV SEATTLE DEPT OF AERONAUTICS AND ASTRONAUTICS

(U) Resonance in Weakly Nonlinear Systems.

DESCRIPTIVE NOTE: Final rept.,

MAY 80 3P

PERSONAL AUTHORS: Kevorkian, J.

CONTRACT NO. F49620-79-C-0141

PROJECT NO. 2340

TASK NO. A4

MONITOR: AFOSR
TR-89-0521

UNCLASSIFIED REPORT

ABSTRACT: (U) Contents: 1)Adiabatic Invariants for Nearly Periodic Hamiltonian Systems Passing through Resonance; 2) Passage through Resonance; 3) Resonant Wave Interactions; 4) Entry Dynamics. Keywords: Mathematical models. (kr)

DESCRIPTORS: (U) *NONLINEAR SYSTEMS, *RESONANCE, HAMILTONIAN FUNCTIONS, INTERACTIONS, MATHEMATICAL MODELS, WAVES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2340A4, Weakly nonlinear systems.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 114 7/2 7/4

ILLINOIS UNIV AT URBANA CENTER FOR SUPERCOMPUTING RESEARCH AND DEVELOPMENT

(U) Alkali-Rare Gas and Metal Halide Molecules as Potential Visible Lasers.

DESCRIPTIVE NOTE: Final rept. 1 Oct 79-30 Sep 80,

OCT 80 28P

PERSONAL AUTHORS: Eden, J. G.

CONTRACT NO. AFOSR-79-0138

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR TR-89-0494

UNCLASSIFIED REPORT

ABSTRACT: (U) The major goal of this research effort is to identify those members of the alkali rare gas and metal halide molecular families which show promise as efficient, powerful and practical visible lasers. Laser photodissociation of polyatomic molecules and self sustained discharge pumping are the primary tools being used to demonstrate lasing from these molecules. (MJM)

DESCRIPTORS: (U) *ALKALI METAL COMPOUNDS, *LASERS, *POLYATOMIC MOLECULES, *RARE GASES, HALIDES, METALS, MOLECULES, PHOTODISSOCIATION, PUMPING, TOOLS, VISIBILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1.

AD-A207 114

AD-A207 113 11/4

NEW YORK UNIV NY COURANT INST OF MATHEMATICAL SCIENCES

(U) Effective Behavior of Composite Materials.

DESCRIPTIVE NOTE: Final rept.,

JUL 80 5P

PERSONAL AUTHORS: Papanicolaou, George C.

CONTRACT NO. F49620-79-C-0153

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR TR-89-0523

UNCLASSIFIED REPORT

ABSTRACT: (U) The following four problems have been analyzed in detail. First, the effective heat removal rate for an insulating screen with many small holes has been computed. Second, the motion of a particle in a random force field has been analyzed. This is a simplified model for the study of conductivity of a solid with impurities where a high energy conduction electron is modelled by a classical particle and the impurities by a random force field. Third, nonlinear effects in the calculation of effective dielectric constants of composites (periodic and random) have been calculated. Fourth, we have analyzed the nature of the self-focusing singularity of a nonlinear beam in three dimensions. My research objectives and work are as follows: (i) Calculation of properties of boundaries and interfaces of composite materials. (ii) Wave propagation, heat conduction and other transport or dynamic effects in materials with amorphous or random structure and their effective macroscopic description. (iii) Linear and nonlinear electromagnetic effects in composites.

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *ELECTROMAGNETIC PROPERTIES, AMORPHOUS MATERIALS, CONDUCTIVITY, CONSTANTS, DIELECTRIC PROPERTIES, DYNAMICS, ELECTRICAL CONDUCTIVITY, ELECTRONS, FOCUSING, HEAT, HIGH ENERGY, HOLES(OPENINGS), IMPURITIES, INTERFACES, LINEARITY, MODELS, NONLINEAR SYSTEMS, PARTICLES, RATES, REMOVAL, SELF OPERATION.

AD-A207 113

AD-A207 113 CONTINUED

SIMPLIFICATION, THERMAL CONDUCTIVITY, WAVE PROPAGATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A4.

AD-A207 112 12/2

FLORIDA UNIV GAINESVILLE DEPT OF MATHEMATICS

(U) Some Remarks on Reachability of Infinite-Dimensional Linear Systems.

DESCRIPTIVE NOTE: Interim rept.,

MAR 79 18P

PERSONAL AUTHORS: Yamamoto, Yutaka

CONTRACT NO. DAAG29-77-G-0225, $AFOSR-76-3034

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-89-0486

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper we shall be concerned with the question of reachability when allowing distribution inputs. We show that a certain class of systems accept distribution inputs, but, in general they cannot be exactly reachable. We shall also consider the problem of the uniqueness of canonical realizations in relation to exact reachability, and show that Matsuo's result on uniqueness does not apply to the example given in Baras, Brockett, and Fuhrmann.

DESCRIPTORS: (U) *LINEAR SYSTEMS, INFINITE SERIES, DISTRIBUTION, INPUT, SIZES(DIMENSIONS).

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 111 20/4

TEXAS UNIV AT AUSTIN DEPT OF MECHANICAL ENGINEERING

(U) Potential Complex-Lamellar Decomposition of Fluid Flows.

DESCRIPTIVE NOTE: Final rept.,

JUN 80 4P

PERSONAL AUTHORS: Panton, Ronald L.

CONTRACT NO. AFOSR-79-0081

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR TR-89-0517

UNCLASSIFIED REPORT

ABSTRACT: (U) Application of the potential complex-lamellar decomposition to the velocity field of a fluid flow was investigated. It was hoped that this decomposition would aid in understanding flows where both irrotational and vortical motions are occurring simultaneously (turbulence, aerodynamic noise, three-dimensional boundary layers). After considerable preliminary study it was found that the basic premise of the work was invalid. This result means that the flexibility of the decomposition is not as great as anticipated, and that further work on three-dimensional flows with viscous is not appropriate. Work on applying the decomposition to inviscid, vortical, three-dimensional flows (plasms) is being pursued by other researchers. (edc)

DESCRIPTORS: (U) *FLUID FLOW, AERODYNAMIC NOISE, BOUNDARY LAYER, DECOMPOSITION, INVISCID FLOW, THREE DIMENSIONAL FLOW, TURBULENCE, VELOCITY, VORTICES.

IDENTIFIERS: (U) Plasms, PE61102F, WUAFOSR2304A4.

AD-A207 111

AD-A207 110 12/2

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

(U) Applications of Graph Theory and System Theory to Large Scale Systems.

DESCRIPTIVE NOTE: Final rept.,

JUL 80 9P

PERSONAL AUTHORS: Roberts, Fred S.; Sontag, Eduardo D.

CONTRACT NO. F49620-79-C-0117

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR TR-89-0515

UNCLASSIFIED REPORT

ABSTRACT: (U) In graph theory, the minimum cardinality (infimum measure) of set colorings, phasings, and intersection assignments has been studied for the important cases where there is no restriction on the sets, where each set is a real interval, and where each set is a consecutive set of integers. The maximum cardinality score (supremum measure score) has also been studied in these cases. Progress has included the development of general procedures, explicit formulas, and efficient algorithms. Related work has explored a series of ultimate numbers related to the n-chromatic numbers, and the structural characterization of certain classes of graphs of boxicity at most 2, which generalize the interval graphs. In system theory, a computationally oriented approach to nonlinear system regulation has been developed, based on the notion of piecewise-linear systems. The necessary algebraic concepts had to be themselves developed during the course of the research. New designs and theoretical results were obtained also for the control and observation of parametrized families of systems, and for delay and other well-known types of systems. (KR)

DESCRIPTORS: (U) *SYSTEMS ANALYSIS, *GRAPHS, *THEORY, ALGEBRA, ALGORITHMS, EFFICIENCY, INTERVALS, NONLINEAR

AD-A207 110

AD-A207 110 CONTINUED

SYSTEMS, NUMBERS, REGULATIONS, SYSTEMS ANALYSIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A6, Large scale systems.

AD-A207 109 20/4

CALIFORNIA UNIV LOS ANGELES DEPT OF MATHEMATICS

(U) Transonic Aerodynamics.

DESCRIPTIVE NOTE: Final rept.,

AUG 80 2P

PERSONAL AUTHORS: Cole, Julian; Cook, L. P.; Ziegler, F.

CONTRACT NO. F49620-79-C-0162

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR
TR-89-0516

UNCLASSIFIED REPORT

ABSTRACT: (U) A study has been made of finite span wings flying at the speed of sound. The general form of inner and outer expansions in terms of B = reduced aspect ratio has been deduced. Suitable far field and near field expansions have been constructed and matched asymptotically. A new integral formula for the essential physical scale of the problem has been derived. (edc)

DESCRIPTORS: (U) *WINGS, *TRANSONIC FLOW, AERODYNAMICS, ASPECT RATIO, FAR FIELD, FORMULAS(MATHEMATICS), NEAR FIELD, PHYSICAL PROPERTIES, SCALE, TRANSONIC CHARACTERISTICS.

IDENTIFIERS: (U) Finite span wings, PE61102F, WUAFOSR2304A4.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 108 12/4

ILLINOIS UNIV AT CHICAGO CIRCLE DEPT OF MATHEMATICS

(U) Design of Experiments and Reliability Models.

DESCRIPTIVE NOTE: Final scientific rept.,

AUG 80 10P

PERSONAL AUTHORS: Hedayat, A.

CONTRACT NO. AFOSR-76-3050

PROJECT NO. 3204

TASK NO. A5

MONITOR: AFOSR
TR-89-0518

UNCLASSIFIED REPORT

ABSTRACT: (U) Our research efforts have been concentrated on two main areas: Design of experiments and Reliability. In the area of design of experiments we have studied problems of data collection relevant to virtually all Air Force technical areas. There is a strong need in the Air Force to reduce costs and save time in the collection of large amounts of data. The reduction in costs and time should be done clearly without any damage to the statistical quality of the data being collected. Our research problems not only add to our store of knowledge about multifacet of data collection and data analysis in general, but they have immediate applications to many important problems which the United States Air Force is faced with. In the area of reliability our efforts have been mainly directed towards developing comprehensive treatments of various reliability models which have useful applications in determining and improving levels of performance and reliabilities of complex systems and their components. These models include: 1) A simple model in structural reliability which has applications in various areas such as inventory depletion, urn models, etc.; 2) Multivariate life distributions useful in modeling system with dependent components; and 3) Multistate (Degradable) Coherent Systems. (KR)

DESCRIPTORS: (U) *EXPERIMENTAL DESIGN, *MATHEMATICAL

AD-A207 108

AD-A207 108 CONTINUED

MODELS, *RELIABILITY, AIR FORCE, COHERENCE, DATA ACQUISITION, DATA PROCESSING, DEPLETION, INVENTORY, LIFE EXPECTANCY(SERVICE LIFE), MULTIVARIATE ANALYSIS, QUALITY, STATISTICS, STRUCTURAL PROPERTIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR3204A5.

AD-A207 108

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 093 12/1

CONNECTICUT UNIV STORRS DEPT OF MATHEMATICS

(U) Convergence and Performance of Synchronous and Asynchronous Parallel and Conventional Iterative Methods.

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

FEB 89 6P

PERSONAL AUTHORS: Neumann, Michael

REPORT NO. 1171-000-22-00211-06-194

CONTRACT NO. AFOSR-88-0047

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-89-0327

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *SIMULTANEOUS EQUATIONS, ITERATIONS, SOLUTIONS(GENERAL), ALGORITHMS, COMPUTERIZED TOMOGRAPHY, IMAGE PROCESSING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3, Kaczmarz algorithm.

AD-A207 093

AD-A207 092 1/1 12/1 20/4

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG INTERDISCIPLINARY CENTER FOR APPLIED MATHEMATICS

(U) State Space Models for Aeroelastic and Viscoelastic Systems.

DESCRIPTIVE NOTE: Technical rept. 1 Jan-31 Dec 88,

FEB 89 5P

PERSONAL AUTHORS: Herdman, T. L.

CONTRACT NO. AFOSR-88-0074

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR
TR-89-0380

UNCLASSIFIED REPORT

ABSTRACT: (U) Dynamic modeling of various aeroelastic control systems require at some point in the derivation of the model an application of Soehngen's inversion formula for finite Hilbert transforms to obtain a desired representation for the solution of the airfoil equation. Conditions on initial data to guarantee well-posedness of the resulting model equations must be matched with those needed to justify the validity of the inversion formula. We showed that this compatibility can be achieved by assuming that the circulation history belongs to a weighted L2 space. The resulting state space formulation provides a suitable setting for control design for the aeroelastic system. Keywords: Mathematical models; Mathematical formulas; Aerodynamic control surfaces; Dynamic response.

DESCRIPTORS: (U) *AERODYNAMIC CONTROL SURFACES, *AEROELASTICITY, *DYNAMIC RESPONSE, *VISCOELASTICITY, AIRFOILS, CIRCULATION, CONTROL SYSTEMS, DYNAMICS, FORMULAS(MATHEMATICS), FORMULATIONS, INVERSION, MATHEMATICAL MODELS, MODELS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A9, Soehngen inversion formula, Finite Hilbert transforms.

AD-A207 092

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 086 12/5

COLORADO STATE UNIV FORT COLLINS DEPT OF MATHEMATICS

(U) Data Fitting.

DESCRIPTIVE NOTE: Final rept. 1 Jul 79-30 Jun 80,

80 4P

PERSONAL AUTHORS: Taylor, Gerald D.

CONTRACT NO. F49620-79-C-0124

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-89-0500

UNCLASSIFIED REPORT

ABSTRACT: (U) The objectives of this research were to study and develop numerical software for the efficient representation of numerical data in digital computers. This effort includes the testing of existing numerical software to identify effective strategies and methodologies, the development of new algorithms and hybrid algorithms from existing algorithms, and the development of numerical software that imposes specific side conditions on the approximants. (KR)

DESCRIPTORS: (U) *DATA REDUCTION, *FITTING FUNCTIONS(MATHEMATICS), ALGORITHMS, COMPUTER PROGRAMS, EFFICIENCY, DIGITAL COMPUTERS, HYBRID SYSTEMS, NUMERICAL ANALYSIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR, *Data fitting, *Numerical data representation.

AD-A207 086

AD-A207 085 11/6.2 11/6

ILLINOIS UNIV AT URBANA DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) Al and Mg Alloys for Aerospace Applications Using Rapid Solidification and Powder Metallurgy Processing.

DESCRIPTIVE NOTE: Final technical rept.,

MAR 89 99P

PERSONAL AUTHORS: Fraser, Hamish L.

CONTRACT NO. AFOSR-85-0191

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR
TR-89-0401

UNCLASSIFIED REPORT

ABSTRACT: (U) The work performed during the past three years has involved studies of some elevated temperature Aluminum and Magnesium alloys, and in addition a preliminary study of intermetallic compounds based on Al3X, where X is Ti, V, and Ni+Ti. In the case of the AL alloys, this work was in essence a continuation of the work performed during the preceeding three years of study, where rapid solidification processing (RSP) of AL alloys was investigated. Two areas were investigated, one involving alloys which might exhibit high elastic moduli, and the second concerned the improvement in fracture toughness when Si is added to AL-Fe-Mo alloys. It was found that the modulus increases AL-Be alloys processed by rapid solidification were as expected from theory, whereas those for AL-Mn alloys were somewhat below expectation. This latter result was attributed to casting porosity present in our samples. In terms of the AL-8Fe-2Mo-Si alloys (where both 0.5% and 1.0% si have been added), the development of microstructure following RSP has been studied in alloys with, and without, the Si additions. The presence of Si resulted in the information of the compound alpha-ALFeSi, with space group determined to be Im3 by convergent beam electron diffraction. The morphology of the precipitates of this compound were found to be approximately spherical and when compared

AD-A207 085

AD-A207 085 CONTINUED

with the lenticular precipitates in the case of consolidated Al-8Fe-2Mo, this shape is thought to account for the difference in fracture toughness results. Keywords: Powder metallurgy, Powder compaction. (aw)

DESCRIPTORS: (U) *ALUMINUM ALLOYS, *MAGNESIUM ALLOYS, *POWDER METALLURGY, *SOLIDIFICATION, AEROSPACE SYSTEMS, ALLOYS, ALUMINUM, CASTING, COMPACTING, CONVERGENCE, ELECTRON DIFFRACTION, FRACTURE(MECHANICS), HIGH TEMPERATURE, INTERMETALLIC COMPOUNDS, MANGANESE ALLOYS, MODULUS OF ELASTICITY, MORPHOLOGY, POROSITY, POWDERS, PRECIPITATES, PROCESSING, QUICK REACTION, TOUGHNESS, NICKEL, BERYLLIUM, IRON, MOLYBDENUM, SILICON.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A1.

AD-A207 055 20/6 9/3

FLORIDA UNIV GAINESVILLE SPACE ASTRONOMY LAB

(U) The Interaction of Solid Particles with Laser Beams.

DESCRIPTIVE NOTE: Final rept.,

APR 89 108P

PERSONAL AUTHORS: Misconi, Nebil Y.; Rusk, Edwin T.; Oliver, John P.

CONTRACT NO. F49620-85-C-0117

PROJECT NO. 2306

TASK NO. A2

MONITOR: AFOSR TR-89-0475

UNCLASSIFIED REPORT

ABSTRACT: (U) Light scattering curves of intensity vs. scattering angle were made of 1) layers of transparent silica particles, 2) single silica particles isolated by optical levitation; using an Argon ion laser light source and a goniometer mounted silicon photodiode detector. Scattering measurements of spherical particles demonstrated an excellent agreement with Mie theory. Spheroids and irregular particles were also measured. Dynamics of particles in a space environment were studied both theoretically, and experimentally inside a 10 to the -7th power Torr vacuum chamber. Research in this area will be continued to determine the effective moment arm of optically induced particle rotation. Keywords: Laser beam, Particle interaction, Light scattering, Laser particle levitation. (JHD)

DESCRIPTORS: (U) *LASER BEAMS, *LIGHT SCATTERING, ANGLES, DYNAMICS, INTERACTIONS, ARGON LASERS, MEASUREMENT, PARTICLES, SCATTERING, SILICON DIOXIDE, SOLIDS, SPACE ENVIRONMENTS, SPHERES, TRANSPARENCE, VACUUM CHAMBERS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A2, Argon ion lasers.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 054 7/4 9/3 20/9

ILLINOIS UNIV AT URBANA DEPT OF MECHANICAL AND INDUSTRIAL ENGINEERING

(U) Spectroscopic Diagnostics of Electron Temperature and Energy Conversion Efficiency of Laser-Sustained Plasma in Flowing Argon.

DESCRIPTIVE NOTE: Rept. for 1 Sep 87-8 Aug 88,

AUG 88 91P

PERSONAL AUTHORS: Mazumder, J., Krier, H.; Chen, X.

REPORT NO. UILU-ENG-88-4014

CONTRACT NO. AFOSR-87-0169, $\FOSR-88-0129

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-89-0442

UNCLASSIFIED REPORT

ABSTRACT: (U) Laser sustained plasmas are often formed during laser materials interaction. The University's 10 kW CW CO2 laser has been used to study argon plasmas for the application to laser supported propulsion and laser materials processing. The spectroscopic diagnostic method has been applied to study laser-sustained plasmas in 1 atmosphere pure argon gas flow with an f/7 on-axis laser focusing scheme. High flow speeds of 2 to 10 m/sec are achieved. Plasma electron temperatures distributions are determined from the 415.8 nm ArI line and its adjacent continuum intensities. Plasma core temperatures as high as 20,000 K are reported. The total absorption of the incident laser power and the radiation loss by the plasma are calculated from the temperature distribution. Results indicated that up to 86 percent of the incident laser power can be absorbed and nearly 60 percent of the incident laser power can be retained by the flowing argon gas to provide thrust. Further research is called for in the laser induced fluorescence (LIF) technique for diagnostics of the downstream mixing zone and the plasma outer region. Experiments over a wider range of operating conditions, as well as multiple plasma testings, are

AD-A207 054

AD-A207 054 CONTINUED

required to find the optimum operating scheme. Keywords: Laser sustained plasmas, Spectroscopy, Plasmas, Beamed energy conversion. (MJM)

DESCRIPTORS: (U) *ARGON, *GAS FLOW, *LASER INDUCED FLUORESCENCE, *LASERS, *PLASMAS(PHYSICS), ABSORPTION, CORES, DIAGNOSIS(GENERAL), DISTRIBUTION, EFFICIENCY, ELECTRON ENERGY, ELECTRONS, ENERGY CONVERSION, FLOW, HIGH RATE, HIGH VELOCITY, INTENSITY, INTERACTIONS, LASER MATERIALS, LOSSES, MIXING, POWER, PROCESSING, PROPULSION SYSTEMS, RADIATION, SPECTROSCOPY, TEMPERATURE.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 037 7/2

GENERAL ELECTRIC CO SYRACUSE NY ELECTRONICS LAB

(U) Pseudomorphic In(x).

DESCRIPTIVE NOTE: Annual rept. 1 Mar 88-30 Mar 89,

MAR 89 24P

PERSONAL AUTHORS: Ballingall, James M ; Ho, P.; Martin, T. Yu

CONTRACT NO. F49620-88-C-0054

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR TR-89-0463

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this program is to evaluate the dependence of pseudomorphic InxGa1-xAs quality on epitaxial growth conditions and InxGa1-xAs composition. All of the structures are fabricated by molecular beam epitaxy (MBE). The effects of different growth conditions are being evaluated with a combination of characterization techniques, including Hall effect, photoluminescence, transmission electron microscopy (TEM), and in-situ reflection high energy electron diffraction (RHEED). The electron spatial distribution and energy levels for quantized pseudomorphic structures are calculated self-consistently and compared with experiment. Critical layer thickness is shown to be a function of MBE growth temperature and the interruption of InxGa1-xAs growth with a few monolayers of GaAs is shown to smooth the InxGa1-xAs surface and provide strain energy relief, substantially extending the critical layer thickness. This new class of strained layer heterostructures which are here named thin strained superlattices (TSSL) extends the practical range of application of the GaAs-InxGa1-xAs system and is anticipated to be generally applicable to other strained layer systems. A publication describing the concept and demonstrating its practicality is tentatively scheduled for the May 22, 1989 issue of Applied Physics Letters. Also, results will be presented at the Electronic Materials Conference June 21-23, 1989

AD-A207 037

AD-A207 037 CONTINUED

at the Massachusetts Institute of Technology. Keywords: Indium compounds, Aluminum gallium arsenide, Gallium arsenides. (MJM)

DESCRIPTORS: (U) *ALUMINUM GALLIUM ARSENIDE, *ELECTRON MICROSCOPY, *GALLIUM ARSENIDES, *INDIUM COMPOUNDS, DISTRIBUTION, ELECTRONIC EQUIPMENT, ELECTRONS, ENERGY LEVELS, ENVIRONMENTS, EPITAXIAL GROWTH, GROWTH(GENERAL), HALL EFFECT, LAYERS, MATERIALS, MOLECULAR BEAMS, PHOTOLUMINESCENCE, SPATIAL DISTRIBUTION, STRUCTURES, SYMPOSIA, TEMPERATURE, THICKNESS, TRANSMITTANCE.

IDENTIFIERS: (U) WUAFOSR2305C1, PE61102F, *indium gallium arsenides.

AD-A207 037

AD-A207 027 20/9

WEST VIRGINIA UNIV MORGANTOWN DEPT OF MATHEMATICS

(U) Problems in Dynamic Phase Transition.

DESCRIPTIVE NOTE: Final rept. 1 Sep 87-30 Sep 88,

NOV 88 6P

PERSONAL AUTHORS: Hattori, Harumi

CONTRACT NO. AFOSR-87-0347

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR
TR-89-0376

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper, on the existence of intermediate magnetohydrodynamic shock waves; has used the technique called the connection matrix to establish one of the intermediate shocks which has not been shown to exist. There are a few approaches to the phase transition problem. One is to consider the momentum equation and another one is to consider the energy equation. Keywords: Initial boundary value problems. (JHD)

DESCRIPTORS: (U) *PLASMA WAVES, *MAGNETOHYDRODYNAMIC WAVES, *SHOCK WAVES, BOUNDARY VALUE PROBLEMS, ENERGY, MOMENTUM, PHASE TRANSFORMATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A9, Initial value problems.

AD-A207 027

AD-A207 018 9/1 20/12

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF ELECTRICAL AND COMPUTER ENGINEERIN G

(U) High Density Ion Implanted Contiguous Disk Bubble Technology.

DESCRIPTIVE NOTE: Final scientific rept. 30 Sep 84-29 Sep 88,

MAR 89 430P

PERSONAL AUTHORS: Kryder, Mark H.; Alex, Michael; Cowen, Allen B.; Greve, David W.; Guzman, A.

CONTRACT NO. AFOSR-84-0341

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR
TR-89-0476

UNCLASSIFIED REPORT

ABSTRACT: (U) The main thrust of research carried out under this program was to develop high density ion-implanted contiguous-disk bubble memory devices. These devices offer order of magnitude higher bit density than presently manufactured bubble memory devices for a given lithographic resolution. In one phase of the research, a computer simulator was constructed and used to model the operation of ion-implanted contiguous-disk bubble devices. Input parameters for the simulator include the geometry of the implanted patterns, magnetic characteristics of the bubble film, implanted layer thickness, conductor geometry, amplitude and phase of currents in conductors, and the frequency and amplitude of the drive field. The fields acting upon the bubble include those from the conductors, implanted/unimplanted boundaries and charged walls. Using the model, the operation of various gates for ion-implanted devices was analyzed, including a trapping transfer gate and a dual conductor block replicate gate. A novel true swap gate for ion-implanted bubble devices was also devised and simulated. The simulated bias margins of both propagation structures and gates were found to correspond well with experimental measurements. (RH)

AD-A207 018

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 018 CONTINUED

DESCRIPTORS: (U) *BUBBLE MEMORIES, *MAGNETIC DISKS, *ION IMPLANTATION, LITHOGRAPHY, RESOLUTION, FILMS, MAGNETIC FIELDS, TRAPPING(CHARGED PARTICLES), DOMAIN WALLS, GATES(CIRCUITS), GRAIN BOUNDARIES, ELECTRIC CURRENT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305C1, Contiguous disk memories, High density, Magnetic films, Charged walls, Transfer gates, Swap gates, Implanted boundaries.

AD-A207 014 12/9

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF COMPUTER SCIENCE

(U) Proceedings of the Connectionists Models Summer School Held in Pittsburgh, Pennsylvania on June 17-26, 1988.

DESCRIPTIVE NOTE: Final technical rept. 14 Nov 87-14 Nov 88,

FEB 89 531P

PERSONAL AUTHORS: Touretzky, David; Hinton, Geoffrey; Sejnowski, Terrence

CONTRACT NO. AFOSR-88-0067

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR TR-89-0443

UNCLASSIFIED REPORT

Availability: Morgan Kaufmann Publishers, Inc., 2929 Campus Drive, San Mateo, CA 94403, PC $24.95. No copies furnished by DTIC/NTIS.

ABSTRACT: (U) Contents: Back-Propagation Learning; Sequential and Recurrent Networks; New Learning Architectures; Analysis of Networks; Language and Cognition; Speech Recognition; Vision; Part 8 Hardware. (KR)

DESCRIPTORS: (U) *MODELS, *SPEECH RECOGNITION, ARCHITECTURE, COGNITION, LEARNING, PENNSYLVANIA, SCHOOLS, SUMMER, VISION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 005 12/4 12/1

STATE UNIV OF NEW YORK AT ALBANY RESEARCH FOUNDATION

(U) Qualitative Results for Distributed Systems.

DESCRIPTIVE NOTE: Final scientific rept. 1 Jul 85-30 Jun 88,

OCT 88 10P

PERSONAL AUTHORS: Inman, Daniel J.

CONTRACT NO. AFOSR-85-0220

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-89-0426

UNCLASSIFIED REPORT

ABSTRACT: (U) This document summarizes the research accomplished under the support of AFOSR-85-0220 from the period of July 1, 1985 to June 30, 1988. Results obtained during this period under AFOSR support are briefly described in the first section. This section is followed by listings of books published, papers published, proceedings published, degrees granted and lectures given while the PI was under Air Force Support. Several results were obtained under the support of this grant which related to the distributed parameter, or partial differential equation, model of a flexible structure. The global model forming the thrust of this research is given by a set of partial differential equations defined on some domain omega with the appropriate boundary and initial conditions. Keywords: Bibliographies, Hilbert space. (kr)

DESCRIPTORS: (U) *BOUNDARY VALUE PROBLEMS, *PARTIAL DIFFERENTIAL EQUATIONS, BIBLIOGRAPHIES, DISTRIBUTION, FLEXIBLE STRUCTURES, HILBERT SPACE, MODELS, PARAMETERS

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A1, Initial value problems.

AD-A207 004 20/11 13/13

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) Mathematical Modeling and Numerical Simulation of the Dynamics of Flexible Structures Subject to Large Overall Motions.

DESCRIPTIVE NOTE: Final rept. 31 Jul 86-30 Jul 88,

89 19P

PERSONAL AUTHORS: Simo, J. C.

CONTRACT NO. AFOSR-86-0292

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR
TR-89-0425

UNCLASSIFIED REPORT

ABSTRACT: (U) A new modelling and computational task for the integrated design of flexible structures undergoing large overall motions has been developed and analyzed. This new approaches utilizes geometrically exact structured models and have the advantage that these models can handle coupled rigid body-flexible appendage systems without resorting to the introduction of the so-called floating frames. (JHD)

DESCRIPTORS: (U) *FLEXIBLE STRUCTURES, *MATHEMATICAL MODELS, *DIGITAL SIMULATION, COMPUTATIONS, DYNAMICS, FLOATING BODIES, FRAMES, INTEGRATED SYSTEMS, NUMERICAL ANALYSIS.

IDENTIFIERS: (U) PE61102F02F, WUAFWUAFOSR2304A1.

AD-A207 005

AD-A207 004

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 003 21/2 14/2

PURDUE UNIV LAFAYETTE IN DEPT OF CHEMISTRY

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

DESCRIPTIVE NOTE: Final rept. 15 Dec 88-31 Jan 89,

FEB 89 21P

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

CONTRACT NO. AFOSR-84-0323

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-89-0410

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes progress on the development of a new laser-based combustion diagnostic for the quantitative measurement of both major and minor species in high pressure flames. The technique, Asynchronous Optical Sampling (ASOPS), is a state-of-the-art improvement in picosecond pump/probe spectroscopy. The timing parameters for the current ASOPS instrument are described and consideration is given to the optimization of these parameters. Results from the study of the sodium atom in an atmospheric flame are presented. Instrumental changes are shown that considerably improve the ASOPS signal-to-noise ratio. A technique for optimization of ultra violet generation is demonstrated and initial hydroxyl fluorescence experiments are described. Keywords: Pump probe spectroscopy; Combustion; Laser diagnostics; Stimulated emission. (MJM)

DESCRIPTORS: (U) *COMBUSTION, *DIAGNOSIS(GENERAL), *FLAMES, *LASER APPLICATIONS, ASYNCHRONOUS SYSTEMS, ATOMS, EMISSION, HIGH PRESSURE, MEASUREMENT, OPTICAL PROPERTIES, OPTIMIZATION, PARAMETERS, PROBES, PUMPS, SAMPLING, SIGNAL TO NOISE RATIO, SODIUM, SPECTROSCOPY, STIMULATION(GENERAL), TIMING DEVICES, ULTRAVIOLET RADIATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A207 003

AD-A207 001 12/3 12/4

MISSOURI UNIV-COLUMBIA DEPT OF STATISTICS

(U) International Research Conference on Reliability.

DESCRIPTIVE NOTE: Final rept. 1 Apr-30 Sep 88,

NOV 88 8P

PERSONAL AUTHORS: Basu, Asit P.

CONTRACT NO. AFOSR-88-0144

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-89-0377

UNCLASSIFIED REPORT

ABSTRACT: (U) An international research conference on RELIABILITY was held at the University of Missouri-Columbia, Missouri, May 17-19, 1988. The primary purpose of the conference is to bring together researchers from industry, government and universities so that they may exchange ideas to identify directions for future relevant research in reliability. Here reliability is interpreted in its broadest sense. The conference is planned by the Research Subcommittee of the American Statistical Association Productivity and Quality Committee and is sponsored by the University of Missouri. Other organizations are also expected to sponsor the conference. The program will consist of invited and contributed papers on a broad spectrum of topics. Among proposed topics are: Accelerated Tests, Artificial Intelligence and Expert Systems, Automatic Diagnostics of Complex Systems, Bayesian Reliability, DataBase Analysis; Network Reliability; Government Documents on Reliability; Reliability Growth; Reliability Management; Repairable Systems; Software Reliability. (KR)

DESCRIPTORS: (U) *COMPUTER PROGRAM RELIABILITY, *SYSTEMS MANAGEMENT, *RELIABILITY, ACCELERATED TESTING, ARTIFICIAL INTELLIGENCE, AUTOMATIC, BAYES THEOREM, DATA BASES, DIAGNOSIS(GENERAL), DOCUMENTS, GROWTH(GENERAL), NETWORKS, PRODUCTIVITY, QUALITY CONTROL, REPAIR, STATISTICAL ANALYSIS, SYMPOSIA.

AD-A207 001

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A207 001 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A207 000 12/1

WISCONSIN UNIV-MADISON DEPT OF COMPUTER SCIENCES

(U) Numerical Analysis.

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

89 6P

PERSONAL AUTHORS: Parter, Syemour V.

CONTRACT NO. AFOSR-86-0163

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-89-0378

UNCLASSIFIED REPORT

ABSTRACT: (U) Work has continued during this period on the following projects: 1) The role of regularity in Multigrid methods -- computational experiments and analytical studies on the V-cycle in an L-shaped domain; 2) Preconditioning and boundary values -- study of preconditioning of elliptic operators; and 3) Preconditioning, boundary values and mixed mode -- extension of 2) above to hyperbolic operators. Keywords: Bibliographies; Linear equations; Partial differential equations. (KR)

DESCRIPTORS: (U) *NUMERICAL ANALYSIS, *PARTIAL DIFFERENTIAL EQUATIONS, BIBLIOGRAPHIES, COMPUTATIONS, LINEAR ALGEBRAIC EQUATIONS, MULTIMODE, BOUNDARY VALUE PROBLEMS, OPERATORS(MATHEMATICS).

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3, Hyperbolic operators, Elliptic operators.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 999 12/9

TEXAS A AND M UNIV COLLEGE STATION DEPT OF ELECTRICAL ENGINEERING

(U) Geometric Methods with Application to Robust Detection and Estimation.

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

89 11P

PERSONAL AUTHORS: Halverson, Don R.

CONTRACT NO. AFOSR-87-0087

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR
TR-89-0382

UNCLASSIFIED REPORT

ABSTRACT: (U) We have obtained a number of results pertaining th image compression, robust estimation, and robust signal detection. All of this work has admitted the presence of data whose statistics are imperfectly known. Our results have featured adaptivity, flexibility, and nontraditional approaches. In order to employ more realistic statistical models, we have directed our research to admit nonstationarity and dependency. Much of our work in robust estimation admit nonstationarity and dependency. Much of our work in robust estimation and detection has employed a geometric approach which we have originated in past research. Our geometric techniques provide a quantitive way to measure the degree of robustness, thus offering the designer more flexibility in the meeting the performance/robustness, needs of the user. Our most recent results have resulted in the admission of essentially arbitrary dependent data, thus leading the a number of important conclusions pertaining to signal detection and the estimation of a random variable. (KR)

DESCRIPTORS: (U) *DATA COMPRESSION, *IMAGE PROCESSING, DETECTION, GEOMETRY, MATHEMATICAL MODELS, SIGNALS, STATISTICAL ANALYSIS.

AD-A206 999 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A6, Robust estimation.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 998 7/1 11/2 7/4

RENSSELAER POLYTECHNIC INST TROY N Y DEPT OF CHEMISTRY

(U) Preparation of Sic/AIN Solid Solutions Using Organometallic Precursors.

DESCRIPTIVE NOTE: Final scientific rept. 30 Sep 85-31 Dec 88.

FEB 89 15P

PERSONAL AUTHORS: Interrante, L. V.

CONTRACT NO. F49620-85-K-0019

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-89-0384

UNCLASSIFIED REPORT

ABSTRACT: (U) The co-pyrolysis of organoaluminum and organosilicon compounds was investigated as a potential source of SiC/ALN solid solutions. Using two different co-pyrolysis methods, homogeneous mixture of organoaluminum amides and both a vinylic polysilane and a polycarbosilane were converted to a pre-ceramic solid that transformed to crystalline Sic/ALN solid solutions at < 1600 C. Moreover, the liquid, polymeric, form of these precursor mixtures provides a potential processing advantage that may be useful for ceramic matrix preparation and other applications. In the course of this work new precursors to both ALN and SiC were identified and their structures and pyrolysis reactions were investigated, providing useful information regarding structure/pyrolysis chemistry relationships for such precursor systems. In addition, modifications of this co-pyrolysis approach to SiC/ALN solid solutions were employed to obtain mixed-phase SiC/ALN solid solutions were employed to obtain mixed-phase SiC/ALN, silicon nitride, silicon nitride/ALN and Beta-SiALON ceramics. The composition, phase distribution, and microstructure of these ceramics were examined by elemental analysis, x-ray powder diffraction, SEM/TEM, and other methods. Keywords: Aluminum nitrides; Organometallic compound. (AW)

AD-A206 998 CONTINUED

DESCRIPTORS: (U) , ORGANOMETALLIC COMPOUNDS, PRECURSORS, SOLID SOLUTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 997 20/4 12/5

WISCONSIN UNIV-MADISON CENTER FOR MATHEMATICAL SCIENCES

(U) A Fast Algorithm for Non-Newtonian Flow. An Enhanced Particle-Tracking Finite Element Code for Solving Boundary-Valve Problems in Viscoelastic Flow.

DESCRIPTIVE NOTE: Final rept. 1 Apr 85-30 Sep 88,

JAN 89 41P

PERSONAL AUTHORS: Malkus, David S.

CONTRACT NO. AFOSR-85-0141

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR
TR-89-0381

UNCLASSIFIED REPORT

ABSTRACT: (U) This project concerned the development of a new fast finite element algorithm to solve flow problems of non-Newtonian fluids such as solutions or melts of polymers. Many constitutive theories for such materials involve single integrals over the deformation history of the particle at the stress evaluation point; examples are the Doi-Edwards and Curtiss-Bird molecular theories and the BKZ family derived from continuum arguments. These theories are believed to be among the most accurate in describing non-Newtonian effects important to polymer process design, effects such as stress relaxation, shear thinning, and normal stress effects. This research developed an optimized version of the algorithm which would run a factor of two faster than the pilot algorithm on scalar machines and would be able to take full advantage of vectorization on machines. Significant progress was made in code vectorization; code enhancement and streamlining; adaptive memory quadrature; model problems for the High Weissenberg Number Problem; exactly incompressible projection; development of multimesh extrapolation procedures; and solution of problems of physical interest. A portable version of the code is in the final stages of benchmarking and testing. It interfaces with the widely used FIDAP fluid dynamics package. (JHD)

AD-A206 997

AD-A206 997 CONTINUED

DESCRIPTORS: (U) *COMPUTER PROGRAMMING, *FLUID DYNAMICS, *NONNEWTONIAN FLUIDS, *VISCOELASTICITY, ALGORITHMS, CODING, DEFORMATION, FLOW, HISTORY, INCOMPRESSIBILITY, INTEGRALS, MELTS, SHEAR PROPERTIES, FINITE ELEMENT ANALYSIS, OPTIMIZATION, POLYMERS, PROBLEM SOLVING, BOUNDARY VALUE PROBLEMS, SCALAR FUNCTIONS, STRESS RELAXATION, STRESSES, TEST AND EVALUATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A9.

AD-A206 997

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 991 11/4 20/11 14/2

AD-A206 991 CONTINUED

CINCINNATI UNIV OH DEPT OF AEROSPACE ENGINEERING AND ENGINEERING MECHANICS

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A3.

(U) Interactions of Ultrasonic Waves with Composite Plates.

DESCRIPTIVE NOTE: Final rept. Dec 85-Dec 88,

MAR 89 65P

PERSONAL AUTHORS: Nayfeh, Adnan H.

CONTRACT NO. AFOSR-86-0052

PROJECT NO. 2306

TASK NO. A3

MONITOR: AFOSR
TR-89-0462

UNCLASSIFIED REPORT

ABSTRACT: (U) We present a unified analytical treatment of the interaction of ultrasonic waves with single and multilayered arbitrarily oriented anisotropic elastic plates. The individual components forming the plate are allowed to possess up to as low as monoclinic symmetry. The plates are assumed to be immersed in a fluid and subjected to incident acoustic waves at arbitrary angles from the normal as well as at arbitrary azimuthal angles. Reflection and transmission coefficients are derived from which all propagation characteristics are identified. Highly complex reflection behavior, expressed as phase velocity-frequency dispersion, is observed as a consequence of anisotropy. Extensive comparisons with the concurrently acquired experimental data by Chimenti at the AFWAL on a variety of composite samples have been of unique help in assessing the validity of our theoretical modeling, and its potential application in the nondestructive evaluation of materials. Keywords: Fiber reinforced composites (AW)

DESCRIPTORS: (U) *COMPOSITE STRUCTURES, *PLATES, *ULTRASONIC TESTS, ACOUSTIC WAVES, ELASTIC PROPERTIES, ANISOTROPY, ACOUSTIC REFLECTION, WAVE PROPAGATION, FREQUENCY, NONDESTRUCTIVE TESTING, FIBER REINFORCED COMPOSITES.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 990 12/9

YALE UNIV NEW HAVEN CONN

(U) A Neural Network Approach to Model-Based Recognition.

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

FEB 89 34P

PERSONAL AUTHORS: Gindi, Gene R.

CONTRACT NO. F49620-88-C-0025

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR
TR-89-0445

UNCLASSIFIED REPORT

ABSTRACT: (U) The problem of recognizing structured patterns (object recognition) is being pursued on several fronts. The main thrust of the work involves the design of networks that store some notion of a relational model of an object and performs recognition via a version of graph matching. This approach is governed by the use of objective functions to both specify the network and the problem to be solved. The dynamics of the net thus carry out an optimization procedure. Key here is the incorporation into the objective function of compositional and specialization hierarchy of models, and provision to perform dynamic grouping (perceptual organization) of the input data. Results so far show very good performance for versions where data is preprocessed into a form matchable to the database, but poorer performance on more difficult problems where the network must itself organize raw data into relational structures for matching. A related effort explores aspects of traditional associative memories that may be of use in more complex networks. Questions of performance, storage and robustness are addressed. A new fast learning algorithms is proposed for a CMAC network. Work in optical implementation of some of these networks constitutes a third front. The main problem here is to use optics to form a fixed interconnection network between layers of 2-D nodes (neurons). Two means of using spatial multiplexing to effect a 4-D interconnect between

AD-A206 990

AD-A206 990 CONTINUED

two 2-D node planes are used: multifaceted holograms and multichannel incoherent image systems. (jhd)

DESCRIPTORS: (U) *NEURAL NETS, *PATTERN RECOGNITION, ALGORITHMS, DATA BASES, GRAPHS, HIERARCHIES, HOLOGRAMS, IMAGES, INPUT, LEARNING, MATCHING, MULTICHANNEL, MULTIPLEXING, NETWORK FLOWS, OPTICS, OPTIMIZATION, SPATIAL DISTRIBUTION, SPECIALIZATION, MASS STORAGE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B1.

AD-A206 990

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 989 20/11 13/13 11/4

BROWN UNIV PROVIDENCE RI DIV OF APPLIED MATHEMATICS

(U) Impulsive Loading of Fiber-Reinforced Structures.

DESCRIPTIVE NOTE: Final rept. 1 Feb 86-31 Dec 88,

MAR 89 23P

PERSONAL AUTHORS: Kolsky, Herbert; Pipkin, Allen

CONTRACT NO. AFOSR-87-0157

PROJECT NO. 2302

TASK NO. C2

MONITOR: AFOSR
TR-89-0469

UNCLASSIFIED REPORT

ABSTRACT: (U) The work described concerns the response of metallic composite beams and simple structures to rapid dynamic loading. It has been shown experimentally that the observed plastic response of clamped beam specimens to very sharp transverse blows could be adequately described by the idealised theory formulated by Spencer and his colleagues so long as the duration was sufficiently short for the plastic wave not to reach the clamp. The reflection process for real clamping conditions was found to very much more complex. The effects of blows of much longer durations on beams and portal arches are also described, as well as the effects of rate-of strain on the yield point of the matrix metal. Impact, Plastic waves, Strain rate effect, Structural response. (jes)

DESCRIPTORS: (U) *COMPOSITE STRUCTURES, *DYNAMIC LOADS, *FIBER REINFORCEMENT, *STRUCTURAL RESPONSE, ARCHES, BEAMS(STRUCTURAL), CLAMPS, IMPULSE LOADING, MATRIX MATERIALS, METALS, PLASTIC PROPERTIES, REFLECTION, SHARPNESS, STRAIN RATE, STRUCTURES, TRANSVERSE, WAVE PROPAGATION, WAVES, YIELD POINT, METAL MATRIX COMPOSITES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302C2.

AD-A206 989

AD-A206 988 7/2 7/4

CHEMICAL DYNAMICS CORP UPPER MARLBORO MD

(U) Growth Studies of Metal-Metal/Semiconductor Structures.

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-31 Jan 89,

MAR 89 46P

PERSONAL AUTHORS: Murthy, C. S.; Rice, B. M.; Redmon, M. J.

CONTRACT NO. F49620-88-C-0086

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR
TR-89-0461

UNCLASSIFIED REPORT

ABSTRACT: (U) The overall goal of the research program is to develop an atomistic approach to gain an understanding of the mechanisms of growth processes and to contribute to the development of metal metal and metal semiconductor heterostructures. The Phase I research involved (i) reliable modelling of underlying atomic interactions within the atomic constituents of the substrate, interface, and adlayer; (ii) static and dynamical studies of interfacial energetics and kinetics. A survey of available schemes has been made and a strategy for our own future modelling efforts is identified. Keywords: Nickel, Copper. (MJM)

DESCRIPTORS: (U) *COPPER, *NICKEL, *SEMICONDUCTORS, DYNAMICS, ENERGETIC PROPERTIES, GAIN, GROWTH(GENERAL), INTERFACES, METALS, STRUCTURES, SUBSTRATES.

IDENTIFIERS: (U) PE61102F, WUAFOSR3005A1.

AD-A206 988

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 980 20/4

SCIENTIFIC RESEARCH ASSOCIATES INC GLASTONBURY CT

(U) Reciprocal Interactions of Hairpin-Shaped Vortices and a Boundary Layer.

DESCRIPTIVE NOTE: Final rept. 1 Feb 86-31 Dec 88,

DEC 88 296P

PERSONAL AUTHORS: Liu, N. S.; Shamroth, S. J.; McDonald, H.

REPORT NO. SRA-R88-910016-F

CONTRACT NO. F49620-86-C-0028

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR
TR-89-0459

UNCLASSIFIED REPORT

ABSTRACT: (U) The role of hairpin vortices in cyclic production of wall turbulence has been studied in many laboratory experiments, primarily by using flow visualization. Study of hairpin vortices in a fully turbulent environment is greatly complicated by the presence of jitters and other co-existing structures. A viable approach for obtaining better understanding of the role of hairpin vortices in turbulence dynamics is to study the flow events stimulated by synthetically generated hairpin vortices in initially laminar boundary layers. This study simulates the flow dynamics stimulated by hairpin-shaped vortices in a boundary layer through the solution of time-dependent, three-dimensional, compressible Navier-Stokes equations. The numerical scheme used leads to temperal-spatial simulations and could be easily applied to future simulations focusing upon the effects of pressure gradient and compressibility on turbulence structure. Two simulations were carried out. In the first case, the initial condition contains only one imposed hairpin-shaped vortex; in the second, there are two incipient vortices separated by a short distance in the streamwise direction Organized flow events; Three dimensional flow. (jes)

AD-A206 980

AD-A206 980 CONTINUED

DESCRIPTORS: (U) *BOUNDARY LAYER, COMPRESSIBLE FLOW, COMPRESSIVE PROPERTIES, CYCLES, DYNAMICS, ENVIRONMENTS, FLOW, FLOW VISUALIZATION, FOCUSING, INTERACTIONS, LABORATORY TESTS, LAMINAR BOUNDARY LAYER, NAVIER STOKES EQUATIONS, NUMERICAL ANALYSIS, PRESSURE GRADIENTS, PRODUCTION, SHORT RANGE(DISTANCE), SIMULATION, SOLUTIONS(GENERAL), THREE DIMENSIONAL FLOW, TIME DEPENDENCE, TURBULENCE, VORTICES, WALLS.

IDENTIFIERS: (U) WUAFOSR3005A1, PE65502F.

AD-A206 980

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 964 1/1

OHIO UNIV ATHENS DEPT OF MECHANICAL ENGINEERING

(U) An Experimental Investigation of High Lift/High Rate Aerodynamics of an Unsteady Airfoil.

DESCRIPTIVE NOTE: Final rept. 1 Sep 87-31 Dec 88,

MAR 89 49P

PERSONAL AUTHORS: Graham, G. M.

CONTRACT NO. AFOSR-87-312

PROJECT NO. 2307

TASK NO. A3

MONITOR: AFOSR TR-89-0438

UNCLASSIFIED REPORT

ABSTRACT: (U) An experimental study of a two dimensional NACA 0015 airfoil undergoing both positive and negative constant pitch rate motions at high angles of attack was conducted in the Ohio University tow tank facility. Nondimensional pitch rates in the range of 0.1 < K < 0.7 and Reynolds numbers in the range of 141,000 < Re < 342, 000 were considered. Test results consist of lift and drag force coefficients and flow visualizations. The results of this study provide insight into the airfoil-dynamic stall vortex interaction during the pitch down motion and the cessation of aerodynamic stall. These data may be useful in high angle of attack applications such as the enhanced maneuverability concept for fighter aircraft. Keywords: Unsteady aerodynamics, Pitching airfoils, Maneuverability. (EDC)

DESCRIPTORS: (U) *AIRFOILS, *STALLING, AERODYNAMIC CHARACTERISTICS, AERODYNAMIC FORCES, AERODYNAMIC LIFT, ANGLE OF ATTACK, COEFFICIENTS, AERODYNAMIC DRAG, JET FIGHTERS, FLIGHT MANEUVERS, FLOW VISUALIZATION, HIGH ANGLES, HIGH LIFT, HIGH RATE, INTERACTIONS, MANEUVERABILITY, PITCH(MOTION), REYNOLDS NUMBER, TEST AND EVALUATION, UNSTEADY FLOW, VORTICES.

IDENTIFIERS: (U) NACA-0015 airfoils, Unsteady aerodynamics, Dynamic stall, PE61102F, WUAFOSR2307A3.

AD-A206 964

AD-A206 948 5/8 6/4

CALIFORNIA UNIV BERKELEY DEPT OF PSYCHOLOGY

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

DESCRIPTIVE NOTE: Annual rept. no. 2, 1 Jan-31 Dec 88,

JAN 89 157P

PERSONAL AUTHORS: Treisman, Anne

CONTRACT NO. AFOSR-87-0125

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR TR-89-0403

UNCLASSIFIED REPORT

ABSTRACT: (U) This research supported by my grant from AFOSR this year completed some of the projects outlined in the first annual report and initiated some new ones. The focus remained on the visual processing of features and objects, the role of spatial attention and the representation of complex visual patterns in perception and memory. Studies of visual search explored the coding of features at potentially more abstract levels than simple luminance filters: Among the features studied were orientation (for lines, dot pairs and edges), orientation and size (for shapes whose boundaries were defined by discontinuities of texture, motion and depth), and illusory contours. Another series of experiments tested the mechanisms underlying the coding of feature conjunctions, using evidence from search latencies and illusory conjunction errors. The results led to a proposed revision of my earlier feature integration theory. Two other studies looked at memory for visual patterns. One studied the effects of prolonged practice (thousands of trials) on the coding of visual patterns. At the other extreme, an experiment explored the effects on memory just one to five presentations of similar patterns. In both cases, we found striking specificity in the coding of these meaningless shapes and in their effects on subjects' later experiences with the same stimuli. Patterned conjunctions of lines, once formed,

AD-A206 948

AD-A206 948 CONTINUED

appear to persist in visual memory and to facilitate their later re-perception provided that the same task and context are also reinstated. Keywords: Attention. (aw)

DESCRIPTORS: (U) *ATTENTION, *MEMORY(PSYCHOLOGY), *VISUAL PERCEPTION, CODING, DISCONTINUITIES, FILTERS, IMAGE PROCESSING, INFORMATION PROCESSING, INTEGRATION, LUMINANCE, OPTICAL IMAGES, PATTERNS, SEARCHING, SPATIAL DISTRIBUTION, STIMULI, TEXTURE, THEORY, VISION, SPACE PERCEPTION, ILLUSIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4.

AD-A206 948

AD-A206 947 9/1

OREGON STATE UNIV CORVALLIS DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Point Defects in Semiconductors: Microscopic Identification, Metastable Properties, Defect Migration, and Diffusion.

DESCRIPTIVE NOTE: Final technical rept. 31 Aug 86-31 Mar 89,

MAR 89 135P

PERSONAL AUTHORS: Van Vechten, James A.; Wager, John F.

CONTRACT NO. AFOSR-86-0309

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR TR-89-0402

UNCLASSIFIED REPORT

ABSTRACT: (U) The goal of the research program described herein was to provide insight into the identity and properties of point defects in semiconductors. Particular emphasis was devoted to problems involving microscopic identification, metastable properties, defect migration, and diffusion of point defects in semiconductors. Our approach was to apply atomistic thermodynamic theory, Monte CArlo simulation, and experimental analysis to elucidate the nature and properties of semiconductor defects. Significant progress has been made in the following seven areas: 1) recombination enhanced vacancy migration in silicon, 2) Monte Carlo simulation of diffusion in semiconductors, 3) phosphorous vacancy nearest-neighbor hopping in InP, 4) entropy of migration for atomic hopping, 5) EL2/ELO identification in GaAs, 6) characterization and identification of DX in A1GaAs, and 7) temperature dependence of band offsets

DESCRIPTORS: (U) *SEMICONDUCTORS, MIGRATION, ENTROPY, DIFFUSION, METASTABLE STATE, MICROSCOPY, SIMULATION, THERMODYNAMICS, SILICON.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306B1.

AD-A206 947

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 946 7/4 21/2

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) Charged Slurry Droplet Research.

DESCRIPTIVE NOTE: Final rept. 1 Oct 86-30 Sep 88,

FEB 89 201P

PERSONAL AUTHORS: Kelly, A. J.

REPORT NO. MAE-1855

CONTRACT NO. AFOSR-86-0013

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-89-0406

UNCLASSIFIED REPORT

ABSTRACT: (U) Rayleigh Bursting, wherein critically charged droplets explosively expel a number of micron sized 'sibling' droplets, enhances atomization and combustion of all liquid fuels. Droplet surface charge is retained during evaporation, permitting multiple Rayleigh Bursts to occur. Moreover, the charge is available for the deagglomeration of residual particulate flocs from slurry droplet evaporation. To fill gaps in our knowledge of these processes, an experimental program involving the use of a charged droplet levitator and a quadrupole mass spectrometer, high speed electrometer (QMS/HSE) has been undertaken to observe the disruption and to measure quantitatively the debris. A charged droplet levitator based on a new video 'frame grabber' technology to image transient events, is described. Sibling droplet size is ten microns or less and is close to, if not coincident with, the predicted phase transition in droplet charging level. The research effort has focused on the exploration of this transition and its implications. Keywords: Charged droplets; Rayleigh bursting; Droplet charging behavior; Charged sprays; Droplet levitation; Quadrupole mass spectrometer. (MJM)

DESCRIPTORS: (U) *COMBUSTION, *DROPS, *FUELS, *LIQUIDS, *SLURRIES, *SPRAYS, ATOMIZATION, ELECTROMETERS, EVAPORATION, IMAGES, MASS SPECTROMETERS, PHASE TRANSFORMATIONS, QUADRUPOLE MOMENT, STATIC ELECTRICITY, TRANSIENTS, VIDEO FRAMES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A206 946 CONTINUED

AD-A206 946

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 936 7/2 7/4

SRI INTERNATIONAL MENLO PARK CA

(U) Dynamics of Excited High-Lying States of H2 and D2

DESCRIPTIVE NOTE: Final rept. 5 May 86-4 Oct 88,

NOV 88 76P

PERSONAL AUTHORS: Kachru, R.; Helm, H.

REPORT NO. SRI-MP-88-234

CONTRACT NO. F49620-86-K-0017

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-89-0474

UNCLASSIFIED REPORT

ABSTRACT: (U) The spectroscopy and dynamics of Rydberg states of molecular hydrogen is important in modeling discharge and electron beam pumped lasers, molecular ion electron collisions, and the photoionization of molecular hydrogen. Our primary objective was to investigate the excited states of H2 and D2 as two prototypes for a systematic study of manifestations of the static and dynamic interactions governing molecular Rydberg states. Our experimental approach employed a stepwise laser excitation scheme. Detection of the charged molecular, atomic fragments and the energy-analyzed electrons enabled us to measure autoionization, ionization, dissociation, and the competition between them. We studied and analyzed the np autoionizing Rydberg states in H2. We also studied the competition between photoionization and photodissociation from the C1IIuH2 state. In addition, we performed the first study of the onset of field ionization and the forced rotational autoionization of the np Rydberg states. We demonstrated that the ionization process can be described classically. Hydrogen; Deuterium. (MJM)

DESCRIPTORS: (U) *DEUTERIUM, *DYNAMICS, *EXCITATION, *HYDROGEN, APPROACH, DETECTION, DISSOCIATION, ELECTRIC FIELDS, ELECTRON BEAMS, ELECTRONS, ELEMENTARY PARTICLES,

AD-A206 936

AD-A206 936 CONTINUED

EXPERIMENTAL DATA, INTERACTIONS, IONIZATION, IONS, LASER PUMPING, LASERS, MODELS MOLECULES, PARTICLE COLLISIONS, PHOTODISSOCIATION, PHOTOIONIZATION, PROTOTYPES, ROTATION, SPECTROSCOPY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A4, LPN:SRI-PYU-2197.

AD-A206 936

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD A206 922 20/4 12/2

TEXAS UNIV AT ARLINGTON COMPUTATION FLUIDS DYNAMICS CENTER

(U) Development of Adaptive Grid Schemes Based on Poisson Grid Generators.

DESCRIPTIVE NOTE: Final rept. 15 May 85-14 Nov 88.

JAN 89 60P

PERSONAL AUTHORS: Anderson, Dale A.

REPORT NO. UTA-CFD-89-02

CONTRACT NO. AFOSR-85-0195

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR 89-0217

UNCLASSIFIED REPORT

ABSTRACT: (U) Poisson equation grid generators are the most popular differential equation mesh generation schemes. Results reported under this program show how to use the existing schemes to construct adaptive grids. Methods for controlling individual arc lengths as well as cell volumes are given and technique for constructing two-dimensional orthogonal adaptive grids are included. Adaptivity was also demonstrated with unstructured meshes using the Poisson equation as a control on grid point location. Additional adaption schemes fro unstructured grids presented using a linear spring analogy. (KR)

DESCRIPTORS: (U) *DIFFERENTIAL EQUATIONS, *POISSON DENSITY FUNCTIONS, *POISSON EQUATION, *ADAPTIVE SYSTEMS, ANALOGIES, GENERATORS, GRIDS, GRIDS(COORDINATES), MESH, ORTHOGONALITY, TWO DIMENSIONAL.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A1, Linear spring analogy

AD A206 922

AD-A206 890 12/9 12/4 6/4 5/8

BOSTON UNIV MA CENTER FOR ADAPTIVE SYSTEMS

(U) Solving the Brightness-from-Luminance Problem: A Neural Architecture for Invariant Brightness Perception.

DESCRIPTIVE NOTE: Interim rept.,

FEB 89 39P

PERSONAL AUTHORS: Grossberg, Stephen; Todorovic, Dejan

CONTRACT NO. F49620-86-C-0037, F49620-87-C-0018

PROJECT NO. 2131

TASK NO. A5

MONITOR: AFOSR
TR-89-0457

UNCLASSIFIED REPORT

ABSTRACT: (U) The spatial distribution of light that constitutes the input to our eyes is the foundation of all visual functions, such as perception of brightness, color, texture, form, and 3-D organization. The perception of brightness may perhaps appear to be the simplest of all functions: The most natural initial explanation of why surface A appears brighter than surface B is that more light arrives into our eyes from surface A than from B. However, as we will show in the following, the relation of luminance (which is a physical variable involving the amount of light energy arriving at the retina) and brightness (which is a psychological variable denoting perceived intensity of light) is much more complicated. The brightness-from luminance problem is the following: find the mapping that transforms any given spatial distribution of luminance into the corresponding spatial distribution of brightness. The problem is generally solved for the simple visual situation involving a bright patch on a dark background. Increasing the luminance of the patch causes it to look increasingly brighter, but in a nonlinear manner. In more complicated visual situations containing several surfaces, their brightnesses may be predicted by taking logarithms, or power functions, of their luminance. To summarize, there are at least two factors that make the relation of

AD-A206 890

AD-A206 890 CONTINUED

brightness and luminance a problem: Illumination discounting and contextual dependence. We will present a neural network architecture that deals with both issues. Keywords: Mathematical models. (KT/AW)

DESCRIPTORS: (U) *BRIGHTNESS, *VISUAL PERCEPTION, *CYBERNETICS, *LUMINANCE, *MATHEMATICAL MODELS, ARCHITECTURE, BACKGROUN^, DARKNESS, ENERGY, EYE, FUNCTIONS, ILLUMINATION, INTENSITY, INVARIANCE, LIGHT, NERVOUS SYSTEM, NEURAL NETS, OPTICAL IMAGES, PERCEPTION, POWER, RETINA, SPATIAL DISTRIBUTION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2131A5, *Neural nets.

AD-A206 883 20/5

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF CHEMISTRY

(U) Nonlocal and Quasilocal Potentials in the Spontaneous Emission of Molecular Exciplexes Coupled to the Phonon Bath of a Solid Matrix,

JAN 89

PERSONAL AUTHORS: Lam, Kai-Shue; George, Thomas F.

CONTRACT NO. F49620-86-C-0009, N00014-86-K-0043

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-89-0465

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v90 n2 p1048-1060, 15 Jan 89.

ABSTRACT: (U) Molecular exciplexes coupled to the phonon-bath of a solid matrix are treated by a two-state model allowing for radiative relaxation from the excited to ground a state and thermal relaxation from each of the state to the phonon bath. Molecular dynamics is considerably simplified by a canonical (Duke-Soules) transformation on the model Hamiltonian. This transformation (i) re-normalizes the bath-free exciplex potential surfaces to phonon-dressed surfaces and (ii) combines the radiative and phonon couplings into a single effective coupling. This leads to an effective nonlocal potential whose kernel is a product of radiative and nonradiative parts, and which can be interpreted pictorially in an intuitive manner when individual terms in the Born series solution of the corresponding Schrodinger equation are linked to special 'Feynman diagrams'. Under the small phonon-energy and the weak correlation (between phonon and nuclear degrees of freedom) approximations, a thermally-averaged wave function for nuclear motion can be constructed, and the nonlocal potential reduces to a quasilocal potential in which the phonon bath 'filters out' certain nonlocal transitions between the exciplex states. Keywords: Molecular exciplexes; Solid matrix; Phonon bath;

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 883 CONTINUED

Radiative relaxation; Thermal relaxation; Theory; Reprints. (JHD)

DESCRIPTORS: (U) *MOLECULAR ENERGY LEVELS, *RELAXATION, CORRELATION, COUPLINGS, DYNAMICS, EMISSION, SOLID STATE PHYSICS, HAMILTONIAN FUNCTIONS, LOW STRENGTH, MODELS, MOLECULAR PROPERTIES, PHONONS, RADIATION, REPRINTS, SCHRODINGER EQUATION, SERIES(MATHEMATICS), SOLUTIONS(GENERAL), THERMAL PROPERTIES, TRANSITIONS.

IDENTIFIERS: (U) WUAFOSR2303B3, PE61102F, Duke Soules transformations, Feynman diagrams, *Molecular exciplexes, Phonon baths.

AD-A206 881 4/1

BOSTON UNIV MA

(U) Magnetosphere - Thermosphere Coupling: An Experiment in Interactive Modeling,

MAR 89 16P

PERSONAL AUTHORS: Forbes, Jeffrey M.; Harel, Moshe

CONTRACT NO. AFOSR-85-0048

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR TR-89-0467

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Geophysical Research, v94 nA3 p2631-2644, 1 Mar 89.

ABSTRACT: (U) The Rice convection model (RCM) is utilized to investigate the electrodynamic coupling between the inner magnetosphere and the thermosphere including the effects of EUV-and convection-driven neutral winds under quasi-equilibrium conditions. It is shown that the parameters determining the coupling are the Pedersen and Hall effective winds, which are the height integrals of the respective conductivity-weighted wind profiles divided by the respective layer conductivities. Their appearance in the RCM is equivalent to a two-slab formulation whereby the integrated Hall conductivity originates in the lower slab, the integrated Pedersen conductivity originates in the upper slab, and the height dependence of the neutral wind is accounted for by assuming different wind vectors for the lower and upper slab. A unique aspect of the study is that the convection-driven winds are included self-consistently and interactively; that is, a steady state wind parameterization is written analytically in terms of the electrostatic potential, which is in turn included in a closed-loop calculation for the electric potential itself. During the early phases of the disturbance when the normal shielding from high latitudes breaks down, the neutral winds do not modify appreciably the disturbance electric fields at middle and low altitudes. As the

AD-A206 881 CONTINUED

system approaches a quasi-equilibrium state, the neutral winds play a much more significant role. By comparison with the 'no-wind' simulation, the fields driven by EUV winds counteract the fields of magnetospheric origin and given the appearance of a shielding effect. Reprints. (JHD)

DESCRIPTORS: (U) *COUPLING(INTERACTION), *INTERACTIONS, *MAGNETOSPHERE, *THERMOSPHERE, CLOSED LOOP SYSTEMS, COMPUTATIONS, ELECTRICAL CONDUCTIVITY, CONVECTION, ELECTRIC FIELDS, ELECTRICITY, ELECTRODYNAMICS, ELECTROSTATICS, HALL EFFECT, INTEGRALS, INTEGRATED SYSTEMS, LAYERS, LOW ALTITUDE, IONOSPHERIC MODELS, NEUTRAL, REPRINTS, ELECTROMAGNETIC SHIELDING, STEADY STATE, VOLTAGE, WIND.

IDENTIFIERS: (U) RCM(Rice Convection Model), Perdersen conductivity, Hall conductivity, Neutral winds, WUAFOSR2310A2, PE61102F.

AD-A206 880 4/1

BOSTON UNIV MA

(U) A Fully Analytic, Low- and Middle-Latitude Ionospheric Model,

FEB 89 6P

PERSONAL AUTHORS: Anderson, David N.; Forbes, Jeffrey M.; Codrescu, Mihail

CONTRACT NO. AFOSR-85-0048

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR
TR-89-0466

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Geophysical Research, v94 nA2 p1520-1524, 1 Feb 89.

ABSTRACT: (U) A fully analytic ionospheric model emphasizing the low latitude F region for various seasonal and solar cycle conditions is presented. Features such as the post-sunset rise in the F layer peak height and the 'equatorial anomaly' maxima in plasma density near + or - deg geomagnetic latitude are designed to closely approximate those in the semiempirical low-latitude ionospheric model. Significant improvements are thus obtained over previous comparable analytic models. Numerical computations are also presented which demonstrate the importance of these large-scale plasma structures to the neutral dynamics of the low-latitude thermosphere. Equally significant effects are anticipated for the electrodynamic simulations of E region/F region coupling involving flux tube integrated electrical conductivities. Keywords: Ionosphere; Model; Low latitude; Reprints. (JHD)

DESCRIPTORS: (U) *F REGION, *IONOSPHERIC MODELS, ANOMALIES, COMPUTATIONS, DENSITY, DYNAMICS, ELECTRODYNAMICS, EQUATORIAL REGIONS, HEIGHT, IONOSPHERE, MATHEMATICAL MODELS, NEUTRAL, NUMERICAL ANALYSIS, PEAK VALUES, PLASMAS(PHYSICS), REPRINTS, SEASONAL VARIATIONS, SIMULATION, SOLAR CYCLE, STRUCTURES.

AD-A206 880 CONTINUED

IDENTIFIERS: (U) WUAFOSR2310A2, PE61102F.

AD-A206 879 7/3

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) The Pyrolysis of Acetylene Initiated by Acetone.

DESCRIPTIVE NOTE: Rept. for Feb 87-Jul 88,

89 22P

PERSONAL AUTHORS: Colket, M. B., III; Seery, D. J.; Palmer, H. B.

CONTRACT NO. F49620-85-C-0012, F49620-88-C-0051

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-89-0456

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Combustion and Flame, v75 p343-366 1989.

ABSTRACT: (U) A detailed, radical chain mechanism is used to model the pyrolysis of acetylene near 1000 K. The initiation process, C2H2 + C2H2 yields C4H3 + H, appears to be inconsistent with thermochemistry. Since experimental evidence indicates the presence of a chain mechanism, alternative sources of initiation are considered. Acetone, a common impurity in purified acetylene, was found to dominate radical initiation during the pyrolysis of acetylene near 1000K despite concentration levels on ly 0.1% that of acetylene. Modeling results compare favorably with the experimental results of Munson and Anderson for acetylene decay and the formation of products vinyl acetylene, benzene, and ethylene. Rate constants were adjusted to optimize the fit of the experimental data. A sensitivity analysis shows that the computed results were most sensitive to rate constants for these and a few other reactions. Keywords: Acetylene pyrolysis, Radical initiation, Effects, Acetone impurities. Reprints. (MJM)

DESCRIPTORS: (U) *ACETONES, *ACETYLENE, *PYROLYSIS, BENZENE, CHAINS, CONSTANTS, DECAY, ETHYLENE, EXPERIMENTAL DATA, IMPURITIES, MODELS, PURIFICATION, RATES, REPRINTS,

AD-A206 879 CONTINUED

SENSITIVITY, SOURCES, THERMOCHEMISTRY.

IDENTIFIERS: (U) WUAFOSR2308A2, PE61102F.

AD-A206 878 6/11

MICHIGAN STATE UNIV EAST LANSING DEPT OF PEDIATRICS/ HUMAN DEVELOPMENT

(U) Dieldrin Inhibition of Gap Junctional Intercellular Communication in Rat Glial Cells as Measured by the Fluorescence Photobleaching and Scrape Loading/Dye Transfer Assays,

87 11P

PERSONAL AUTHORS: Trosko, James E.; El-Fouly, Mohamed H.; Suter, S.; Lockwood, L. R.; Koestner, A.

CONTRACT NO. AFOSR-86-0084

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR TR-89-0450

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Fundamental and Applied Toxicology, v9 p785-794 1987.

ABSTRACT: (U) Application of the fluorescence-recovery after photobleaching (FRAP analysis) technique and scrape loading/dye transfer assay was made to measure the presence of gap junctional communication in primary rat glial cells in vitro in the presence and absence of the neurotoxicant and tumor promoter dieldrin, a chlorinated insecticide. Results demonstrate that primary rat glial cells are able to exhibit gap junctional intercellular communication and that dieldrin at noncytotoxic concentrations can modulate gap junctional communication as early as 10 min after exposure to the chemical and that the effect is reversible after 4 hr recovery from the dieldrin exposure. Both the FRAP analysis and the scrap loading/dye transfer assay have validated the observation that dieldrin inhibits gap junctional communication in other cell types using different techniques to measure gap junction function. These results were interpreted as an indication that inhibition of gap junctional communication might contribute to the cellular mechanism of dieldrin's neurotoxicity. Reprints. (aw)

AD-A206 878 CONTINUED

DESCRIPTORS: (U) *NERVE CELLS, *DIELDRIN, *TOXICITY, BIOASSAY, CHLORINATION, DYES, EXPOSURE(PHYSIOLOGY), INHIBITION, INSECTICIDES, NEOPLASMS, NERVOUS SYSTEM, REPRINTS, TRANSFER, NERVE BLOCKING, CARCINOGENS.

IDENTIFIERS: (U) WUAFOSR2312AS, PE61102F, *Gap junctional intercellular communication, *Glial cells, Photobleaching, Scrape loading, Tumor promoters, Neurotoxicity, Intercellular communication.

AD-A206 878

AD-A206 877 6/11

MICHIGAN STATE UNIV EAST LANSING DEPT OF PEDIATRICS/ HUMAN DEVELOPMENT

(U) Nongenotoxic Mechanisms in Carcinogenesis: Role of Inhibited Intercellular Communication,

88 33P

PERSONAL AUTHORS: Trosko, James E.; Chang, Chia-ChengM

CONTRACT NO. AFOSR-86-0084

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR TR-89-0454

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Carcinogen Risk Assessment, n31 p139-170 1988.

ABSTRACT: (U) Carcinogenesis is a multistep process, involving several distinct mechanisms, involving the conversion of a normal stem-like cell to a cell resistant to terminal differentiation (i.e., initiation), followed by the clonal expansion of this initiated cell (i.e., promotion), during which time additional changes occur allowing the cell to become malignant (i.e., progression). Each of these distinct operational stages of carcinogensis probably involves mechanisms (i.e., many mechanisms for initiation and promotion). Since gene and chromosomal mutations, cell death, and modulation of gene expression are the biological consequences of chemical exposure, many genetic, biological, and environmental factors can modulate how a given chemical can induce these changes. The general paradigm of 'carcinogenesis as mutagens' is considered totally inadequate to design the test protocol for animal bioassays and to interpret the data from these tests. The role of inhibited intercellular communication has been postulated to play a role in the tumor promotion and progression phases . Examination of experimental results of known tumor promotes as inhibitors of intercel ular communication is presented. Implications of these results suggest a new paradigm is needed to approach the problem of a

AD-A206 877

AD-A206 877 CONTINUED

'biological risk assessment' model. 'Science progresses more by the introduction of new world views or 'pictures' than by the steady accumulation of information.' Reprints. (AW)

DESCRIPTORS: (U) *CARCINOGENESIS, *CELLS(BIOLOGY), *NEOPLASMS, ACCUMULATION, ANIMALS, BIOASSAY, BIOLOGY, CHEMICALS, CHROMOSOMES, COMMUNICATION AND RADIO SYSTEMS, DEATH, ENVIRONMENTS, EXPOSURE(PHYSIOLOGY), GENES, GLOBAL, INHIBITORS, MODELS, MODULATION, MUTAGENS, MUTATIONS, RESISTANCE, RISK, STEADY STATE.

IDENTIFIERS: (U) WUAFOSR2312A5, PE61102F, *Intercellular communication, Stem cells, Tumor promoters, Nongenotoxic agents.

AD-A206 876 6/11 6/5

MICHIGAN STATE UNIV EAST LANSING DEPT OF PEDIATRICS/ HUMAN DEVELOPMENT

(U) Chemical and Oncogene Modulation of Gap Junctional Intercellular Communication.

88 16P

PERSONAL AUTHORS: Trosko, James E.; Chang, Chia-Cheng

CONTRACT NO. AFOSR-86-0084

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR TR-89-0447

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Tumor Promoters: Biological Approaches for Mechanistic Studies and Assay Systems, p97-111 1988.

ABSTRACT: (U) In this report, we will present chemical modulation of gap junctional intercellular communication as a cellular mechanism of chemical toxicity which could lead to a wide variety of harmful endpoints. We and others have postulated that chemical modulation of gap junctional communication can lead to teratogenesis, promote initiated cells during carcinogensis, cause neurotoxic effects, bring about reproductive dysfunction and other dysfunctional physiological states. Gap junctional communication appears to be an important biological process involved in the regulation of proliferation, differentiation and adaptive responses of differentiated cells. The process of gap junctional-intercellular is operationally dependent on a cell's ability to recognize and 'dock' with another cell, to organize the gap junction subunits into functional channels, to transfer regulatory ions and small molecules and to have appropriate subcellular components to respond to these regulatory signals. The biophysical/biochemical chemical nature of the gap junction structure, while not yet unequivocally delineated, seems to be modulated by several important factors, including Ca++, pH, C-AMP, voltage changes, and temperature. Endogenous and

AD-A206 876 CONTINUED

exogenous chemicals have been shown to affect gap junction structure/function. Reprints. (aw)

DESCRIPTORS: (U) *CELLS(BIOLOGY), *CHEMICALS, *TERATOGENIC COMPOUNDS, *TOXICITY, ADAPTATION, BIOLOGY, CHANNELS, CHEMICAL AGENTS, DYSFUNCTION, MODULATION, MOLECULES, PHYSIOLOGICAL EFFECTS, REPRINTS, REPRODUCTION(PHYSIOLOGY), RESPONSE(BIOLOGY), VOLTAGE, CALCIUM, PH FACTOR, ADENOSINE PHOSPHATES.

IDENTIFIERS: (U) WUAFOSR2312A5, PE61102F, *Gap junctional intercellular communication, *Oncogenes, Chemical modulation, Neurotoxicity, Intercellular communication.

AD-A206 876

AD-A206 875 6/11

MICHIGAN STATE UNIV EAST LANSING DEPT OF PEDIATRICS/ HUMAN DEVELOPMENT

(U) Effects of Hepatic Tumor Promoters Phenobarbital and Polybrominated Biphenyls on Intercellular Communication between Rat Liver Epithelial Cells.

88 15P

PERSONAL AUTHORS: Trosko, James E.; Rezabek, Margit S.; Jone, Cyrenius; Sleight, Stuart D.

CONTRACT NO. AFOSR-86-0084

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR TR-89-0446

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Molecular and Cellular Toxicology, v2 n1 p45-58 1988.

ABSTRACT: (U) FireMaster BP-6 (FM), a mixture of polybrominated biphenyls, and phenobarbital (PB) promote hepatic carcinogenesis in rats. Inhibition of intercellular communication is a possible mechanism of tumor promotion. Vitamin A compounds, such as retinyl acetate (RA), antagonize the carcinogenic process in some systems. In this study, FM, PB and RA were tested in two intercellular communication assays using a rat liver epithelial cell line (WB-F344). One assay measured inhibition of metabolic cooperation (MC) between cells containing the enzyme hypoxanthine-guanine phosphoribosyl transferase and mutant cells lacking the enzyme. The other assay evaluated the inhibition of fluorescence redistribution after photobleaching (FRAP), which occurs through gap junctions between cells loaded with a fluorescent dye. The hepatic tumor promoter PB inhibited MC, but did not block junctional communication in the FRAP assay. The hepatic tumor promoter FM inhibited MC and also blocked FRAP. Retinyl acetate blocked MC did not inhibit FRAP, and had no effect on the ability of FM to block junctional communication in the MC or FRAP assays. Reprints. (aw)

AD-A206 875

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 875 CONTINUED

DESCRIPTORS: (U) *BARBITURATES, *BIPHENYL, *CARCINOGENESIS, *CELLS(BIOLOGY), *EPITHELIUM, *LIVER, *BROMINE COMPOUNDS, BIOASSAY, CARCINOGENS, COOPERATION, DISTRIBUTION, ENZYMES, FLUORESCENCE, FLUORESCENT DYES, INHIBITION, METABOLISM, MUTATIONS, NEOPLASMS, RATS, REPRINTS.

IDENTIFIERS: (U) WUAFOSR2312A5, PE61102F, *Intercellular communication, *Phenobarbital, *Polybrominated biphenyls, Gap junctional intercellular communication, Firemaster BP-6, Tumor promoters, Photobleaching, Retinyl acetate.

AD-A206 875

AD-A206 874 6/11 6/2 6/5

MICHIGAN STATE UNIV EAST LANSING DEPT OF PEDIATRICS/ HUMAN DEVELOPMENT

(U) A Failed Paradigm: Carcinogenesis Is More Than Mutagenesis.

88 3P

PERSONAL AUTHORS: Trosko, James E.

CONTRACT NO. AFOSR-86-0084

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR TR-89-0453

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Mutagenesis, v3 n4 p363-366 1988.

ABSTRACT:. (U) An important series of recent assessments related to carcinogen/mutagen screening strategies and the evaluation of predictability of carcinogenicity from short term 'genotoxicity' tests (STT) have appeared. Further studies based on the acceptance of the assumptions of the current bioassay protocol, on the unchallenged acceptance of the STTs ability to measure only mutations, and reluctance to recognize non-mutagenic mechanisms such as cytotoxicity and altered gene expression through modulated intercellular communication mechanisms, will only produce more of the same kind of uninterpretable data. Carcinogenesis is more than mutagenesis and not all chemicals detected as 'positive' in short-term assays designed to detect mutagens are, in fact, mutagenic. In addition, many carcinogens detected in animal bioassays are clearly not mutagenic. Until the role of chemical-induced cytotoxicity and non-genotoxic or epigenetic mechanisms are accounted for, evaluations of the relevance of either the STTs and bioassay results will remain quite dubious. Reprints. (AW)

DESCRIPTORS: (U) *CARCINOGENESIS, *CELLS(BIOLOGY), *MUTATIONS, ANIMALS, BIOASSAY, CARCINOGENS, CHEMICALS, GENES, MODULATION, MUTAGENS, PREDICTIONS, REPRINTS, SHORT

AD-A206 874

AD-A206 874 CONTINUED

RANGE(TIME).

IDENTIFIERS: (U) WUAFOSR2312A5, PE61102F, *Mutagenesis, Genotoxicity, Intercellular communication, Cytoxicity, Nongenotoxic agents.

AD-A206 874

AD-A206 873 6/11

MICHIGAN STATE UNIV EAST LANSING DEPT OF PEDIATRICS/ HUMAN DEVELOPMENT

(U) Anchored Cell Analysis/Sorting Coupled with the Scrape-Loading/Dye-Transfer Technique to Quantify Inhibition of Gap-Junctional Intercellular Communication in WB-F344 Cells by 2,2',4,4', 5,5'-Hexabromobiphenyl,

88

PERSONAL AUTHORS: Trosko, James E.; Evans, Mark G.; El-Fouly, Mohamed H.; Sleight, Stuart D.

CONTRACT NO. AFOSR-86-0084

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR TR-89-0449

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Toxicology and Environmental Health, v24 p261-271 1988.

ABSTRACT: (U) Inhibition of intercellular communication has been hypothesized to play a role in tumor promotion. The compound 2,2', 4,4', 5,5' -hexabromobiphenyl (245-HBB) is a tumor promoter in vivo and blocks inter-cellular communication in vitro. The scrape-loading/dye-transfer (SL/DT) assay was used to assess this in vitro effect at varying concentrations of 245-HBB. The SL/DT technique is based on the inter-cellular loading of a fluorescent dye, lucifer yellow (LY), and monitoring its transfer into adjacent cells via patent gap junctions. Confluent WB-F344 (rat epithelial) cells were exposed to various non-cytolethal concentrations of 245-HBB. Transfer of LY was then quantified with anchored cell analysis/sorting. The results indicate an inverse correlation between the degree of fluorescence in secondary LY-recipient cells and the treatment concentration. The coupling of these two new methods of cellular biology provided rapid quantitative analysis of dye transfer in measuring the concentration/response of modulation of gap-junctional permeability in cultured cells. Keywords: Toxicity, Reprints. (AW)

AD-A206 873

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 873 CONTINUED

DESCRIPTORS: (U) *CELLS(BIOLOGY), *CARCINOGENS, *BIPHENYL, *BROMINE COMPOUNDS, CORRELATION, CYTOLOGY, DYES, FLUORESCENCE, FLUORESCENT DYES, IN VITRO ANALYSIS, IN VIVO ANALYSIS, INHIBITION, INVERSION, MODULATION, NEOPLASMS, QUANTITATIVE ANALYSIS, RATS, REPRINTS, SORTING, TOXICITY, TRANSFER.

IDENTIFIERS: (U) WUAFOSR2312A5, PE61102F, *Gap junctional intercellular communication, *Hexabromobiphenyls, Biphenyl/2,2,4,4,5,5-hexabromo, Tumor promoters, Lucifer yellow dyes,, Intercellular communication.

AD-A206 873

AD-A206 872 6/11 6/15

MICHIGAN STATE UNIV EAST LANSING DEPT OF PEDIATRICS/ HUMAN DEVELOPMENT

(U) Inhibited of Gap Junctional Blockage by Palmitoyl Carnitine and TMB-8 in a Rat Liver Epithelial Cell Line.

88 6P

PERSONAL AUTHORS: Trosko, James E.; Madhukar, Burra V.; Oh, Saw Y.

CONTRACT NO. AFOSR-86-0084

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR TR-89-0451

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Carcinogenesis, v9 n1 p135-139 1988.

ABSTRACT: (U) Intercellular communication is considered an important cellular mechanism for regulating growth and differentiation (1-4). Thus blockage of the exchange of important 'signal' ions and molecules between normal communicating cells could lead to abnormal cell proliferation. Tumor promoting agents, such as 12-O-tetradecanoylphorbol-13-acetate (TPA), have been shown to block gap junctional intercellular communication (GJIC) in various cell types. Using a scrape loading/dye transfer technique, TPA was shown to cause a dose-dependent and transient inhibition of GJIC in WB-F344, a normal rat liver epithelial cell line. Such a down-modulation of intercellular communication was found to be associated with an increase in protein kinase C (PKC) activity. Translocation of this activity to the particulate fraction occurred 10 min after exposure to 16 nM TPA and was consistent with the time course needed to inhibit GJIC. After 6 h exposure to TPA, essentially all the PKC activity was lost concurrent with the recovery of communication in these cells. During this time, the cells also became refractory to inhibition by further addition of TPA. Blockage of communication induced by TPA in WB

AD-A206 872

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 872 CONTINUED

cells was prevented by treating the cells with 23 micrometers palmitoyl carnitine for 1 h or 100 micrometers 8-N,N-(diethylamino)-octyl-3,4,5-trimethoxybenzoate for 30 min. The results indicate that TPA transiently modulates GJIC in WB cells and PKC activation is possibly involved in blockage of communication in these cells. Keywords: In vitro analysis, Reprints. (aw)

DESCRIPTORS: (U) *CELLS(BIOLOGY), *CARCINOGENS, *DRUGS, *LIVER, *EPITHELIUM, ABNORMALITIES, ACTIVATION, ALKALOIDS, DYES, IN VITRO ANALYSIS, INHIBITION, IONS, MOLECULES, NEOPLASMS, RECOVERY, REPRINTS, SIGNALS, TRANSFER, TRANSIENTS, TRANSLOCATION, TOXICITY, RATS.

IDENTIFIERS: (U) WUAFOSR2312A5, PE61102F, *Palmitoyl carnitine, *Methoxybenzoates, *Gap junctional intercellular communication, Intercellular communication, Benzoate/8-n-n-(diethylamino)-octyl-3-4-5-trimethoxy, Phorbol acetates, Acetate/12-o-tetradecanoylphorbol-13, TPA(12-o-tetradecanoylphorbol-13-acetate).

AD-A206 872

AD-A206 871 6/1 6/4

MICHIGAN STATE UNIV EAST LANSING DEPT OF PEDIATRICS/ HUMAN DEVELOPMENT

(U) Altered Regulation of Intercellular Communication by Epidermal Growth Factor, Transforming Growth Factor-Beta and Peptide Hormones in Normal Human Keratinocytes.

89 9P

PERSONAL AUTHORS: Trosko, James E.; Madhukar, Burra V.; Oh, Saw Y.; Chang, Chia-Cheng; Wade, M.

CONTRACT NO. AFOSR-86-0084

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR TR-89-0448

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Carcinogenesis, v10 n1 p13-20 1989.

ABSTRACT: (U) Since many chemical tumor promoters and some oncogens have been shown to inhibit gap junction-mediated intercellular communication, the effect of various growth factors on gap junctional intercellular communication on normal human keratinocytes was examined. In order to measure the effect of the growth factors on gap junctional communication, the scrape loading/dye transfer technique was used on human keratinocytes grown in a serum-free medium in vitro. At 24 h after treatment epidermal growth factor transforming growth factor-Beta, whole bovine pituitary extract and 12-O-tetradecanoyl-phorbol-13-acetate (TPA) inhibited intercellular communication. In order to study the possible mechanism by which the growth factors might inhibit intercellular communication, the effect of the growth factors on protein kinase C activation and alterations of intracellular free calcium was investigated. The results indicated that neither protein kinase C nor an increase in (Ca2+)i were involved in the modulation of gap junctional communication by epidermal growth factor or transforming growth factor Beta. The study suggests that

AD-A206 871

AD-A206 871 CONTINUED

in the human keratinocytes inhibition of intercellular communication may be involved (i) in the action of growth factors such as epidermal growth factor during cellular proliferation and (ii) in the differentiation of primary keratinocytes by transforming growth factor-Beta. Reprints. (AW)

DESCRIPTORS: (U) *EPIDERMIS, *GROWTH SUBSTANCES, *HORMONES, CELLS(BIOLOGY), CARCINOGENESIS, DYES, TRANSFER, PEPTIDE HYDROLASES, INHIBITION, CALCIUM, ACTIVATION, PITUITARY HORMONES.

IDENTIFIERS: (U) WUAFOSR2312A5, PE61102F, *Keratinocytes, Intercellular communication, *Gap junction intercellular communication, Tumor promoters, Orcogenes, Acetate/12-O-tetradecanoyl phorbo 1-13, Protein kinase C.

AD-A206 843 21/8.2 21/2

GEORGE WASHINGTON UNIV WASHINGTON DC

(U) Combustion Instability in Solid Rocket Motors.

DESCRIPTIVE NOTE: Final rept. Oct 85-Mar 89,

MAR 89 291P

PERSONAL AUTHORS: Price, E. W.; Flandro, G. A.

CONTRACT NO. F49620-86-C-0005

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-89-0460

UNCLASSIFIED REPORT

ABSTRACT: (U) This report consists of a partial manuscript of a book on combustion instability, and plans for future work to complete the book. The manuscript is submitted in it present form as a report of work completed. Combustion Instability, solid propellants, Rocket motors, Solid propellant rocket engines. (mjm)

DESCRIPTORS: (U) *COMBUSTION STABILITY, *SOLID PROPELLANT ROCKET ENGINES, BOOKS, REPORTS, ROCKET ENGINES, SOLID PROPELLANTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 840 12/7 12/4

GEORGIA INST OF TECH ATLANTA SCHOOL OF INFORMATION AND COMPUTER SCIENCE

(U) Parametric Analysis of Queueing Networks with Blocking.

DESCRIPTIVE NOTE: Final rept. 1 Nov 87-1 Nov 88,

NOV 88 10P

PERSONAL AUTHORS: Akyildiz, I. F.

CONTRACT NO. AFOSR-88-0028

PROJECT NO. 2304

TASK NO. A2

MONITOR: AFOSR TR-89-0424

UNCLASSIFIED REPORT

ABSTRACT: (U) As we already observed in the investigation of queueing networks with blocking that the throughout is a non-decreasing function of the number of jobs (3), i ..., the blocking events have the effect of violating the throughout results. Two questions arose from this observation: 1) How to distribute the total buffer capacity to the stations such that no deadlock will occur and a maximum (optional) throughout will be achieved?; and 2) Given the buffer capacity of each station in the network. How to select the total number of jobs in the network such that the throughput will be maximum (optimum)? To answer these questions first we assumed that all stations have infinite capacity and derived new formulas for optimal throughput and response times based on the well-known mean value analysis approach (4). Then in (5(we found necessary and sufficient conditions for buffer allocation in the cyclic networks with blocking such that an optimal throughput will be achieved. (kr)

DESCRIPTORS: (U) *NETWORKS, *QUEUEING THEORY, ALLOCATIONS, BLOCKING, BUFFERS, CAPACITY(QUANTITY), CYCLES, OPTIMIZATION, PARAMETRIC ANALYSIS, THROUGHPUT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A2.

AD-A206 840

AD-A206 839 21/2

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF MECHANICAL ENGINEERING

(U) Fuel Structure and Pressure Effects on the Formation of Soot Particles in Diffusion Flames.

DESCRIPTIVE NOTE: Annual technical rept. 15 Jan 88-15 Jan 89,

FEB 89 41P

PERSONAL AUTHORS: Santoro, Robert J.

CONTRACT NO. AFOSR-87-0145

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-89-0405

UNCLASSIFIED REPORT

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

ABSTRACT: (U) Studies emphasizing the effects of fuel molecular structure on soot formation processes in laminar diffusion flames have been investigated. Particular attention has been given to the particle inception and surface growth processes for a series of fuels. Studies of butane, 1-butene and 1,3 butadiene have revealed that fuel structure strongly affects the soot particle inception process. However, subsequent surface growth processes are largely determined by the available surface area. Thus, the surface growth process is independent of the fuel molecular structure following the initial particle inception stage. Studies of the particle inception region indicate that increased soot formation is strongly correlated with visible fluorescence measurements attributed to large polynuclear aromatic hydrocarbon species in the flame. Soot formation, Soot particles, Diffusion flames, Combustion. (jes)

DESCRIPTORS: (U) *COMBUSTION, BUTANES, DIFFUSION, FLAMES, FLUORESCENCE, FUELS, GROWTH(GENERAL), LAMINAR FLOW, MEASUREMENT, MOLECULAR STRUCTURE, PARTICLES, PRESSURE,

AD-A206 839

AD-A206 839 CONTINUED

SOOT, SURFACES, VISIBILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A206 832 7/2 7/3

ILLINOIS UNIV AT URBANA

(U) Thermotropic Ionic Liquid Crystals. 6. Structural Parameters of Solid and Liquid Crystal Phases of Anhydrous Short-Chain Sodium Alkanoates.

DESCRIPTIVE NOTE: Rept. for 1 Oct 85-31 Oct 86,

87 10P

PERSONAL AUTHORS: Phillips, M. L.; Jonas, J.

CONTRACT NO. AFOSR-85-0345

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-89-0250

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Liquid Crystals, v2 n3 p335-343 1987.

ABSTRACT: (U) Unit cell constants were determined from powder X ray diffraction photographs taken of several anhydrous short chain sodium alkanoates at room temperature. The temperature dependence of the bilayer spacing in the alkanoates was determined over the range 25-300 C. Overall changes in bilayer spacing between the solid and the neat phase were found to be much smaller than in long chain alkanoates. A correspondence was noted between the room temperature lateral packing area and the 23Na quadrupole coupling constant in the mesophase. The mesophase bilayer spacing was consistent with a structural model in which the tilted anion chain rotates on a cone. X ray diffraction; Thermotropic ionic liquid crystals; Short chain; Sodium alkanoates. Reprints. (mjm)

DESCRIPTORS: (U) *LIQUID CRYSTALS, *LIQUID PHASES, *SOLID PHASE, *SODIUM COMPOUNDS, *ALKANES, ANIONS, CELLS, CHAINS, CONICAL BODIES, CONSTANTS, LAYERS, MODELS, PARAMETERS, PHASE, REPRINTS, ROOM TEMPERATURE, SOLIDS, STRUCTURAL PROPERTIES, THERMAL PROPERTIES, TILT, X RAY DIFFRACTION.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 832 CONTINUED

IDENTIFIERS: (U) WUAFOSR2303A3, PE61102F, *sodium alkanoates

AD-A206 831 20/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Development of Practical MO Techniques for Prediction of the properties and Behaviour of Materials.

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 85-1 Nov 88,

JAN 89 34P

PERSONAL AUTHORS: Dewar, Michael J.

CONTRACT NO. AFOSR-86-0022

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-89-0242

UNCLASSIFIED REPORT

ABSTRACT: (U) Notable advances in computational procedures include development of AM1 parameters for phosphorus and sulfur, analytical derivatives for treatments including CI, a new and effective procedure for locating transition states, AM1 parameters for boron and silicon. Work has begun on two new semiempirical treatments. There has been a revision of current ideas concerning the mechanisms of pericyclic reactions and an extensive survey of elimination reactions. A novel mechanism for superconductivity has been suggested. Phosphorus parameters, Sulfur parameters, Superconductivity, Boron, Silicon. (jes)

DESCRIPTORS: (U) *SUPERCONDUCTIVITY, BORON, COMPUTATIONS, DERIVATIVES(MATHEMATICS), ELIMINATION REACTIONS, PARAMETERS, PHOSPHORUS, PREDICTIONS, SILICON, SULFUR, SURVEYS, TRANSITIONS.

IDENTIFIERS: (U) WUAFOSR2303B2, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 812 9/3

IOWA STATE UNIV IOWA CITY

(U) Partial Support of the International Laser Science Conference (3rd) Held in Atlantic City, New Jersey on 1-4 November 1987.

DESCRIPTIVE NOTE: Final rept. 15 Jul 87-14 Jul 88.

DEC 88 3P

PERSONAL AUTHORS: Stwalley, William C

CONTRACT NO. AFOSR-87-0319

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR TR-89-0413

UNCLASSIFIED REPORT

ABSTRACT: (U) The annual International Laser Science Conferences have been established to survey the core laser science areas including lasers and their properties, spectroscopy, laser-induced processes, and a selection of laser applications. This meeting is a Topical Conference of the American Physical Society (APS) and is also the annual meeting of the APS Topical Group on Laser Science. Earlier ILS Conferences were held in Dallas in 1985 (ILS-I) and in Seattle in 1986 (ILS-II). ILS-III was held in Atlantic City, New Jersey, November 1-4, 1987, with the co-sponsorship of the Optical Society of America. (mjm)

DESCRIPTORS: (U) *LASER APPLICATIONS, *LASERS, *SYMPOSIA, INTERNATIONAL, NEW JERSEY, PHYSICAL PROPERTIES, SELECTION, SPECTROSCOPY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1.

AD-A206 812

AD-A206 811 9/1 7/2

ILLINOIS UNIV AT URBANA DEPT OF ELECTRICAL AND COMPUTER ENGINEERING

(U) Non-Linear Optical Techniques for Thin Film Growth and Visible Ultraviolet Lasers.

DESCRIPTIVE NOTE: Final rept. 30 Sep 85-29 Sep 88.

NOV 88 49P

PERSONAL AUTHORS: Eden, J. G.

CONTRACT NO. F49620-85-C-0141

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR TR-89-0437

UNCLASSIFIED REPORT

ABSTRACT: (U) The goals of this AFOSR-supported program have been: 1) to investigate novel applications of non-linear gas phase photochemistry to the low temperature growth of semiconductor and metal films and 2) to develop new sources of stimulated emission at short wavelengths (lambda < 200 nm). This work has resulted in several significant accomplishments: 1) epitaxial semiconductor (Ge) films have been grown o GaAs at temperatures as low as 285 C by laser photochemical vapor deposition (LPVD); 2) NH3 has been demonstrated as a photosensitizer in the LPVD growth of films; 3) Ge/Si alloys have been grown by LPVD and analyzed; 4) the photochemical nature of laser assisted MOCVD growth of GaAs on GaAs has been demonstrated; and 5) the excited state structure of Zn2, Cd2, Ar2, and Ne2 has been examined by laser spectroscopy. Epitaxial, Semiconductor, Laser assisted, Ultraviolet germanium, Ionization, Lasers, Sensitizers, Gallium arsenides, Silicon. (mjm)

DESCRIPTORS: (U) *EPITAXIAL GROWTH, *GALLIUM ARSENIDES, *GERMANIUM, *METAL FILMS, *SILICON, *THIN FILMS, ALLOYS, EMISSION, FILMS, GROWTH(GENERAL), IONIZATION, LASERS, LOW TEMPERATURE, METHODOLOGY, NONLINEAR SYSTEMS, OPTICS, PHOTOCHEMICAL REACTIONS, PHOTOSENSITIVITY, SEMICONDUCTORS, SHORT WAVELENGTHS, SOURCES, SPECTROSCOPY.

AD-A206 811

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 811 CONTINUED

STIMULATION(GENERAL), ULTRAVIOLET LASERS, ULTRAVIOLET RADIATION, VAPOR DEPOSITION, VAPOR PHASES, VISIBILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1.

AD-A206 810 5/1

AIR FORCE OFFICE OF SCIENTIFIC RESEARCH BOLLING AFB DC

(U) Research Proposal Quarterly Status Report for July-September 1988,

OCT 88 67P

PERSONAL AUTHORS: Tyrrell, Debra

MONITOR: AFOSR
TR-89-0390

UNCLASSIFIED REPORT

ABSTRACT: (U) This Research Proposal Status Report is published quarterly as of March, June, September, and December of each year. It lists all the research proposals received by the Air Force Office of Scientific Research (AFOSR) in the six month period prior to the date of this report. Normally, decisions and actions are made within six months after receiving a research proposal. The action taken (i.e. Initiated, Declined, or Withdrawn) will be listed in this Report. The report is divided into two parts: Part I is the Institution Index which lists the proposals received, alphabetically by institution. Part II is the AFOSR Directorate Index in which the proposals received are listed alphabetically by Directorate and alphabetically by AFOSR Program Manager within the Directorate. The purpose of the quarterly report is to uniform other Government sponsoring agencies of the proposals received by the AFOSR and the action taken on these proposals. (KR)

DESCRIPTORS: (U) *RESEARCH MANAGEMENT, AIR FORCE RESEARCH.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI3?L

AD A206 739 20/5

CARNEGIE-MELLON UNIV PITTSBURGH PA DEPT OF ELECTRICAL AND COMPUTER ENGINEERIN G

(U) Associative Processors and Directed Graphs for Optical Processing.

DESCRIPTIVE NOTE: Final rept. Sep 84 Mar 89.

FEB 89 145P

PERSONAL AUTHORS: Casasent, David

CONTRACT NO. AFOSR-84-0293

PROJECT NO. 2305

TASK NO. B1

MONITOR. AFOSR
TR-89-0440

UNCLASSIFIED REPORT

ABSTRACT: (U) This presents the final report on our recent 4 year effort. We briefly review our prior feature space and distortion-invariant processors. We then highlight several of our optical Artificial Intelligence processor concepts. Emphasis is given to new associative processor and directed graph optical systems for large knowledge base processing. Keywords: Pattern recognition, Computer generated holograms, Feature extraction. (kr)

DESCRIPTORS: (U) *ASSOCIATIVE PROCESSING, *IMAGE PROCESSING, *GRAPHS, HOLOGRAMS, ARTIFICIAL INTELLIGENCE, PATTERN RECOGNITION, PROCESSING EQUIPMENT, EXTRACTION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B1, *Directed graphs, Knowledge base processing, Feature extraction.

AD-A206 739

AD-A206 737 23/3 12/9

BOSTON UNIV MA CENTER FOR ADAPTIVE SYSTEMS

(U) Neural Network Models of Vector Coding, Learning, and Trajectory Formation During Planned and Reactive Arm and Eye Movements.

DESCRIPTIVE NOTE: Interim rept.,

FEB 89 37P

PERSONAL AUTHORS: Grossberg, Stephen

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

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR
TR-89-0430

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Supported in part by NSF-IRI-87-16960.

ABSTRACT: (U) Contemporary neural network models provide insights into some of the organizational principles that govern biological sensory-motor systems, and offer a level of computational precision that enables sharp comparisons and contrasts to be made between different sensory-motor systems. The capacity of these models to clarify, integrate, and predict behavioral and neural data is predicated upon the coordinated use of theoretical, mathematical, computational and empirical tools in a manner that reveals many more constraints on brain design than empirical tools alone. No single experimental paradigm in the behavioral and brain sciences provides sufficiently many data to uniquely characterize a neural system. Interdisciplinary theoretical and empirical approaches that can coordinate and discover both top-down and bottom-up constraints at multiple levels of behavioral and neural organization provide a much greater level of guidance towards characterizing brain designs. The present chapter takes as its point of departure one important design principle that has been clarified by such an interdisciplinary approach. This is the principle of vector encoding that has been described, for example, in both the control of

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AD-A206 737 CONTINUED

saccadic eye movements by the superior colliculus and the control of arm movements by the motor cortex. Keywords: Neural networks; Eye movement; Arm movement; Robotics; Self-organization; Learning; Trajectory formation; Planning; Vector coding. (JHD)

DESCRIPTORS: (U) *NEURAL NETS, *ROBOTICS, CODING, EYE MOVEMENTS, GUIDANCE, LEARNING, MODELS, MOTORS, ORGANIZATIONS, THEORY, TRAJECTORIES, VECTOR ANALYSIS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A5.

AD-A206 737

AD-A206 736 21/5 20/13

UNITED TECHNOLOGIES RESEARCH CENTER EAST HARTFORD CT

(U) Three Dimensional Flow and Temperature Profile Attenuation in an Axial Flow Turbine.

DESCRIPTIVE NOTE: Final rept. 15 Dec 85-15 Mar 89,

MAR 89 136P

PERSONAL AUTHORS: Joslyn, David H.; Dring, Robert P.

CONTRACT NO. F49620-86-C-0020

PROJECT NO. 2307

TASK NO. A4

MONITOR: AFOSR TR-89-0439

UNCLASSIFIED REPORT

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

ABSTRACT: (U) While strongly three dimensional and highly unsteady nature of the flow in axial turbines has, until recently, defied in-depth analysis, the benefits that can be realized from an improved capability to predict the aerodynamics and heat transfer in turbines are numerous. These benefits include improved performance through higher efficiency, higher thrust-to-weight ratio through higher turbine inlet temperature, and improved durability through more precise predictions of local heat load. This program was particularly interested in the aerodynamic mechanisms affecting attenuation of a radial temperature profile in the flow as it passed through the turbine. The radial temperature profile in the flow exiting a combustor and entering a turbine can range from compressor exit temperature (approx = 1100 F) near the hub and tip end walls to a maximum (as high as 3200 F) in the midspan region. The heat load at any location on the turbine airfoils or end walls depends strongly on the local gas temperature at that location; hence the mixing, or attenuation, of the inlet temperature profile is of critical importance. This program has advanced the state-of-the-art by providing: 1) an exhaustive aerodynamic data base for the three dimensional flow in a large scale

AD-A206 736

AD-A206 736 CONTINUED

axial turbine; 2) an exhaustive data base documenting the mixing of a simulated combustor exit temperature profile as it passed through the turbine; and 3) an assessment of sota three dimensional time accurate, Navier-Stokes prediction of the flow in the turbine stage. Keywords: Temperature redistribution. (EDC)

DESCRIPTORS: (U) *AXIAL FLOW TURBINES, *THREE DIMENSIONAL FLOW, AERODYNAMICS, AIRFOILS, ATTENUATION, AXIAL FLOW, COMBUSTORS, COMPRESSORS, DATA BASES, DISTRIBUTION, EFFICIENCY, EXITS, GAS FLOW, GAS TURBINE BLADES, GASES, HEAT, HEAT TRANSFER, JET ENGINE INLETS, JET MIXING FLOW, NAVIER STOKES EQUATIONS, PRECISION, MATHEMATICAL PREDICTION, PROFILES, RATIOS, STATE OF THE ART, TEMPERATURE, THREE DIMENSIONAL, THRUST, TIME, WALLS, WEIGHT.

IDENTIFIERS: (U) End walls, PE61102F, WUAFOSR2307A4.

AD-A206 736

AD-A206 734 20/5

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF CHEMISTRY

(U) Studies on Ions and Neutrals Desorbed from Solid Surfaces by Ion and Electron Bombardment.

DESCRIPTIVE NOTE: Final rept. 1 Nov 84-31 Oct 88,

MAR 89 23P

PERSONAL AUTHORS: Winograd, Nicholas

CONTRACT NO. AFOSR-86-0028

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-89-0398

UNCLASSIFIED REPORT

ABSTRACT: (U) This project was aimed toward increasing our fundamental knowledge of the details of the interaction of energetic particles with solid surfaces. These studies included the measurement of the angular and energy contributions of the yield of desorbed ions by secondary ion mass spectrometry (SIMS). In addition, we developed a novel angle and energy resolved detector capable of measuring for the first time the yield of neutral particles desorbed from monolayers. This detector utilized multi-photon resonance ionization of the ejected atoms which occur at efficiencies approaching 100%. The results of the experimental measurements were coupled to classical dynamics calculations of the ion impact event. This approach has been pursued to utilize ion beams to examine the structure of surface layers through anisotropies observed in the angular distributions. A variety of materials including alloys, semi-conductors and organic monolayers on metals were candidates as model system. The experiments have opened new avenues for using ion beam methods for the trace analysis of important electronic materials at unprecedented sensitivity limited.

DESCRIPTORS: (U) *ELECTRON IRRADIATION, *IONS, *SOLID BODIES, *SURFACES, ALLOYS, ANGLES, ANISOTROPY, ATOMS, COMPUTATIONS, DISTRIBUTION, DYNAMICS, ELECTRONIC

AD-A206 734

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 734 CONTINUED

EQUIPMENT, ENERGETIC PROPERTIES, ENERGY, EXPERIMENTAL DATA, IMPACT, INTERACTIONS, ION BEAMS, IONIZATION, LAYERS, MASS SPECTROMETRY, MATERIALS, MEASUREMENT, METALS, MODELS, NEUTRAL, PARTICLES, PHOTONS, RESONANCE, TRACER STUDIES, YIELD.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A2.

AD-A206 734

• AD-A206 733 4/1

HAYSTACK OBSERVATORY WESTFORD MA

(U) Multi-Instrument Studies of the Auroral Ionosphere.

DESCRIPTIVE NOTE: Final rept. 1 Nov 85-31 Oct 88,

MAR 89 18P

PERSONAL AUTHORS: Foster, J. C.

CONTRACT NO. AFOSR-86-0023

PROJECT NO. 2310

TASK NO. A2

MONITOR: AFOSR
TR-89-0399

UNCLASSIFIED REPORT

ABSTRACT: (U) New data collection modes and analysis techniques were developed which provide good time and spatial coverage and empirical models of the high latitude ionosphere have been developed and tested. 1) The first three-radar azimuth scanning experiment was performed combining observations from Millstone Hill, Sondrestrom, and EISCAT to produce maps of the convection electric field at high latitudes at 30 minute intervals throughout an interval of increasing disturbance. 2) Empirical models of the ionospheric convection electric field were developed from an extensive radar data base. 3) Quantitative models have been developed describing the distribution of the field-aligned currents which link the ionosphere and magnetosphere at high-latitudes. 4) A test of the local midnight-sector differences in the ionospheric convection models based on incoherent scatter radar data and those based on satellite observations was completed. 5) A new class of intense radar backscatter from the topside F region was identified as produced by parallel current-induced enhancement of the acoustic line. 6) The general characteristics of coherent radar backscatter from E region irregularities as observed with the Millstone Hill UHF radar was the subject of an intensive study.

DESCRIPTORS: (U) +IONOSPHERE, ALIGNMENT, ARTIFICIAL SATELLITES, AURORAE, BACKSCATTERING, COHERENT RADAR,

AD-A206 733

AD-A206 733 CONTINUED

CONVECTION, CURRENTS, DATA ACQUISITION, DATA BASES, E REGION, ELECTRIC FIELDS, F REGION, HIGH LATITUDES, INCOHERENT SCATTERING, INTENSITY, IONOSPHERIC MODELS, MODELS, OPTIMIZATION, PARALLEL ORIENTATION, RADAR RADAR REFLECTIONS, SPATIAL DISTRIBUTION, ULTRAHIGH FREQUENCY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A2.

AD-A206 732 6/1 6/4

KENT STATE UNIV OHIO

(U) Description and Manipulation of Membrane Lipid Alterations Associated with Synaptic Functions in Isolated Cerebellar Glomeruli.

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

FEB 89 8P

PERSONAL AUTHORS: Dorman, Robert V.

CONTRACT NO. AFOSR-86-0045

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR TR-89-0404

UNCLASSIFIED REPORT

ABSTRACT: (U) Isolated cerebellar and Hippocampal mossy fiber synaptosomes were used to assess the relationships between membrane lipid metabolism and the evoked release of excitatory amino acid neurotransmitters. Mossy fiber terminals were radio-labeled with arachidonic acid and the effects of membrane depolarization and calcium influx on the labeling of the component lipid pools were determined. It was observed that depolarization and Ca2+ influx stimulated the accumulation of unesterified arachidonate. This effect was correlated with increased production of prostaglandins, and lipoxygenase inhibitors. The depolarization and arachidonate-induced transmitter release was mimicked by the addition of PGE2a and blocked by the cyclooxygenase inhibitor ibuprofen. The correlation of arachidonic acid metabolism with prostaglandin synthesis, ATPase inhibition and Ca2+ mobilization, suggests they may all play a role in the mechanisms of neurotransmitter release. (AW)

DESCRIPTORS: (U) *CEREBELLUM, *GLOMERULI, *LIPID METABOLISM, *MEMBRANES(BIOLOGY), *NEUROMUSCULAR TRANSMISSION, *SYNAPSE, AMINO ACIDS, CALCIUM, DEPOLARIZATION, FATTY ACIDS, FUNCTIONS, INHIBITION, ISOLATION, LIPIDS, METABOLISM, NERVE TRANSMISSION, PRODUCTION, PROSTAGLANDIN, RELEASE, BIOSYNTHESIS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 732 CONTINUED

HIPPOCAMPUS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2, Mossy fibers, Synaptosomes, Arachidonate, Ibuprofen, Calcium channels.

AD-A206 731 20/8

OREGON UNIV EUGENE INST OF THEORETICAL SCIENCE

(U) Ultrasmall Holographic X-Ray Gratings Using Synchrotron Radiation and X-Ray Lithographic Techniques.

DESCRIPTIVE NOTE: Final rept. 1 May 87-30 Apr 88,

NOV 88 31P

PERSONAL AUTHORS: Csonka, Paul L.; Tatchyn, Roman O.

CONTRACT NO. AFOSR-87-0211

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-89-0415

UNCLASSIFIED REPORT

ABSTRACT: (U) In a series of experiments use was made of radiation generated by the undulator magnet, recently installed on ALLADIN at the Synchrotron Radiation Center. Since the properties of that radiation were not previously known, the first step consisted of characterizing the radiation not only spectrally, but also in angular intensity space. The angular characterization was accomplished by allowing the radiation to paa through a pinhole before reaching a gold photodiode. The photodiode measurements served to ascertain the beam profiles along both the horizontal and vertical directions. In terms of the first harmonic frequency, v(1), the first harmonic photon energy, e(1), can be written as hv(1). At hv(1)=50 eV, the measurements confirmed expectations and demonstrated a Gaussian distribution along both axes. Two sets of measurement were performed: one with, the other without interposition of an aluminum filter 800 A(o) thick. Keywords: Grating; Lithography; Undulator. (JHD)

DESCRIPTORS: (U) *X RAY APPARATUS, *GRATINGS(SPECTRA), *LITHOGRAPHY, CYCLOTRON RESONANCE, ENERGY, HARMONICS, PHOTONS, GOLD, PHOTODIODES, SYNCHROTRONS, MEASUREMENT, NORMAL DISTRIBUTION.

AD-A206 731 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1, *Synchrotron radiation, Undulators, Wiggler magnets, *X ray gratings, Aluminum filters.

AD-A206 730 20/3

JOHNS HOPKINS UNIV LAUREL MD APPLIED PHYSICS LAB

(U) Organo-Metallic Elements for Associative Information Processing.

DESCRIPTIVE NOTE: Final rept. 15 Apr 85-15 Apr 88,

JAN 89 78P

PERSONAL AUTHORS: Potember, Richard S ; Poehler, Theodore O.

CONTRACT NO. AFOSR-85-0169

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-89-0388

UNCLASSIFIED REPORT

ABSTRACT: (U) In the three years of the program we have: (1) built and tested a 4 bit element matrix device for possible use in high density content-addressable memories systems; (2) established a test and evaluation laboratory to examine optical materials for nonlinear effects, saturable absorption, harmonic generation and photochromism; (3) successfully designed, constructed and operated a codeposition processing system that enables organic materials to be deposited on a variety of substrates to produce optical grade coatings and films. This system is also compatible with other traditional microelectronic techniques; (4) used the sol-gel process with colloidal AgTCNQ to fabricate high speed photochromic switches; (5) develop and applied for patent coverage to make VO2 optical switching materials via the sol gel processing using vanadium (IV) alkoxide compounds Nonlinear optics, conducting polymers, electrical switches, Charge-transfer complexes, organic solids, neural networks, Organic semiconductor, Photochromics, TCNQ VO2. (jes)

DESCRIPTORS: (U) *ASSOCIATIVE PROCESSING, *INFORMATION PROCESSING, *MICROELECTRONICS, *ORGANOMETALLIC COMPOUNDS, *PHOTOCHROMIC MATERIALS, ABSORPTION, CHARGE TRANSFER, DEPOSITION, ELECTRIC SWITCHES, HARMONIC GENERATORS,

AD A206 730 CONTINUED

NEURAL NETS, NONLINEAR SYSTEMS, OPTICAL COATINGS, OPTICAL MATERIALS, OPTICS, ORGANIC MATERIALS, PATENTS, PHOTOCHROMISM, POLYMERS, PROCESSING, SATURATION, SEMICONDUCTORS, SOLIDS, SUBSTRATES, SWITCHES, VANADIUM.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A206 694 9/1 12/1 20/3

CLAREMONT GRADUATE SCHOOL CA DEPT OF MATHEMATICS

(U) Three-Dimensional Modelling for Contact Resistance of Current Flow into a Source/Drain Region.

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

MAY 88 35P

PERSONAL AUTHORS: Cumberbatch, Ellis; Fang, Weifu

CONTRACT NO. AFOSR-87-0222

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR TR-89-0433

UNCLASSIFIED REPORT

ABSTRACT: (U) Various extensions of the transmission line model are introduced to find the resistance for current flow in MOSFET source/drain regions. The geometry is taken to be a rectangular box with a rectangular contact on the upper surface. Explicit formula are derived by assuming that the current flow is restricted to various geometrical planes. Comparison of basic results with simulation and experimental data is good. Comparison with simulation results for misalignment is less good. (mjm)

DESCRIPTORS: (U) *DRAINAGE, *MODELS, *MOSFET SEMICONDUCTORS, *SIMULATION, *TRANSMISSION LINES, BOXES, COMPARISON, EXPERIMENTAL DATA, FLOW, MISALIGNMENT, RECTANGULAR BODIES, REGIONS, SOURCES, SURFACES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A9.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 693 7/4 21/2

AEROCHEM RESEARCH LABS INC PRINCETON NJ

(U) Computer Modeling of Soot Formation Comparing Free Radical and Ionic Mechanisms.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 87-30 Sep 88,

MAR 89 41P

PERSONAL AUTHORS: Calcote, H. F.; Gill, Robert J.

REPORT NO. AEROCHEM-TP-482

CONTRACT NO. F49620-88-C-0007

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR 89-0417

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Pennsylvania State Univ., University Park.

ABSTRACT: (U) A collaborative effort has been initiated between AeroChem and Penn State to compare the relative importance of the free radical mechanism of Frenklach and associates and the ionic mechanism of Calcote and associates by use of a computer program run at Penn State. During the present report period: the thermodynamic data for some neutral species and the ions employed in the ionic mechanism were either compiled from the literature or calculated; the reaction mechanism was developed and the rate coefficients either obtained from the literature or estimated; and the ambipolar diffusion coefficients of the ions involved were calculated. Considerably more work is yet required in estimating the reaction rate coefficients. Comparative computer runs will first be made on the well documented sooting acetylene/oxygen/argon flat flame at a pressure of 1.67 kPa and a linear flow rate of 50 cm/s. Keywords: Soot formation; Ionic mechanism; Thermodynamics; Ion-Molecule reactions; Ion electron recombination; Ionic diffusion. (AW)

DESCRIPTORS: (U) *FREE RADICALS, *IONS, *SOOT, *FLAMES, CHEMICAL REACTIONS, COEFFICIENTS, COMPUTER APPLICATIONS, COMPUTER PROGRAMS, COMPUTERIZED SIMULATION, ELECTRONS, FLOW RATE, LINEARITY, MOLECULES, NEUTRAL, RATES, REACTION TIME, RESPONSE, THERMODYNAMICS, ACETYLENE, OXYGEN, ARGON, DIFFUSION, RECOMBINATION REACTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2, Ion molecule interactions, Ion electron interactions.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 685 20/3

WESTINGHOUSE RESEARCH AND DEVELOPMENT CENTER PITTSBURGH PA

(U) Superconducting Oxide Films for Multispectral Infrared Sensors.

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

FEB 89 43P

PERSONAL AUTHORS: Braginski, A. I.; Forrester, M. G.

REPORT NO. 89-9S52-INFSC-R1

CONTRACT NO. F49620-88-C-0030

PROJECT NO. D812

TASK NO. B1

MONITOR: AFOSR TR-0385

UNCLASSIFIED REPORT

ABSTRACT: (U) We have investigated optical detection in epitaxial and granular films of YBa2Cu3O7-Delta, at wavelengths of 0.63, 3.39, and 10.6 micrometers, at temperatures from 4.2K to 100K. Epitaxial films, and granular films fabricated at Westinghouse, exhibit an optically-induced voltage shift, Delta V, which is proportional to the temperature derivative of the sample dc resistance at the same bias current. Granular films provided by the University of Texas, which exhibit 'semiconducting' resistive behavior, exhibit a response which deviates from dR/dT, but which can be explained in terms of the temperature dependence of the film thermal conductance. The response time of all films is long and strongly wavelength dependent, varying from of order microseconds at 0.63 micrometers to tenths of a second at 3.39 micrometers. Our results indicate that all these films exhibit only bolometric or thermal detection, with no evidence for quantum or non-equilibrium effects in this temperature range. Superconductivity, High temperature, Infrared, Optical, Yttrium barium copper oxide, Thin films, Detection, Epitaxial, Granular. (jes)

DESCRIPTORS: (U) *SUPERCONDUCTIVITY, *THERMAL CONDUCTIVITY, BARIUM OXIDES, BIAS, BOLOMETERS, COPPER COMPOUNDS, DETECTION, DIRECT CURRENT, EPITAXIAL GROWTH, FILMS, HIGH TEMPERATURE, INFRARED DETECTORS, MICROSECOND TIME, MULTISPECTRAL, NONEQUILIBRIUM FLOW, OPTICAL DETECTION, OXIDES, RANGE(EXTREMES), REACTION TIME, RESISTANCE, SUPERCONDUCTORS, TEMPERATURE, THERMAL PROPERTIES, THERMAL RADIATION, THIN FILMS, YTTRIUM OXIDES.

IDENTIFIERS: (U) PE61102F, WUAFOSRD812B1.

AD-A206 685

AD-A206 685

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 683 7/4 12/1

PRINCETON UNIV NJ

(U) Lumped Model Generation and Evaluation: Sensitivity and Lie Algebraic Techniques with Applications to Combustion.

DESCRIPTIVE NOTE: Final technical rept.,

MAR 89 10P

PERSONAL AUTHORS: Rabitz, H.; Dryer, F. L.; Yetter, R.

CONTRACT NO. AFOSR-85-0346

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-89-0418

UNCLASSIFIED REPORT

ABSTRACT: (U) This program dealt with the development and application of new approaches for producing and evaluating semi-empirical (lumped parameter) models of physical processes. Procedures using local sensitivity gradient methods were used to study the existing lumped kinetic models for the moist carbon monoxide oxidation to show that transport processes can cause oversimplified lumped models derived from homogeneous kinetics to fail when applied to flame propagation systems. New models are under development which will include the appropriate level of detail. A Lie group formalism was developed to address global parameter space mapping issues for first order differential equations. The rigorous criteria for the existence of exact lumping by linear projective transformations was also established. (kr)

DESCRIPTORS: (U) *CARBON MONOXIDE, *COMBUSTION, *REACTION KINETICS, ALGEBRA, DIFFERENTIAL EQUATIONS, FLAME PROPAGATION, GRADIENTS, HOMOGENEITY, LIE GROUPS, MATHEMATICAL MODELS, MOISTURE, OXIDATION, PARAMETERS, SENSITIVITY, TRANSPORT PROPERTIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A7.

AD A206 683

AD-A206 682 13/13 20/11 8/10

NORTHWESTERN UNIV EVANSTON IL DEPT OF CIVIL ENGINEERING

(U) Dynamic Response of Embedded Structures.

DESCRIPTIVE NOTE: Final rept. 15 Jan 86-14 Jan 89,

JAN 89 26P

PERSONAL AUTHORS: Keer, Leon M.; Shah, Surendra P.

CONTRACT NO. AFOSR-86-0058

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR
TR-89-0421

UNCLASSIFIED REPORT

ABSTRACT: (U) A shock impulse environment simulated by low velocity impact (free-drop impact system) was developed to generate a well characterized dynamic loading on the free surface. Low velocity impact of a circular plate resting on sand provided the vehicle by which the dynamic loading on the free surface was characterized. An analysis based on linear elastodynamics was derived for transient waves on a thin plate resting on an elastic half-space (sand). The results provide an understanding of plate vibration (foundation vibration), of the interaction between the plate and the sand, and of the propagation of the load into the sand. The dynamic behavior of a typical elastic buried structure was studied by using plexiglass; where as micro reinforced-concrete was used to study the behavior of a buried reinforced concrete structure. Loading relief at the center of the roof of the buried structures was observed. Furthermore, the Stiffer structure was observed to the experience loss soil arching. When a linear-elastic dynamic analysis by the finite element method was conducted, the numerical results were found to have good correlation with the experimental observation of the peak displacement on the buried roof. However, the behavior after the peak response can not be simulated using the current linear elastic formulation. (AW)

DESCRIPTORS: (U) *DYNAMIC LOADS, *DYNAMIC RESPONSE,

AD-A206 682

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 682 CONTINUED

*ELASTIC PROPERTIES, *PLATES, *REINFORCED CONCRETE, *UNDERGROUND STRUCTURES, ARCHES, BURIED OBJECTS, DISPLACEMENT, ELASTIC WAVES, EMBEDDING, ENVIRONMENTS, FINITE ELEMENT ANALYSIS, FORMULATIONS, FREE DROPPING, IMPACT, LINEARITY, LOSSES, LOW VELOCITY, MECHANICAL PROPERTIES, NUMERICAL ANALYSIS, OBSERVATION, PEAK VALUES, PROPAGATION, IMPULSE LOADING, ROOFS, SAND, SHOCK(MECHANICS), SOILS, TRANSIENTS, VIBRATION, WAVES, IMPACT TESTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302C1.

AD-A206 681 12/3

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) A Dilogarithmic Extension of Liouville's Theorem on Integration in Finite Terms.

DESCRIPTIVE NOTE: Final rept. 1 Mar 87-28 Feb 88,

FEB 88 39P

PERSONAL AUTHORS: Moses, Joel; Baddoura, Jamil

CONTRACT NO. AFOSR-87-0167

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR TR-89-0432

UNCLASSIFIED REPORT

ABSTRACT: (U) The result obtained generalizes Liouville's Theorem by allowing, in addition to the elementary functions, dilogarithms to appear in the integral of an elementary function. The basic conclusion is that an associated function to the dilogarithm, if dilogarithms appear in the integral, appears linearly, with logarithms appearing in a non-linear way. (kr)

DESCRIPTORS: (U) *LIOUVILLE EQUATION, *THEOREMS, FUNCTIONAL ANALYSIS, NONLINEAR SYSTEMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A7, Liouville theorem.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 680 7/4

AAI CORP COCKEYSVILLE MD

(U) Femtosecond Real-Time Probing of Reactions. 3. Inversion to the Potential from Femtosecond Transition-State Spectroscopy Experiments,

JAN 89 15P

PERSONAL AUTHORS: Bernstein, Richard B.; Zewail, Ahmed H.

CONTRACT NO. AFOSR-87-0071

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-89-0420

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v90 n2 p829-842, 15 Jan 89. See also Volume 1, AD-A204 983.

ABSTRACT: (U) Fem-to-second transition state spectroscopy (FTS) of elementary reactions (M. Dantus, M. J. Rosker, and A.H. Zewail, J. Chem. Phys. 87, 2395 (1987)) provides real-time observations of photofragments in the process of formation. A classical mechanical description of the time dependent absorption of fragments during photodissociation (R. Bersohn and A. H. Zewail, Ber. Bunsenges. Phys. Chem 92, 373 (1988)) forms the basis for the present scheme for relating observations to the potential energy surface. A direct inversion scheme is presented that allows the difference in two relevant excited-state potential curves to be deducted from observed transients at different probe wavelength tunings. In addition, from the shape and dependence of the transients on pump wavelength, information on the lower of the two potential curves (i.e., that of the dissociating molecule) is obtained. The methodology is applied to the experimental FTS data (Dantus et al) on the CN photofragment from the ICN photodissociation. Fem-to-second transition state spectroscopy, Real time observations, Time dependent absorption fragments, Photodissociation Reprints. (mjm)

DESCRIPTORS: (U) *FRAGMENTS, *PHOTODISSOCIATION,

AD-A206 680

AD-A206 680 CONTINUED

*SPECTROSCOPY, *TRANSITIONS, ABSORPTION, FREQUENCY, INVERSION, MECHANICAL PROPERTIES, POTENTIAL ENERGY, PROBES, PUMPS, REAL TIME, REPRINTS, SURFACES, TIME DEPENDENCE, TRANSIENTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

AD-A206 680

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 676 7/2 7/4

UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF CHEMISTRY

(U) State to State Collision Induced Dissociation and Gas/ Surface Interactions.

DESCRIPTIVE NOTE: Final rept. Oct 85-Oct 88,

MAR 89 19P

PERSONAL AUTHORS: Wittig, Curt; Reisler, Hanna

CONTRACT NO. F49620-86-C-0004

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-89-0383

UNCLASSIFIED REPORT

ABSTRACT: (U) The main thrust of our contract was directed towards the study of gas surface interactions and the complementary collisionless photodissociation processes. Our initial experiments were concerned with NO scattering from an insulating MgO(100) single crystal surfaces, and the preliminary results have been published in Chem. Phys. Lett. We are now conducting experiments in which molecules with high kinetic energy are dissociated and/or ionized upon impact on surfaces. Our preliminary results, which are first of their kind since they involve state-resolved detection of the dissociation products, have been accepted as a Communication in the Journal of Chemical Physics. In parallel with these new experiments, we have continued our studies of the photophysics and photodissociation dynamics of molecules which are suitable candidates for the beam/surface and beam/beam experiments. These include detailed studies of the photodissociation dynamics of such molecules as nitrosyl cyanide, nitrosyl chloride, t-BuNO and n- and iso-nitrosopropane. Gas surface collisions, Scattering, Nitrogen oxide, Photodissociation dynamics, Dissociative scattering. (mjm)

DESCRIPTORS: (U) *GAS SURFACE INTERACTIONS, *NITROGEN OXIDES, *PHOTODISSOCIATION, *MAGNESIUM OXIDES, CHLORIDES,

AD-A206 676

AD-A206 676 CONTINUED

COLLISIONS, CYANIDES, DISSOCIATION, DYNAMICS, GASES, HIGH ENERGY, IMPACT, KINETIC ENERGY, MOLECULES, NITROSO COMPOUNDS, SCATTERING, SURFACES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

AD-A206 676

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 669 21/2

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MECHANICAL ENGINEERING

(U) Basic Instability Mechanisms in Chemically Reacting Subsonic and Supersonic Flows.

DESCRIPTIVE NOTE: Final scientific rept. 30 Sep 83-31 Dec 88.

FEB 89 21P

PERSONAL AUTHORS: Toong, Tau-Yi

CONTRACT NO. AFOSR-83-0373

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-89-0414

UNCLASSIFIED REPORT

ABSTRACT: (U) This report summarizes the main results and conclusions of research on turbulent combustion. The main objective was to determine and elucidate the mechanisms governing turbulence-combustion interactions in different spectral regimes. Problems studied included: 1) Structure of disturbed flames; 2) Evolution of turbulence-combustion interactions; and 3) Thermal and flow structures of turbulent premixed V-flames at low Damkoehler numbers. In an experimental investigation, simultaneous measurements of velocity and temperature in premixed, rod-stabilized, lean methane-air V-flames demonstrated the presence of high-frequency fluctuations within slowly drifting flame brushes, leading to temporal changes in flame shapes, thicknesses and propagation speeds. Cross-correlation coefficients of these simultaneous signals assumed high values within the reaction zone, suggesting the possibility that these fluctuations might be induced by the same governing mechanism. A theoretical study showed the importance of 'wrinkling like' effects as well as the effects of chemical reactions rate on the evolution of fluctuations in a reacting shear layer. The direct rate augmentation effects due to reaction led to changes in phase relationships between the various fluctuations, resulting

AD-A206 669 CONTINUED

in turbulent energy and mass transport in a direction opposite to that suggested by the gradient model.
Keywords: Reaction kinetics; Energy transport; Thermal and flow structures; Methane/ethane/air; High frequency fluctuations; Spectral density distributions; Probability density functions. (edc)

DESCRIPTORS: (U) *FLAME PROPAGATION, *COMBUSTION STABILITY, *SUBSONIC FLOW, *SUPERSONIC FLOW, *TURBULENCE, AIR, BRUSHES, BURNING RATE, CHEMICAL REACTIONS, COEFFICIENTS, COMBUSTION, CROSS CORRELATION, DRIFT, ENERGY, ENERGY TRANSFER, ETHANES, FLAMES, GRADIENTS, HIGH FREQUENCY, INTERACTIONS, LAYERS, MASS TRANSFER, MEASUREMENT, METHANE, MATHEMATICAL MODELS, PHASE, PROBABILITY DENSITY FUNCTIONS, RATES, REACTION KINETICS, SHAPE, SHEAR PROPERTIES, SIGNALS, SPECTRA, SPECTRAL ENERGY DISTRIBUTION, SYNCHRONISM, THERMAL PROPERTIES, THICKNESS, VARIATIONS, VELOCITY.

IDENTIFIERS: (U) Instability, Damkoehler number, PE61102F, WUAFOSR2308A2.

AD-A206 669

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 662 9/1

MINNESOTA UNIV MINNEAPOLIS INST FOR MATHEMATICS AND ITS APPLICATIONS

(U) Signal Processing.

DESCRIPTIVE NOTE: Final rept. 1 Jul-13 Dec 88,

FEB 89 39P

PERSONAL AUTHORS: Miller, Willard, Jr

CONTRACT NO. AFOSR-88-0283

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR
TR-89-0412

UNCLASSIFIED REPORT

ABSTRACT: (U) Partial Contents: On the complexity of pattern recognition algorithms on a tree-structured parallel computer; Soliton mathematics in signal processing; The phase problem of X-Ray crystallography; Extension problems under the displacement structure regime; Basic Algorithms in Tomography; Speech recognition using pattern recognition methods. Keywords: Abstracts. (kr)

DESCRIPTORS: (U) *SIGNAL PROCESSING, *SPEECH RECOGNITION, ALGORITHMS, CRYSTALLOGRAPHY, DISPLACEMENT, METHODOLOGY, PATTERN RECOGNITION, TOMOGRAPHY, X RAYS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A6.

AD-A206 662

AD-A206 656 21/2 17/5.1 17/5.2

CHEMICAL DYNAMICS CORP UPPER MARLBORO MD

(U) Calculation of Kinetic Data for Processes Leading to UV Signatures.

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-31 Jan 89,

MAR 89 56P

PERSONAL AUTHORS: Swaminathan, P. K.; Natanson, G. A ; Garrett, B. C.; Redmon, M. J.

CONTRACT NO. F49620-88-C-0085

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR
TR-89-0395

UNCLASSIFIED REPORT

ABSTRACT: (U) Novel state-of-the-art computational techniques were developed and validated for studying collisional processes responsible for producing infrared and ultraviolet signatures in rocket plumes. The promising new methods involve computation of cross sections and rates within a semiclassical methodology. Two of the key beneficiary programs are the SPURC and the CHARM programs which require detailed microscopic dynamical information (kinetic rates and cross sections) about such collisional processes for successful modeling of the chemistry within appropriate flowfield simulation codes. Successful prediction and interpretation of ultraviolet signatures require treating collision induced transitions between different electronic states caused by the coupling between electronic and nuclear motions in molecules during collisions. Electronic transitions bring in inherently quantum mechanical effects that have no analog in classical mechanics. The task of numerically solving the quantum mechanical equations of motion is still an unsolvable computational problem for many realistic molecular systems. The semiclassical theory is accurate enough to reproduce specific quantum mechanical features necessary, because it leads to ordinary differential equations instead of the partial differential equations of quantum mechanics. Electronic

AD-A206 656

AD-A206 656 CONTINUED

structure information required in modelling the production of candidate excited species, nitrogen, nitric oxide, and hydroxyl radical molecules in some elementary reactions was analyzed. It was determined that modern quantum chemistry can provide all the required information involving excited hydroxyl production and less extensive data for other systems. (jhd)

DESCRIPTORS: (U) *EXHAUST PLUMES, *INFRARED SIGNATURES, *HYDROXYL RADICALS, *EMISSION SPECTRA, *ROCKET EXHAUST, *ULTRAVIOLET SIGNATURES, CODING, PARTICLE COLLISIONS, COMPUTATIONS, CROSS SECTIONS, DIFFERENTIAL EQUATIONS, DYNAMICS, ELECTRON TRANSITIONS, ELECTRONIC STATES, ELECTRONICS, FLOW FIELDS, KINETICS, MICROSCOPY, MOLECULAR STRUCTURE, MOLECULES, NITROGEN, NITROGEN OXIDES, PARTIAL DIFFERENTIAL EQUATIONS, PRODUCTION, QUANTUM CHEMISTRY, QUANTUM THEORY, REACTION KINETICS, SIMULATION, STATE OF THE ART, TRANSITIONS.

IDENTIFIERS: (U) PE65502F, WUAFOSR3005A1.

AD-A206 655 12/4

ILLINOIS UNIV AT URBANA COORDINATED SCIENCE LAB

(U) Stochastic Systems with Multiple Decision Makers and Parametric Uncertainties.

DESCRIPTIVE NOTE: Final rept. 1 May 85-30 Apr 88,

JUN 88 27P

PERSONAL AUTHORS: Basar, Tamer

CONTRACT NO. AFOSR-84-0056

PROJECT NO. 2304

TASK NO. A8

MONITOR: AFOSR
TR-89-0423

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report summarizes the findings of research on the topic Stochastic Dynamic Systems with Multiple Decision Makers and Parametric Uncertainties, supported by a Grant from the Air Force Office of Scientific Research, during the period May 1, 1985-April 30, 1988. The focus of the research during this three-year period has been on the development of methodologies and new solution techniques for obtaining strategies in stochastic systems, with good sensitivity properties, and for deriving optimal decision rules in systems with nonclassical information patterns. A further major thrust has been on the development of learning schemes and distributed algorithms for multiple decision-maker problems under different types of uncertainty. (kr)

DESCRIPTORS: (U) *DECISION MAKING, *STOCHASTIC PROCESSES, ALGORITHMS, DISTRIBUTION, DYNAMICS, LEARNING, METHODOLOGY, OPTIMIZATION, PATTERNS, SENSITIVITY, SOLUTIONS(GENERAL).

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A8.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 654 7/4 14/2

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) Nuclear Magnetic Resonance and Laser Scattering Techniques at High Pressure,

87 44P

PERSONAL AUTHORS: Jonas, Jiri

CONTRACT NO. AFOSR-85-0345

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-89-0251

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in High Pressure Chemistry and Biochemistry, p193-235 1987.

ABSTRACT: (U) This review covers various aspects of nuclear magnetic resonance spectroscopy and laser Raman and Rayleigh spectroscopy at high pressure. The presentation is organized into the following main sections: 1. Introduction; 2. Experimental High Pressure NMR Techniques; 3. Experimental High Pressure Laser Scattering Techniques; 4. Applications of NMR at High Pressure; 5. Applications of Laser Raman Scattering at High Pressure. The main emphasis is on studies aimed towards improving our fundamental understanding of the dynamic structure of fluids but several examples dealing with disordered solids are also included. High pressure; Raman scattering fluids; Disordered solids; Nuclear magnetic resonance; Reprints. (mjm)

DESCRIPTORS: (U) *LASERS, *LIGHT SCATTERING, *NUCLEAR MAGNETIC RESONANCE, *NUCLEAR RADIATION SPECTROSCOPY, *RAMAN SPECTROSCOPY, DYNAMICS, FLUIDS, HIGH PRESSURE, ORDER DISORDER TRANSFORMATIONS, RAMAN SPECTRA, REPRINTS, SOLIDS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303, A3.

AD-A206 643 7/3

NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) Convenient Routes to Di-tert-butylsilanediyl: Chemical, Thermal and Photochemical Generation,

OCT 88 3P

PERSONAL AUTHORS: Boudjouk, Philip; Samaraweera, Upasiri; Sooriyakumaran, Ratnasabapathy; Chrusciel, Jerzy; Anderson, Kevin R.

CONTRACT NO. AFOSR-88-0060

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-89-0369

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Angewandte Chemie, International Edition in English, v27 n10 p1355-1356 Oct 88.

ABSTRACT: (U) Although the chemistry of the silanediyl is well developed and of continuing interest, there are few convenient methods for generating these species on a preparative scale. We had need for a variety of methods for making di-tert-butylsilanediyl (2) and in this communication we report three convenient routes for generating this intermediate, possibly in a complexed form like 8, in high yields. Silane, Butyl radicals, Reprints. (mjm)

DESCRIPTORS: (U) *BUTYL RADICALS, *SILANES, CHEMISTRY, PHOTOCHEMICAL REACTIONS, REPRINTS, YIELD.

IDENTIFIERS: (U) WUAFOSR2303B2, PE61102F, *silanediyl/di-tert-butyl.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 605 1/3 11/6

WYMAN-GORDON CO WORCESTER MASS

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

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

MAR 89 35P

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

CONTRACT NO. F49620-86-C-0024

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR TR-89-0400

UNCLASSIFIED REPORT

ABSTRACT: (U) Direct SEM measurement of closure local to crack tips in several structural alloys was performed. Growth rates for both large and small cracks in an aluminum alloy, a nickel-base superalloy, and an intermetallic alloy were correlated by formulating correctly the crack driving force. It was determined that apparent differences in crack growth rates under varying circumstances, including variable amplitude loading, were caused not by differences in the intrinsic crack advance mechanism, but rather by inaccuracies in determining the proper transfer function between the conventional cyclic stress intensity, and the true local crack driving force. The relationship between microstructure and fracture toughness was investigated for state-of-the-art Al-Fe-X alloys. Relevant fracture mechanisms and origins of fracture toughness were identified, and analyzed in terms of microstructural factors (dispersoids and oxide fragments). The origin of the brittle-to-ductile transition in Al-Fe-X was identified, and shown to be controlled by the tearing modulus. Concepts for increasing toughness were established. Aircraft. (JES)

DESCRIPTORS: (U) *AEROSPACE CRAFT, *ALLOYS, *CONSTRUCTION MATERIALS, *FRACTURE(MECHANICS), *FATIGUE(MECHANICS), AIRCRAFT, ALUMINUM ALLOYS, AMPLITUDE,

AD-A206 605 CONTINUED

CRACK PROPAGATION, CRACKS, CYCLES, DISPERSIONS, FORCE(MECHANICS), FRAGMENTS, GROWTH(GENERAL), INTENSITY, IRON ALLOYS, METALLURGY, MICROSTRUCTURE, NICKEL ALLOYS, OXIDES, RATES, STATE OF THE ART, STRESSES, STRUCTURAL PROPERTIES, SUPERALLOYS, TOUGHNESS, TRANSFER FUNCTIONS, VARIABLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A1, LPN-SWRI-06-8972, LPN-SWRI-8972/5, Crack tips.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 599 7/2

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Reactions of Laser-Generated CF2 (Free Radicals) on Silicon and Silicon Oxide Surfaces.

DESCRIPTIVE NOTE: Scientific interim rept.,

89 11P

PERSONAL AUTHORS: Langan, J. G.; Shorter, J. A.; Xin, Xu; Joyce, S. A.; Steinfeld, J. I.

CONTRACT NO. F49620-86-C-0003, $NSF-CHE86-02986

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-89-0367

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Surface Science, v207 p344-353 1989.

ABSTRACT: (U) The reactions of CF2, generated by UV laser photolysis of gas phase precursors, have been investigated for single crystal silicon and thermally deposited silicon oxide surfaces. CF2 deposits intact on the oxide surface, but undergoes partial dissociative chemisorption on clean silicon surfaces. Neither silicon nor silicon oxide are spontaneously etched by CF2 under the conditions of these experiments. Silicon, Silicon oxide, Fluorocarbon, Chemisorption, Reprints. (mjm)

DESCRIPTORS: (U) *DISSOCIATION, *FLUORINATED HYDROCARBONS, *OXIDES, *PHOTOLYSIS, *SILICON, *SILICON COMPOUNDS, *SINGLE CRYSTALS, CHEMISORPTION, FREE RADICALS, PRECURSORS, REPRINTS, SURFACES, ULTRAVIOLET LASERS, VAPOR PHASES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1, *Carbon difluoride.

AD A206 599

AD-A206 595 20/5

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Energy and Chemical Change.

DESCRIPTIVE NOTE: Final rept. 1 Nov 86-1 Nov 88,

NOV 88 30P

PERSONAL AUTHORS: Levine, R. D.; Kinsey, J. L.

CONTRACT NO. AFOSR-86-0011

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-89-0434

UNCLASSIFIED REPORT

ABSTRACT: (U) The algebraic approach to the structure and dynamics of molecules has been applied in a number of ways: The ability to compute the spectra of energy-rich molecules has been demonstrated. Broad gateway states have been examined for vibrationally excited molecules. A link between the intramolecular dynamics and the statistical analysis of spectra has been established. The underlying potential energy has been determined directly from the observed spectra. The intramolecular dynamics of vibrationally excited acetylene has been studied and the spectral signatures of vibrational energy pathways have been examined. Keywords: Energy rich molecules; Spectrum; Intensity distribution; Reaction pathways. (JES)

DESCRIPTORS: (U) *ELECTROMAGNETIC SPECTRA, MOLECULE MOLECULE INTERACTIONS, CHEMICAL REACTIONS, ACETLYLENE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

AD A206 595

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 594 7/2 7/4

VANDERBILT UNIV NASHVILLE TN DEPT OF CHEMISTRY

(U) Ab Initio Studies of Molecular Structures and Energies. 2 Energies and Stabilities of PH(n), SH(n), and C1H(n) Compounds.

89

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

CONTRACT NO. AFOSR-86-0146

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-89-0441

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical Society, v111 n5 p1552 1558 1989 See also Volume 1, AD-A174 601.

ABSTRACT: (U) The energies and molecular structures of the highly coordinated species PH5, SH4, SH6, C1H3, and C1H5 have been derived by ab initio computations. Of particular interest are C1H3, which is of C2v symmetry, and C1H5, which is C4v. MP2 vibrational frequencies were derived for each species. Each was found to be structurally stable, although C1H7 was found to be unstable. The enthalpies and free energies for the decomposition of each species with respect to loss of H and H2 were computed. Each was found to be thermodynamically unstable with respect to these processes except loss of H atoms by PH5, SH6, and SH4. The thermodynamic instability was greatest for the chlorine hydrides. The energy of each compound was analyzed by use of the ab initio multicenter energy resolution, a method of analysis that was found to be an especially powerful way of elucidating the nature of its bonding and the origins and degree of its structural stabilities. Molecular stability, Hydrogen compounds, Hypervalent, Quantum chemistry. Reprints. (mjm)

DESCRIPTORS: (U) *ENERGETIC PROPERTIES, *HYDRIDES, *HYDROGEN COMPOUNDS, *QUANTUM CHEMISTRY, *STABILITY.

AD-A206 594

AD-A206 594 CONTINUED

CHLORINE, COMPUTATIONS, DECOMPOSITION, ENERGY, MOLECULAR STRUCTURE, MOLECULES, PH FACTOR, REPRINTS, RESOLUTION, STRUCTURAL PROPERTIES, THERMODYNAMICS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

AD A206 594

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 593 7/4

VANDERBILT UNIV NASHVILLE TN DEPT OF CHEMISTRY

(U) Perturbative Corrections to Basis Incompleteness in Molecular SCF Calculations.

89 14P

PERSONAL AUTHORS: Ewig, Carl S.; Smentek-Mielczarek, Lidia; Hess, B A., Jr

CONTRACT NO. AFOSR-86-0146

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-89-0409

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Theoretica Chimica Acta, v75 p129-141 1989.

ABSTRACT: (U) A unified summary is presented of the mathematical approach developed by McDowell for employing perturbation theory to correct for basis-set incompleteness in ab initio SCF calculations. Revised expressions for the corrections to the wavefunction both in terms of orbitals and spin orbitals are presented with explicit incorporation of the spin variables. Employing H2O as an example, we show that this approach is considerably more powerful for computing molecular energies with standard basis sets than was indicated by previous work. In particular at the higher levels of approximation it accurately reproduces the effect of polarization functions in sets such as 6-31G* and 6-31G**. The equilibrium molecular structure of H2O was also computed by this approach and found to give good accuracy In each case perturbing functions coupled to both occupied and virtual orbitals are required for acceptable results. Perturbation theory, Green's functions, Basis sets, Quantum mechanics, Water Reprints (mjm)

DESCRIPTORS: (U) ACCURACY, CORRECTIONS, ENERGY, EQUILIBRIUM(GENERAL), FUNCTIONS, GREENS FUNCTION, MATHEMATICS, MOLECULAR STRUCTURE, MOLECULES, PERTURBATION THEORY, PERTURBATIONS, POLARIZATION, QUANTUM THEORY,

AD A206 593

AD-A206 593 CONTINUED

REPRINTS, SPINNING(MOTION), VARIABLES, WATER, WAVE FUNCTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

AD A206 593

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 591 7/1 11/9

SRI INTERNATIONAL MENLO PARK CA

(U) Reaction Kinetics and Chemo-Rheology of Poly(p-phenylenebenzobisthiazole) Polymerization in the Ordered Phase.

JUL 88 10P

PERSONAL AUTHORS: Chow, Andrea W.; Sandell, Janet F.; Wolfe, James F.

REPORT NO. SRI-PYU-4621

CONTRACT NO. F49620-85-K-0015

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-89-0396

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Polymer, v29 p1307-1312 1988.

ABSTRACT: (U) The phenomenon of mesophase-enhanced polymerization of the rodlike polymer poly(phenylenebenzobisthiazole) at 15% by weight in polyphosphoric acid has been investigated. The reacting mixture becomes anisotropic at an early stage of the polymerization. The reaction rate increases significantly at the isotropic-nematic phase transition as the rods are aligned in positions more favourable for the condensation reaction to occur. The chemo-rheological properties at high shear rates but not at low shear rates, also indicate the occurrence of the phase change. A systematic study of the effects of shear rate and temperature suggests that initial mixing of the monomer mixture below the polymerization temperature greatly influences the final achievable molecular weight of the polycondensation reaction. Keywords: Polymers, Fibers heat treatment, Polymerization, Phosphoric acids, Rod polymers, Polyphosphoric acids, Reprints. (sdw)

DESCRIPTORS: (U) *PHOSPHORIC ACIDS, *POLYMERS, *REACTION KINETICS, *RHEOLOGY, ACIDS, CONDENSATION REACTIONS, FIBERS, HEAT TREATMENT, HIGH RATE, LOW RATE, MIXTURES,

AD A206 591

AD-A206 591 CONTINUED

MOLECULAR WEIGHT, MONOMERS, PHASE TRANSFORMATIONS, POLYMERIZATION, RATES, REACTION TIME, REPRINTS, RODS, SHEAR PROPERTIES, TEMPERATURE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3, Chemorheology, Phenylenebenzobisthiazole.

AD-A206 591

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 590 20/12 9/3

NOTRE DAME UNIV IN

(U) Vibrational, Mechanical, and Thermal Properties of III-V Semiconductors.

DESCRIPTIVE NOTE: Final technical rept. 1 Sep 85-31 Aug 88.

FEB 89 8P

PERSONAL AUTHORS: Dow, John D.

CONTRACT NO. AFOSR-85-0331

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR TR-89-0387

UNCLASSIFIED REPORT

ABSTRACT: (U) Theories of the mechanical, vibrational, and electronic properties of III-V semiconductors have been developed and applied to (i) help determine the feasibility of InN-based visible and ultraviolet lasers and light detectors, (ii) develop a theory of phonons in semiconductor alloys, (iii) understand surface reconstruction of semiconductors, (iv) predict the effects of atomic correlations on the light-scattering (Raman) properties of semiconductive alloys, (v) develop a new first principles pseudo-function implementation of local-density theory, (vi) study the oxidation of GaAs, (vii) develop a theory of scanning tunneling microscope images, and (viii) understand the electronic and optical properties of highly strained artificial semiconductors and small semiconductor particles. (JHD)

DESCRIPTORS: (U) *SEMICONDUCTOR DEVICES, *OPTICAL DETECTORS, *SEMICONDUCTOR LASERS, *ULTRAVIOLET DETECTORS, ATOMIC PROPERTIES, CORRELATION TECHNIQUES, ELECTRONICS, GALLIUM ARSENIDES, GROUP III COMPOUNDS, GROUP V COMPOUNDS, OPTICAL IMAGES, ELECTRONICS, MICROSCOPES, OPTICAL PROPERTIES, OXIDATION, PARTICLE SIZE, PHONONS, SCANNING, SEMICONDUCTORS, THEORY, THERMAL PROPERTIES, TUNNELING(ELECTRONICS), ULTRAVIOLET LASERS.

AD-A206 590

AD-A206 590 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2306B1, Group III-V semiconductors.

AD-A206 590

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 589 7/3 7/6 11/2

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Organosilicon Compounds and Polymers and Silicon Ceramics.

DESCRIPTIVE NOTE: Final scientific rept. 1 Oct 85-31 Oct 88,

MAR 89 14P

PERSONAL AUTHORS: Seyferth, Dietmar

CONTRACT NO. AFOSR-85-0265

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-89-0389

UNCLASSIFIED REPORT

ABSTRACT: (U) The n-BuLi/Me3COK reagent metalates every fourth CH2 group of (CH3)2SiCH2. The metalated polymer was converted to vinyl-containing polycarbosilanes whose reaction with (CH3SiH)x(CH3Si)yn gave useful preceramic polymers. Cross-linkable CH3(H)SiCH2N has been prepared using CH3(Ph)SiCH2n as starting material. The reactions of (CH3SiH)x(CH3Si)yn with Cp2MMe2 (M= Ti, Sr Hf) gave precursors for SiC/MC blends. 1,1,3,3-Tetramethyl-1,3-disilacyclobutane can be metalated with t-BuLi/TMEDA. Keywords: Metal carbonyls, 1,1,3,3-Tetramethyl-1,3-disila cyclobutane, Biscyclopentad ienyldimethyl derivatives, Polycarbosilanes, Polysilanes, Silicon carbide. (aw)

DESCRIPTORS: (U) *CERAMIC MATERIALS, *ORGANIC COMPOUNDS, *POLYSILANES, *SILICON COMPOUNDS, METAL CARBONYLS, POLYMERS, SILICON, SILICON CARBIDES, STARTING.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, Polycarbosilanes, Cyclobutanes.

AD-A206 589

AD-A206 539 20/4

CALIFORNIA INST OF TECH PASADENA GRADUATE AERONAUTICAL LABS

(U) Unsteady and Separated Flows.

DESCRIPTIVE NOTE: Annual technical rept. 1 Oct 87-30 Sep 88,

NOV 88

PERSONAL AUTHORS: Dimotakis, P. E.; Leonard, A.; Roshko, A.

CONTRACT NO. F49620-86-C-0134

PROJECT NO. 3484

TASK NO. A1

MONITOR: AFOSR
TR-89-0386

UNCLASSIFIED REPORT

ABSTRACT: (U) A computer controlled system for the X-carriage on the Tow Tank has been installed. A force balance for measuring dynamic forces on models carried by the carriage has been built and installed. Initial measurements of such forces have been obtained on a flat-plate airfoil at various angles of attack. Optical and computer components have been assembled and integrated into a system for acquiring and processing streakline images of fluorescent particles in flow fields in water. Water-tunnel experiments on a Liebeck airfoil showed that a large cavity on the upper surface (to establish a free shear layer along the pressure plateau) promotes reattachment into the adverse pressure gradient and delays stall. Unsteady flow; Separated flow; Vortex interaction; Flow control. (mjm)

DESCRIPTORS: (U) *COMPUTERS, *CONTROL SYSTEMS, *FLOW FIELDS, *FLOW SEPARATION, *UNSTEADY FLOW, ADVERSE CONDITIONS, AIRFOILS, ANGLE OF ATTACK, BALANCE, CAVITIES, CONTROL, DYNAMIC LOADS, FLOW, FLUORESCENCE, IMAGES, INTERACTIONS, LAYERS, MEASUREMENT, MODEL BASINS, OPTICAL EQUIPMENT, PARTICLES, PLATES, PRESSURE GRADIENTS, SHEAR PROPERTIES, SURFACES, VORTICES, WATER.

AD-A206 539

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 539 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR3484A1.

AD-A206 495 7/2 7/3

BRISTOL UNIV (ENGLAND) DEPT OF INORGANIC CHEMISTRY

(U) Chemistry of Polynuclear Metal Complexes with Bridging Carbene or Carbyne Ligands. Part 83. Molybdenum and Tungsten Complexes Containing the Alkylidyne Group C(eta6-C6H4(OMe-2)Cr(CO)3).

88

PERSONAL AUTHORS: Fernandez, Jose R.; Stone, F. G.

CONTRACT NO. AFOSR-86-0125

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-89-0344

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the Chemical Society, Dalton Trans., p3035-3040, 1988.

ABSTRACT: (U) In our early work on polynuclear metal compounds with bridging alkylidyne ligands we employed as a precursor the compound W(=CC6HMe-4)(CO)2(eta-C5H5). In this paper we introduce a further class of mononuclear metal alkylidyne complex for use in the preparation of compounds having metal metal bonds. In the new reagents, the molybdenum or tungsten atoms are ligated by the alkylidyne group CC6H4OMe-2, the arene ring of which is eta-co- ordinated to a Cr(CO)3 moiety. The resulting products thus contain an additional metal-ligand fragment. Reprints. (mjm)

DESCRIPTORS: (U) *METAL COMPLEXES, *METAL COMPOUNDS, *MOLYBDENUM, *TUNGSTEN, ATOMS, BRIDGES, CARBENES, CHEMICAL AGENTS, CHEMISTRY, LIGANDS, METAL METAL BONDS, PREPARATION REPRINTS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 494 7/3

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF CHEMISTRY

(U) Reactions of (eta 5-C5H5)(eta 5-C5Me5r(Si(SiMe3)3)X (X = Cl, Me) Complexes with Carbon Monoxide and the Isocyanide 2,6-Me2C6H3NC. Crystal Structure of (eta 5-C5H5)-(eta 5 -C5Me5r(eta 2-C(N-2,6-Me2C6H3)Si(SiMe3)3) Cl.

88

PERSONAL AUTHORS: Elsner, Frederick H.; Tilley, T. D.; Rheingold, Arnold L.; Geib, Steven J.

CONTRACT NO. AFOSR-85-0228

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-89-0346

UNCLASSIFIED REPORT

ABSTRACT: (U) Early transition metal silyl compounds are proving to have a rich reaction chemistry that is distinct from that of late transition metal silyl derivatives. For example, early transition metal (do) silyl complexes are reactive toward insertions of unsaturated substrates into their M-Si bonds, whereas late metal silyls typically are not. We are interested in the factors that influence this insertion chemistry, and have observed that the reactivity of early metal-silicon bonds varies considerably as the metal, and substituents at both the metal and silicon, are changed. Here we describe some insertion chemistry that has been observed for the mixed-ring zirconium silyls. Reprints. (mjm)

DESCRIPTORS: (U) *BONDING, *CARBON MONOXIDE, *METALS, *SILICON, CHEMICAL REACTIONS, CRYSTAL STRUCTURE, REACTIVITIES, REPRINTS, TRANSITION METALS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A206 487 22/1 12/1

VIRGINIA UNIV CHARLOTTESVILLE DEPT OF APPLIED MATHEMATICS AND COMPUTER SCIENC E

(U) Increasing the Margin of Stability of Arbitrarily Finite Modes of Flexible Large Space Structures with Damping.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 87-31 Aug 88,

DEC 88

PERSONAL AUTHORS: Lasiecka, I.; Triggiani, R.

REPORT NO. UVA/525683/AM89/102

CONTRACT NO. AFOSR-87-0321

MONITOR: AFOSR TR-89-0328

UNCLASSIFIED REPORT

ABSTRACT: (U) Achievements during this report period include new results for wave equations and plate equations, linear and nonlinear, on the following problems: exact controllability, strong and uniform stabilization, structural damping, quadratic optimal control problem, Riccati equations, and numerical aspects thereof. Keywords: Space based flexible structures, Equations of motion.

DESCRIPTORS: (U) *DAMPING, *CONTROL SYSTEMS, *FLEXIBLE STRUCTURES, *SPACECRAFT, CONTROL, EQUATIONS OF MOTION, OPTIMIZATION, QUADRATIC EQUATIONS, RICCATI EQUATION, SPACE BASED, STABILITY, STABILIZATION, STRUCTURAL PROPERTIES, WAVE EQUATIONS.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 486 20/8

CALIFORNIA UNIV BERKELEY LAWRENCE BERKELEY LAB

(U) Low Energy X-Ray and Electron Physics and Technology for High-Temperature Plasma Diagnostics.

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

OCT 87

PERSONAL AUTHORS: Henke, Burton L.

CONTRACT NO. AFOSR-ISSA-87-0019

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR
TR-89-0195

UNCLASSIFIED REPORT

ABSTRACT: (U) This program in low-energy x-ray physics and technology has expanded into a major program with the principal objective of supporting research and application programs at the new large x-ray source facilities, particularly the high temperature plasma and synchrotron radiation sources. This program addresses the development of absolute x-ray diagnostics for the fusion energy and x-ray laser research and development. The new laboratory includes five specially designed spectrographic stations for the measurement of x-rays and the associated photoemissions in the 100-10,000 eV region. Keywords: X-ray diagnostics; X-ray lasers, Fusion energy. (jhd)

DESCRIPTORS: (U) *X RAY APPARATUS, *CONTROLLED NUCLEAR FUSION, *X RAY DIAGNOSTICS, ELECTRONS, HIGH TEMPERATURE, LASERS, LOW ENERGY, MEASUREMENT, PLASMA DIAGNOSTICS, PLASMAS(PHYSICS), RADIATION, SPECTROGRAPHS, STATIONS, SYNCHROTRONS, X RAYS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1, X ray lasers.

AD-A206 470 20/4

MASSACHUSETTS UNIV AMHERST DEPT OF MATHEMATICS AND STATISTICS

(U) Vortex Dynamics and Vortex Breakdown.

DESCRIPTIVE NOTE: Annual rept. 1 Mar 87-28 Feb 88,

AUG 88

PERSONAL AUTHORS: Berger, Melvyn S.

CONTRACT NO. AFOSR-87-0170

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR
TR-89-0351

UNCLASSIFIED REPORT

ABSTRACT: (U) Topics studied include: 1) I have been able to determine analytically vortex rings and bubbles with swirl via the Stokes stream-function from an isoperimetric variational viewpoint extending my previous work, and 2) In the case of thin vortex rings I have been able to establish analytically the Hamiltonian formulation and the calculus of variations. (edc)

DESCRIPTORS: (U) *VORTICES, BUBBLES, CALCULUS OF VARIATIONS, DYNAMICS, FORMULAS(MATHEMATICS), HAMILTONIAN FUNCTIONS, RINGS, THINNESS.

IDENTIFIERS: (U) Vortex rings, Vortex breakdown, WUAFOSR2304A9, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 469 12/1 12/6

COLORADO UNIV AT DENVER

(U) Fast Algorithms for Partial Differential Equations on Advanced Computers.

DESCRIPTIVE NOTE: Final rept. 1 Feb 86-1 May 88,

MAR 89

PERSONAL AUTHORS: Manteuffel, Thomas A.

CONTRACT NO. AFOSR-86-0061

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR
TR-89-0352

UNCLASSIFIED REPORT

ABSTRACT: (U) This report covers four areas of research. The first area is an analysis of preconditionings. We have examined the properties that a preconditioning must possess in order to yield an iterative method with convergence properties independent of the discretization parameters. The second area is an attempt to provide a framework for the construction of conjugate gradient methods. The third area of research is the analysis of the equations governing the transport of neutrally charged particles and the construction of iterative methods for the solution of discrete transport equations. The final area of research is supraconvergence which deals with accurately approximating the solution of partial differential equations on highly irregular meshes. The first topic is very theoretical in nature but will have important implications to the practical choice of preconditionings. The second area is also theoretical in nature, but leads immediately to the development of new iterative methods. The third area builds on the analysis of the continuous operators to yield insight into the behavior of discrete approximations. The final goal of this third project is the development of efficient numerical methods for the solution of discrete transport equations on massively parallel machines. The final area of research will lead to more efficient solution of differential equations on irregular meshes. (KR)

AD-A206 469

AD-A206 469 CONTINUED

DESCRIPTORS: (U) *ALGORITHMS, *PARTIAL DIFFERENTIAL EQUATIONS, APPROXIMATION(MATHEMATICS), BEHAVIOR, CHARGED PARTICLES, COMPUTERS, CONSTRUCTION, CONVERGENCE, DIFFERENTIAL EQUATIONS, DISCRETE DISTRIBUTION, EFFICIENCY, EQUATIONS, GRADIENTS, ITERATIONS, METHODOLOGY, NUMERICAL METHODS AND PROCEDURES, PARALLEL PROCESSORS, SOLUTIONS(GENERAL), TRANSPORT PROPERTIES, YIELD.

IDENTIFIERS: (U) WUAFOSR2304A3, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 468 14/2

ARIZONA UNIV TUCSON OPTICAL SCIENCES CENTER

(U) Laboratory for X-Ray Optics.

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

OCT 88

PERSONAL AUTHORS: Falco, C. M.

CONTRACT NO. AFOSR-86-0347

PROJECT NO. 3396

TASK NO. A6

MONITOR: AFOSR
TR-89-0293

UNCLASSIFIED REPORT

ABSTRACT: (U) A silicon/metals molecular beam epitaxy (MBE) apparatus was purchased with this support. The capability for producing MBE multilayer coatings for use in the 10-A to 300-A wavelength range (i.e., between soft x rays and the extended ultraviolet, referred to here as X-UV) is unique at laboratories conducting research in the field of x-ray optics. The University of Arizona now has a complete program, with capabilities for design, fabrication, characterization, and testing of multilayer coatings for the XUV; for development of state-of-the-art instrumentation to produce and characterize these materials; and for training graduate students and visiting scientists in this important field. (JHD)

DESCRIPTORS: (U) *EPITAXIAL GROWTH, *X RAY APPARATUS, COATINGS, INSTRUMENTATION, LAYERS, OPTICS, SILICON, SOFT X RAYS, STATE OF THE ART, FAR ULTRAVIOLET RADIATION, X RAYS, MOLECULAR BEAMS.

IDENTIFIERS: (U) WUAFOSR3396A6, PE61102F.

AD-A206 468

AD-A206 438 21/2 20/4

CALIFORNIA UNIV IRVINE DEPT OF MECHANICAL ENGINEERING

(U) Fundamental Studies on Spray Combustion and Turbulent Combustion.

DESCRIPTIVE NOTE: Annual technical rept. 1 Nov 87-31 Oct 88,

FEB 89

PERSONAL AUTHORS: Sirignano, W. A.; Samuelsen, G. S.; Rangel, R. H.; Chiang, C.-H.; Miralles-Wilhelm, F.

CONTRACT NO. AFOSR-86-0016

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-89-0436

UNCLASSIFIED REPORT

ABSTRACT: (U) Four major research tasks were performed during the year. Several prototype liquid atomization experimental designs were developed and tested, and the pulse visualization system was demonstrated. A nonlinear theory for liquid sheet deformation has been developed that predicts vortical rollup of the liquid-gas interface and allows for a rough estimate of early ligament dimensions in the atomization process. The turbulent reactive flow study identifies that the mixing and entrainment rates are identical on the high-speed and low-speed sides of a constant-density mixing layer. The formation, merging, and pairing of vortical structures is also predicted. Variable property effects have been included in the vaporizing droplet theory providing significant modifications on drag coefficients, Nusselt number, and Sherwood numbers. Modified correlations for higher transfer numbers are being developed and interacting droplets are considered. Keywords: Spray combustion, Turbulent combustion, Atomization.

DESCRIPTORS: (U) *ATOMIZATION, *COMBUSTION, *TURBULENT FLOW, *VORTICES, COEFFICIENTS, DEFORMATION, DRAG, DROPS, ENTRAINMENT, ESTIMATES, FLOW, GASES, INTERACTIONS, INTERFACES, LIGAMENTS, LIQUIDS, LOW VELOCITY,

AD-A206 438

AD-A206 438 CONTINUED

MODIFICATION, NONLINEAR SYSTEMS, PROTOTYPES, RATES, REACTION KINETICS, ROUGHNESS, SHEETS, SIDES, SPRAYS, THEORY, TRANSFER, TURBULENCE, VARIABLES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A206 414 7/4

BRISTOL UNIV (ENGLAND) DEPT OF INORGANIC CHEMISTRY

(U) Chemistry of Polynuclear metal complexes with Bridging Carbene or Carbyne Ligands. Part 84. Carbarorane Tungsten Platinum Complexes having a Mu-CC6H3ME(2)-2,6 Ligand: Crystal Structures of (WPt(MU- CC6H3ME(2)-2,6) (CO)N-(Pet3)(MU-Alp;ha:ETA5-C2B9HMe2)(N= 2 or 3).

89

MONITOR: AFOSR-TR-89-0347
24804.7-MS

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in ANTEC, p1626-1629 1988.

ABSTRACT: (U) The reaction between the salts in acetone at low temperature affords the dimetal compound in which the carbarborane ligand forms a B-H+Pt three center bond by employing a BH group in the pentagonalface of the cage. This product readily affords the complex (WPt(MU-CCH3Me202-6) (CO)2(Pet3)-(MU-:N5-C2B9H8ME2) as a mixture of two isomers. The structure of the major isomer has been established by the X Ray diffraction.

DESCRIPTORS: (U) *CARBENES, *LIGANDS, *METAL COMPLEXES, ACETONES, LOW TEMPERATURE, ISOMERS, MIXTURES, REPRINTS, BONDED JOINTS, TUNGSTEN, BORON, CRYSTAL STRUCTURE, HYDROGEN, LOSSES, X RAY DIFFRACTION.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 411 7/4

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) Femtosecond Studies of Electron-Cation Geminate Recombination in Water.

89

PERSONAL AUTHORS: Lu, Hong; Long, Frederick H.; Bowman, Robert M.; Eisenthal, Kenneth B.

CONTRACT NO. AFOSR-88-0014

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-89-0356

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v93 n1 p27-28 1989.

ABSTRACT: (U) Femtosecond photoionization studies in neat water at room temperature have been performed. After the electron has solvated, we have seen for the first time geminate recombination of the electron cation pair formed upon ionization. The recombination kinetics appears to level off after roughly 60ps with 50-60% of the electrons having undergone geminate recombination. Reprints. (mjm)

DESCRIPTORS: (U) *PHOTOIONIZATION, *RECOMBINATION REACTIONS, *WATER, CATIONS, ELECTRONS, IONIZATION, REACTION KINETICS, REPRINTS, ROOM TEMPERATURE, TEMPERATURE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A206 384 7/4

NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) A New Catalyst for the Efficient and Selective Beta-Hydrosilylation of Acrylonitrile. Effect of Ultrasound.

89

PERSONAL AUTHORS: Rajkumar, Amirthini B.; Boudjouk, Philip

CONTRACT NO. AFOSR-88-0060

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-89-0373

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Organometallics, v8 p549-550 1989.

ABSTRACT: (U) While there is an abundance of catalysts that are useful in promoting the addition of the Si-H bond across alkenes and alkynes, relatively few agents efficiently catalyze the hydrosilylation of acrylonitrile. In particular, catalysts that lead to exclusively Beta-addition to the double bond in acrylonitrile are rare and generally give low yields. These include tertiary amines, platinum on carbon, Raney nickel, amides, and phosphines. The two most effective catalysts are a three-component system (CuCl/n-Bu3N/N,N,N',N'-tetramethylethylene-diamine (TMEDA) developed by Bluestein which requires temperatures of 50-126 C for 40 h to give 75% yields of Beta-adduct (7.5:1:1.2 mol ratio of reactants/CuCl/amines) and a binary system of a copper compound (Cu2O, CuCl, or Cu(acac)2) and an isocyanide developed by Svoboda et al., which requires heating to 120 C for 2 h to give 70-75% yields of Beta-adduct (9:0.1:0.3 mol ratio of reactants/Cu catalysts/isocyanide). Reprints. (jes)

DESCRIPTORS: (U) *ACRYLONITRILE POLYMERS, *BONDING, *CATALYSTS, *REACTANTS(CHEMISTRY), ALKENES, ALKYNES, AMIDES, AMINES, CARBON, COPPER COMPOUNDS, PHOSPHINE, PLATINUM, RATIOS, REPRINTS, YIELD.

AD-A206 411

AD-A206 384

AD-A206 384 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A206 377 12/9

BOSTON UNIV MA CENTER FOR ADAPTIVE SYSTEMS

(U) Sustained Oscillations in a Symmetric Cooperative-Competitive Neural Network: Disproof of a Conjecture about Content Addressable Memory,

88

PERSONAL AUTHORS: Cohen, Michael A.

CONTRACT NO. F49620-86-C-0037

MONITOR: AFOSR TR-89-0341

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Neural Networks, v1 p217-221 1988.

ABSTRACT: (U) Cohen and Grossberg proved that a large class of neural networks with symmetric interaction coefficients admit a global Liapunov function guaranteeing that their trajectories approach equilibrium points. Such networks function as content-addressable memories, and the equilibria are the stored memories. Cohen and Grossberg also conjectured, based upon substantial computational evidence, that networks within a class of mixed cooperative-competitive networks with symmetric interaction coefficients also have this property. This conjecture is here disproved. In particular, a class of homogeneous, distance-dependent, on-center off-surround neural networks are constructed which supports persistent oscillations for appropriate initial data. Such a class is constructed in each even dimension. Similary systems, which have been used to model the dynamics of the hippocampus, are compared to this class of networks to clarify the origins of oscillatory class of behavior in this class of systems. Reprints. (JHD)

DESCRIPTORS: (U) *MEMORY DEVICES, *NEURAL NETS, COEFFICIENTS, COMPUTATIONS, DYNAMICS, FUNCTIONS, HIPPOCAMPUS, INTERACTIONS, NETWORKS, OSCILLATION, REPRINTS, SIZES(DIMENSIONS), SYMMETRY, LYAPUNOV FUNCTIONS, ADDRESSING.

IDENTIFIERS: (U) PE61102F, Addressable memories.

AD-A206 377

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 372 7/6 20/6

PENNSYLVANIA UNIV PHILADELPHIA DEPT OF PHYSICS

(U) Molecular Optics Nonlinear Optical Processes in Organic and Polymeric Crystals and Films.

DESCRIPTIVE NOTE: Final rept. Jun 85-Apr 88,

APR 88

PERSONAL AUTHORS: Garito, A. G.

CONTRACT NO. F49620-85-C-0105

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-89-0360

UNCLASSIFIED REPORT

ABSTRACT: (U) Experimental and theoretical studies have firmly established that the largest second and third order microscopic nonlinear optical susceptibilities occur in organic and polymer systems. This major development has resulted in studies in optical bistability, phase conjugate wave generation, and neural networks. The physical microscopic origin and mechanism of second and third order nonlinear optical responses in conjugate polymers has been investigated. New theoretical concepts relating to the many-body nature of highly charge-correlated pi-electron states have been developed. The nonlinear optical responses of new pi-electron topological structures have been calculated, optical bistability in nonlinear optical conjugated polymers has been demonstrated. (mjm)

DESCRIPTORS: (U) *CRYSTALS, *NONLINEAR SYSTEMS, *OPTICAL MATERIALS, *OPTICAL PROPERTIES, *ORGANIC MATERIALS, *POLYMERS, EXPERIMENTAL DATA, NEURAL NETS, RESPONSE, THEORY, WAVE PROPAGATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A206 372

AD-A206 368 7/2 7/4 9/3

HUGHES RESEARCH LABS MALIBU CA

(U) Cooperative Phenomena for New Coherent Radiation Sources.

DESCRIPTIVE NOTE: Final rept. 14 May 87-14 Jun 88,

OCT 88

PERSONAL AUTHORS: McFarlane, R. A.

CONTRACT NO. F49620-85-C-0058

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR TR-89-0321

UNCLASSIFIED REPORT

ABSTRACT: (U) The principal objective of this research is to investigate, both theoretically and experimentally, cooperative optical transitions in solids, with the goal of finding efficient systems for the generation of upconverted stimulated emission. Of interest also are new optical pair effects and studies of the resonance fluorescence and coherence on cooperative transitions. In the third year of the program, significant advances were made in the experimental aspects. Measurements of upconversion dynamics were made in erbium-doped crystals and in a fluorozirconate glass. Upconversion laser operation was observed at two visible wavelengths in YLiF4:Er 5% and pumping pathways identified. Spectral and lifetime studies are reported for promising new laser host materials. Upconversion lasers; Cooperative phenomena; Pair processes; Rare earth ions; Solid state lasers; Coherent sources; Yhrium; Lithium fluorides; Erbium. (mjm)

DESCRIPTORS: (U) *COHERENT RADIATION, *ERBIUM, *LASER MATERIALS, *LITHIUM FLUORIDES, *OPTICAL PROPERTIES, *RARE EARTH ELEMENTS, *SOLID STATE LASERS, COHERENCE, CONVERSION, DYNAMICS, EFFICIENCY, EMISSION, FLUORESCENCE, FREQUENCY, IONS, LASERS, OPERATION, RESONANCE, SOLIDS, SOURCES, SPECTRA, STIMULATION(GENERAL), TRANSITIONS, VISIBILITY.

AD-A206 368

AD-A206 368 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A1.

AD-A206 338 7/2 7/4

PITTSBURGH UNIV PA SURFACE SCIENCE CENTER

(U) Observation of Adsorbate Vibrational Amplitude Modification during a Phase Transformation in the Overlayer.

DEC 88

PERSONAL AUTHORS: Kiskinova, Maya; Szabo, Andras; Yates, John T., Jr

CONTRACT NO. AFOSR-82-0133

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR TR-89-0314

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review Letters, v61 n25 p2875-2878, 19 Dec 88.

ABSTRACT: (U) The digital electron stimulated desorption ion angular distribution method has been used to observe the amplitude of the low frequency frustrated-translational modes of chemisorbed CO on Pt(111) when the CO adsorbs on empty Pt sites present in a p (2x2)-Se overlayer. Significant changes in the CO vibrational amplitudes are observed during a two-dimensional phase transition driven by repulsive forces in the overlayer. This work represents the first observation of the relationship between the vibrational amplitude of an adsorbed molecule and a phase transformation in an overlayer. Keywords: Surface phase transformation, Adsorbate, Frustrated translation, Selenium, Carbon monoxide, Platinum, Reprints. (MJM)

DESCRIPTORS: (U) *ADSORPTION, *CARBON MONOXIDE, *PHASE TRANSFORMATIONS, *PLATINUM, *SELENIUM, AMPLITUDE, MOLECULES, OBSERVATION, REPRINTS, SURFACES, TWO DIMENSIONAL, VIBRATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A2, platinum(111).

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 335 3/2

WYOMING UNIV LARAMIE DEPT OF PHYSICS AND ASTRONOMY

(U) Ground-Based Infrared Observations of Sources Discovered by the AFGL, FIRRSE and IRAS Infrared Surveys.

DESCRIPTIVE NOTE: Final rept. 15 Jul 84-14 Jul 87,

JUN 88 4P

PERSONAL AUTHORS: Spillar, E J.

CONTRACT NO. AFOSR-85-0058

PROJECT NO. 2311

TASK NO. A1

MONITOR: AFOSR TR-89-0345

UNCLASSIFIED REPORT

ABSTRACT: (U) The contracts research objective was to understand the infrared sources discovered by the AFGL, FIRRSE and IRAS Infrared Surveys. Work has continued on young stellar objects with a variety of collaborators. In particular, extensive infrared and radio observations have yielded new information on the true nature of this highly energetic outflow object. Particular results are the lack of a disk and the resolution of accelerated shells. High resolution maps have been made of several other young stellar objects in an effort to understand the energetics and nature of the objects. The group has continued its investigation of comets. Comets investigated include Giacobini-Zinner and Halley. Emphasis has been on understanding the emission from the dust in these objects. Because of the changing illumination of these dust grains, and the well understood geometry of comets, these objects provide unique information on interstellar dust. (JHD)

DESCRIPTORS: (U) *INFRARED RADIATION, *ASTRONOMY, COMETS, COSMIC DUST, ENERGETIC PROPERTIES, GEOMETRY, HIGH RESOLUTION, ILLUMINATION, INTERSTELLAR SPACE, MAPS, OBSERVATION, RESOLUTION, SOURCES, ACCELERATION, STARS, SURVEYS.

AD A206 335

AD-A206 335 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2311A1, *Infrared astronomy, Infrared sources(Astronomy).

AD A206 335

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 331 1/1 20/4

FLOW INDUSTRIES INC KENT WA

(U) Unsteady Flows Around Three-Dimensional Lifting Surfaces.

DESCRIPTIVE NOTE: Final technical rept. 1 May 83-30 Sep 85,

NOV 85

PERSONAL AUTHORS: Gad-el-Hal, Mohamed

REPORT NO. FLOW-RR-342

CONTRACT NO. F49620-85-C-0028

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR
TR-89-0305

UNCLASSIFIED REPORT

ABSTRACT: (U) The time-dependent flows around wings and slender bodies of revolution undergoing large amplitude harmonic motions were investigated using unique flow visualization techniques. The lifting surfaces were towed in an 18-meter water channel at Reynolds numbers up to 750,000. The effects of planform, leading edge contour, reduced frequency and Reynolds number were investigated. The unsteady separation phenomenon was found to be significantly different from the separation on a lifting surface in steady flight. The role of the separation vortices was elaborated and a model of the flow field is proposed. Keywords: Pitch motion, Delta wings, Maneuverability, Unsteady separated flows, Lifting surfaces, Three-dimensional wings, Body of revolution, Supermaneuverability. (EDC)

DESCRIPTORS: (U) *DELTA WINGS, *FLOW SEPARATION, *LIFTING SURFACES, *UNSTEADY FLOW, AMPLITUDE, BODIES OF REVOLUTION, CONTOURS, FLIGHT, FLOW, FLOW FIELDS, FLOW VISUALIZATION, HARMONICS, LEADING EDGES, MANEUVERABILITY, MOTION, PITCH(MOTION), PLANFORM, REYNOLDS NUMBER SLENDER BODIES, STEADY STATE, THREE DIMENSIONAL, TIME DEPENDENCE, TOWED BODIES, VORTICES, CHANNELS(WATERWAYS).

AD-A206 331

AD-A206 331 CONTINUED

IDENTIFIERS: (U) Supermaneuverability, PE61102F, WUAFOSR2307A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 289 7/3

NORTH DAKOTA STATE UNIV FARGO DEPT OF CHEMISTRY

(U) Reductive Coupling of Carbonyl Compounds with Zinc and Trimethylchlorosilane to Produce O-Silylated Pinacols. Effect of Ultrasonic Waves,

88

PERSONAL AUTHORS: So, Jeung-Ho; Park, Moon-Kyeu; Boudjouk, Philip

CONTRACT NO. AFOSR-88-0060

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-89-0370

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Organic Chemistry, v53 p5871-5875 1988.

ABSTRACT: (U) Trimethylchlorosilane reacts with carbonyl compounds in the presence of zinc to give O-silylated pinacols, vicinal bis(trimethylsiloxy)alkanes, in good yields via reductive dimerization. This is a very mild route to bis(siloxy)alkanes, which are easily converted to pinacols or pinacolones in excellent yields. Electron-donating groups accelerate coupling while electron-withdrawing groups have an inhibiting effect. Cross-coupling reactions yield a mixture of bis(siloxy)alkanes. Ultrasonic irradiation of these reactions increases the yields up to 50% compared to stirring at the same temperature. Silanes, Methyl radicals, Chlorine compounds, Reprints. (mjm)

DESCRIPTORS: (U) *SILANES, *METHYL RADICALS, *CARBONYL COMPOUNDS, ZINC, CHEMICAL REACTIONS.

AD-A206 289

AD-A206 257 7/2 7/4

SRI INTERNATIONAL MENLO PARK CA

(U) Free Radical-Surface Interactions Using Multiphoton Ionization of Free Radicals.

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 85-30 Sep 88.

JAN 89

PERSONAL AUTHORS: Robertson, Robert M.; Golden, David M.; Rossi, Michael J.

CONTRACT NO. F49620-86-K-0001

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-89-0302

UNCLASSIFIED REPORT

ABSTRACT: (U) Free Radical and Atom Surface interactions have been studied in a low pressure reactor (Knudsen cell) where the atomic and molecular transients predominantly collide with the walls of the reaction vessel. The approach taken involved generating the neutral transients using IR-multiphoton decomposition of an appropriate precursor and subsequently exposing the photolysis products to given surfaces at variable temperature (ambient to 450 C). The detection was performed by molecular beam sampling mass spectrometry and in situ Resonance enhanced Multiphoton Ionization using a tunable dye laser. The combination of both techniques affords the possibility to determine the kinetics of the neutral transients in quantitative terms, that is competition between first order and second-order processes, and the determination of quantitative REMPI ionization cross sections. The heterogeneous loss rate constants are cast in the form of a sticking coefficient for a specific radical on a given surface. We have investigated the interaction of CF3 radical on SiO2 and Si over a range of temperatures. SiH2 has been investigated in its interaction with solid Si- containing surfaces, and I and Br atoms have been studied as to their reaction with various surfaces. Sticking coefficients, Free radicals

AD-A206 257

AD-A206 257 CONTINUED

atoms, Cross section, Silicon, Carbon trifluoride, Silicon dioxide. (mjm)

DESCRIPTORS: (U) *CARBON, *FLUORIDES, *FREE RADICALS, *PHOTOIONIZATION, *SILICON, *SILICON DIOXIDE, ATOMS, CHEMICAL RADICALS, COEFFICIENTS, CONSTANTS, CROSS SECTIONS, DETECTION, DYE LASERS, HETEROGENEITY, INTERACTIONS, IONIZATION, KNUDSEN GAGES, LOSSES, NEUTRAL, PHOTOLYSIS, RATES, SURFACE CHEMISTRY, SURFACES, TEMPERATURE, TRANSIENTS, TUNABLE LASERS, VARIABLES, WALLS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1, LPN-PYU-1227, *Carbon trifluoride.

AD-A206 239 20/4 12/1

SIBLEY SCHOOL OF MECHANICAL AND AEROSPACE ENGINEERING
ITHACA NY

(U) An Algorithm for Tracking Fluid Particles in Numerical Simulations of Homogeneous Turbulence.

DEC 88

PERSONAL AUTHORS: Yeung, P. K.; Pope, Steven B.

CONTRACT NO. AFOSR-85-0083

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-89-0322

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Computational Physics, v79 n2 p373-415 Dec 88.

ABSTRACT: (U) Lagrangian statistical quantities are of fundamental physical importance in our understanding of turbulence, but are very difficult to measure and hence infrequently reported in the literature. A particle-tracking algorithm is developed to extract accurate Lagrangian statistics from numerically calculated velocity fields. Lagrangian time-series are obtained from the method of direct numerical simulation, which supplies the Eulerian velocity field on a three-dimensional grid network. The accuracy of the Lagrangian time series depends, primarily, on the accuracy of the interpolation scheme used to calculate fluid-particle velocities. Interpolation schemes based on Taylor series and on cubic splines have been implemented and tested. Errors in computed particle displacement are quantified for simple frozen velocity fields. The algorithm is applied to stationary homogeneous isotropic turbulence with the energy maintained by artificial forcing. It is demonstrated that with adequate spatial resolution, accurate estimates of Lagrangian statistics such as velocity autocorrelations, structure functions, and frequency spectra can be obtained either with a third order Taylor series interpolation scheme or with a cubic spline scheme. Cubic splines give higher interpolation

AD-A206 239 CONTINUED

accuracy, but they are difficult to implement in codes that rely on secondary storage. Keywords: Numerical simulation; Lagrangian; Turbulence; Reprints. (JHD)

DESCRIPTORS: (U) *DIGITAL SIMULATION, *TRACKING, *TURBULENCE, ACCURACY, ALGORITHMS, AUTOCORRELATION, CUBIC SPLINE TECHNIQUE, DISPLACEMENT, ESTIMATES, FLUIDS, GRIDS, HOMOGENEITY, INTERPOLATION, ISOTROPISM, LAGRANGIAN FUNCTIONS, NETWORKS, PARTICLES, REPRINTS, RESOLUTION, SECONDARY, SPATIAL DISTRIBUTION, STATIONARY, STATISTICAL DATA, STATISTICS, STORAGE, TAYLORS SERIES, THREE DIMENSIONAL, TIME SERIES ANALYSIS, VELOCITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A206 239

AD-A206 238 21/2 17/5

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF MECHANICAL ENGINEERING

(U) Optical Measurements of Soot Particles in Flames.

88

PERSONAL AUTHORS: Santoro, Robert J.

CONTRACT NO. AFOSR-87-0145

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-89-0323

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Proceedings of Materials Research Society Symposium, v117 p157-163 1988.

ABSTRACT: (U) The formation and growth of soot particles in combustion systems represents an area of significant research interest. Critical to progress in this area has been development of suitable optical diagnostic techniques. Principal among this has been the utilization of laser light scattering techniques to obtain particle size and concentration information. When combined with measurements of other quantities such as the velocity, the resulting spatially and temporally resolved measurements can be used to examine particle processes such as coagulation and surface growth. In the present work, the results from studies conducted in laminar diffusion flames involving laser based measurements of the soot particle and velocity fields are reviewed. As an example of the utility of such an approach, these results are used to examine the evolution of the particle surface area for a series of simple hydrocarbon fuels. The results indicate that the available surface area varies strongly with the fuel molecular structure. However, the specific surface growth rate is observed to be similar for all the fuels studied. Diagnostics, Optical techniques, Soot formation, Reprints. (mjm)

DESCRIPTORS: (U) *DIAGNOSIS(GENERAL), *FLAMES, *PARTICLES, *SOOT, COAGULATION, COMBUSTION, DIFFUSION,

AD-A206 238

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 238 CONTINUED

FUELS, GROWTH(GENERAL), HYDROCARBONS, LAMINAR FLOW, LASERS, LIGHT SCATTERING, MEASUREMENT, METHODOLOGY, MOLECULAR STRUCTURE, OPTICAL PROPERTIES, OPTICS, PARTICLE SIZE, RATES, REPRINTS, SURFACES, VELOCITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A206 237 20/4

MICHIGAN UNIV ANN ARBOR DEPT OF AEROSPACE ENGINEERING

(U) Structure of the Near-Injector Region of Non-Evaporating Pressure-Atomized Sprays,

JAN 89

PERSONAL AUTHORS: Ruff, G.; Bernal, L.; Faeth, G.

CONTRACT NO. AFOSR-85-0244

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR TR-89-0324

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Aerospace Sciences Meeting (27th), January 9-12 1989.

ABSTRACT: (U) The dense-spray region of pressure-atomized nonevaporating sprays in the atomization breakup regime was studied, emphasizing the properties of the multiphase mixing layer which surrounds the all-liquid core. The dispersed-phase properties of a large-scale (9.5 mm injector diameter) water jet injected vertically down in still air was measured using double-flash holography. The inner portion of the mixing layer contained large irregularly-shaped liquid elements and drops with the proportion of drops increasing and drop sizes decreasing with increasing radial distance. The all-liquid core and the liquid elements cause mean liquid volume fractions to be high near the axis; however, the gas-containing region is relatively dilute at each instant. The velocities of large drops are generally much larger than small drops and predictions based on the locally-homogeneous-flow approximation, providing direct evidence of significant separated-flow effects. Multiphase flow, Sprays, Reprints. (mjm)

DESCRIPTORS: (U) *MULTIPHASE FLOW, *SPRAYS, *WATER JETS, AIR, ATOMIZATION, DROPS, LAYERS, LIQUIDS, MEAN, MIXING, PHASE, RANGE(DISTANCE), REPRINTS, VELOCITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A2.

AD-A206 237

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 234 20/3 20/10

STATE UNIV OF NEW YORK AT BUFFALO DEPT OF PHYSICS AND ASTRONOMY

(U) Effect of Finite Size on Magnetoresistance,

FEB 89

PERSONAL AUTHORS: Lee, H. R.; Oh, H. G.; George, Thomas F. ; Um, C. I.

CONTRACT NO. F49620-86-C-0009

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-89-0368

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review B, v39 n4 p2822-2825, 1 Feb 89.

ABSTRACT: (U) Finite size effects are studied for Magnetoresistance in a disordered metallic system. Quantum corrections to the conductivity are strongly affected by the presence of an in-plane magnetic field in a thin film. They are also affected significantly by the boundaries of the finite quantum size. Expressions are obtained for the quantum correction to the conductivity due to both effects. The dephasing characteristic time scale due to the magnetic field is found by the exact eigenvalues of the system. One-two- and three-dimensional results can be obtained with the proper limits. Some numerical results are presented for the given inelastic scattering length. Keywords: Magnetoresistance; Finite size effects; Metallic system; Disordered; Conductivity; Quantum corrections; Reprints. (JHD)

DESCRIPTORS: (U) *MAGNETORESISTANCE, *QUANTUM ELECTRONICS, *ELECTRICAL CONDUCTIVITY, CORRECTIONS, EIGENVALUES, INELASTIC SCATTERING, LENGTH, MAGNETIC FIELDS, METALS, NUMERICAL ANALYSIS, ORDER DISORDER TRANSFORMATIONS, REPRINTS, THIN FILMS, THREE DIMENSIONAL.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3, Metallic systems.

AD-A206 234

AD-A206 215 13/8

CALIFORNIA UNIV SAN DIEGO LA JOLLA

(U) Establishment of an Electron Beam Lithography Facility.

DESCRIPTIVE NOTE: Final rept. 15 Aug 87-31 Jul 88,

FEB 89

PERSONAL AUTHORS: Lee, Sing H.

CONTRACT NO. AFOSR-87-0060

PROJECT NO. 2305

TASK NO. B1

MONITOR: AFOSR TR-89-0343

UNCLASSIFIED REPORT

ABSTRACT: (U) Enclosed is a final report on testing of an electron beam writer. This electron beam writer will be used to produce high resolution, large space bandwidth product holographic optical elements (which are versatile, passive components of opto-electronic systems), to fabricate fast, compact, active opto-electronic devices and to make masks for high speed millimeter wave devices or high frequency integrated circuits, as described in the original proposal. (jhd)

DESCRIPTORS: (U) *ELECTRON BEAMS, *LITHOGRAPHY, *FABRICATION, ELECTRONIC EQUIPMENT, ELECTROOPTICS, FACILITIES, HIGH FREQUENCY, HIGH RESOLUTION, INTEGRATED CIRCUITS, PASSIVE SYSTEMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2305B1, Electron beam writer.

AD-A206 215

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 210 7/2 7/4

CHICAGO UNIV IL JAMES FRANCK INST

(U) Dynamics of Gas-Surface Interactions.

DESCRIPTIVE NOTE: Final technical rept. 1 Apr 84-31 May 88.

FEB 89

PERSONAL AUTHORS: Sibener, S. J.

CONTRACT NO. AFOSR-84-0073

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR
TR-89-0317

UNCLASSIFIED REPORT

ABSTRACT: (U) This research initiative has dealt with the interaction of atomic, molecular, electron, and optical beams with well-characterized single crystal surfaces. These studies were motivated by a desire to understand and control catalytic surface chemistry, the technological need to characterize the physical properties of thin films and surfaces, and the desire to understand how energy and momentum are exchanged at the surface of a material when it is subjected to gas-surface collisions, electron-surface collisions, optical illumination, or chemical reaction. During the past grant period, two major new scattering instruments were completed. One is a high performance neutral particle scattering apparatus, which routinely achieves an energy resolution of ca. 300 micro-eV. It has successfully performed elastic and inelastic scattering measurements on alkali halide, semiconductor, and metallic surfaces. Results are presented in this final report for Lithium Fluoride (001), Silicon (001)-(2x1), and Silver (110). The Si phonon dispersion measurements differ markedly from theoretical calculations, and strongly suggest that the dynamical properties of partially disordered surfaces merit increasing attention in this program. Gas surface interactions, Electron surface interactions, Inelastic scattering, Gas surface energy transfer, Surface phonons, Lithium fluoride, Silicon, Silver. (mjm)

AD-A206 210

AD-A206 210 CONTINUED

DESCRIPTORS: (U) *DYNAMICS, *GAS SURFACE INTERACTIONS, *LITHIUM FLUORIDES, *SILICON, *SILVER, ALKALI METAL COMPOUNDS, BEAMS(ELECTROMAGNETIC), CATALYTIC CRACKING, CHEMICAL REACTIONS, COLLISIONS, COMPUTATIONS, CONTROL, DISPERSING, ELASTIC PROPERTIES, ELECTRONS, ENERGY, ENERGY TRANSFER, GASES, HALIDES, ILLUMINATION, INELASTIC SCATTERING, INSTRUMENTATION, INTERACTIONS, MEASUREMENT, METALS, MOMENTUM, OPTICAL EQUIPMENT, OPTICAL PROPERTIES, PHONONS, PHYSICAL PROPERTIES, RESOLUTION, SCATTERING, SINGLE CRYSTALS, SURFACE CHEMISTRY, SURFACE ENERGY, SURFACE PROPERTIES, SURFACES, THEORY, THIN FILMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A2.

AD-A206 210

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 206 7/4

VANDERBILT UNIV NASHVILLE TN DEPT OF CHEMISTRY

(U) Reduced Potential-Energy Curves for Diatomic Molecules,

FEB 89

PERSONAL AUTHORS: Tellinghuisen, Joel; Henderson, Stuart D.; Austin, Derek; Lawley, Kenneth P.; Donovan, Robert J.

CONTRACT NO. F49620-86-C-0125

PROJECT NO. 3484

TASK NO. A2

MONITOR: AFOSR TR-89-0372

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review A, v39 n3 p925-930, 1 Feb 89.

ABSTRACT: (U) A simple prescription for scaling diatomic potentials so that they have a common dissociation limit and fixed curvature near the minimum is used to examine 35 diatomic potentials which are know over relatively large fractions of their well depths. These global comparisons reveal greater similarity, particularly among chemically related molecules, than might be predicted from spectroscopic properties that are based on derivatives of the potential near its minimum. Keywords: Potential energy curves, Diatomic molecules, Scaled potentials. Reprints. (MJM)

DESCRIPTORS: (U) *DIATOMIC MOLECULES, *DISSOCIATION, *SCALING FACTORS, CURVATURE, DEPTH, LIMITATIONS, MOLECULES, REPRINTS, SPECTROSCOPY.

IDENTIFIERS: (U) PE61102F, WUAFOSR3484A2.

AD-A206 155 9/3 7/4

COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) Ultrafast Chemical Reactions in the Liquid State,

88

PERSONAL AUTHORS: Eisenthal, Kenneth B.

CONTRACT NO. AFOSR-88-0014

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-89-0359

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Topics in Applied Physics, v60: Ultrashort Laser Pulses and spplications, p319-356 1988.

ABSTRACT: (U) The aim of this chapter is to provide some feeling for the impact of picosecond lasers on studies of chemical phenomena in liquids. Reprints. (MJM)

DESCRIPTORS: (U) *CHEMICAL REACTIONS, *LASERS, *LIQUIDS, CHEMICALS, HIGH RATE, REPRINTS.

IDENTIFIERS: (U) WUAFOSR2303B2, PE61102F.

AD-A206 154 12/9

BOSTON UNIV MA CENTER FOR ADAPTIVE SYSTEMS

(U) Sustained Oscillations in a Symmetric Cooperative-Competitive Neural Network: Disproof of a Conjecture About Content Addressable Memory.

88

PERSONAL AUTHORS: Cohen, Michael A.

CONTRACT NO. F49620-86-C-0037

MONITOR: AFOSR
TR-89-0334

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Neural Networks, v1 p217-221 1988.

ABSTRACT: (U) Cohen and Grossberg proved that a large class of neural networks with symmetric interaction coefficients admit a global Liapunov function guaranteeing that their trajectories approach equilibrium points. Such networks function as content-addressable memories, and the equilibria are the stored memories. Cohen and Grossberg also conjectured, based upon substantial computational evidence, that networks within a class of mixed cooperative-competitive networks with symmetric interaction coefficients also have this property. This conjecture is here disproved. In particular, a class of homogeneous, distance-dependent, on-center off-surround neural networks are constructed which supports persistent oscillations for appropriate initial data. Such a class is constructed in each even dimension. Similar systems, which have been used to model the dynamics of the hippocampus, are compared to this class of networks to clarify the origins of oscillatory class of behavior in this class of systems. Reprints. (JHD)

DESCRIPTORS: (U) *ADDRESSING, *NEURAL NETS, *MEMORY DEVICES, BEHAVIOR, COEFFICIENTS, COMPUTATIONS, DYNAMICS, FUNCTIONS, HIPPOCAMPUS, INTERACTIONS, NETWORKS, OSCILLATION, REPRINTS, SIZES(DIMENSIONS), SYMMETRY, LYAPUNOV FUNCTIONS.

IDENTIFIERS: (U) PE61102F, Addressable memories.

AD-A206 154

AD-A206 153 5/8 12/9

BOSTON UNIV MA CENTER FOR ADAPTIVE SYSTEMS

(U) Self-Organizing Neural Architectures for Eye Movements, Arm Movements, and Eye-Arm Coordination.

88

PERSONAL AUTHORS: Grossberg, Stephen; Bullock, Daniel

CONTRACT NO. F49620-86-C-0037, F49620-87-C-0018

MONITOR: AFOSR
TR-89-0333

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Neural and Synergetic Computers, p197-228 1988.

ABSTRACT: (U) Many important sensory-motor skills arise as a result of a self-organizing process whereby a biological organism actively moves within a fluctuating environment. The present chapter discusses recent results concerning several key steps in this process: The adaptive transformation of a target position light on the retina into a target position computed in head-centered coordinates; the transformation of a target position computed in head-centered coordinates into a target position command to move an arm to the corresponding location in space; and the conversion of the target position command into a synchronous trajectory of the arm's many components that executes this command in real-time. These transformations involve several different brain regions, such as posterior parietal cortex, pre-central motor cortex, and the basal ganglia. Our concern in this chapter will be primarily with the underlying functional and computational issues. Keywords: Learning; Cybernetics; Neural networks. (kt)

DESCRIPTORS: (U) *BRAIN, *CYBERNETICS, *EYE MOVEMENTS, *NEURAL NETS, *MOTOR REACTIONS, *ARMS(ANATOMY), ADAPTIVE SYSTEMS, ARCHITECTURE, ARMS(ANATOMY), GANGLIA, LEARNING, LIGHT, NERVOUS SYSTEM, POSITION(LOCATION), RETINA, SELF ORGANIZING SYSTEMS, TARGETS, TRANSFORMATIONS, SKILLS, REAL TIME, SYNCHRONISM, NEUROMUSCULAR TRANSMISSION.

IDENTIFIERS: (U) PE61102F, Coordination.

AD-A206 153

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 151 12/9 6/4

BOSTON UNIV MA CENTER FOR ADAPTIVE SYSTEMS

(U) Neural Networks for Visual Perception in Variable Illumination,

AUG 88

PERSONAL AUTHORS: Grossberg, Stephen

CONTRACT NO. F49620-86-C-0037, F49620-87-C-0018

MONITOR: AFOSR
TR-89-0332

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Optics News, v14 n8 p1-10 Aug 88.

ABSTRACT: (U) On March 16, 1987, the International Neural Network Society (INNS) was formed. Members began to join in July, 1987. By April 1988, only 10 months later, there were over 2000 members from 34 countries and 47 states of the United States. Many engineers have been drawn to the field because neural network researchers have discovered promising approaches to the many types of problems for which adaptive, massively parallel, fault toler nt solutions are needed, and for which neural networks will run in real-time when they are realized compactly in specialized hardware. The most advanced neural network architectures are providing examples of intelligent systems capable of autonomous learning and skillful performance within complex and noisy environments that are not under strict control. Such examples and future possibilities have helped to generate a high level of enthusiasm among people working in the field. In this article I briefly discuss some recent results from a type of neural model that may be of particular interest to the optics community: Neural models of vision. Two of the central goals of visual science are to understand how human vision works and to develop automatic vision machines for applications in technology. These two goals have merged into one through the recent discovery and progressive characterization of a neural network architecture to explain the processes of preattentive vision. Keywords: Cybernetics; Parallel processing. (kt)

AD-A206 151

AD-A206 151 CONTINUED

DESCRIPTORS: (U) *CYBERNETICS, *NEURAL NETS, *VISION, *VISUAL PERCEPTION, ARCHITECTURE, AUTOMATIC, COMMUNITIES, FAULTS, HUMANS, ILLUMINATION, INTERNATIONAL, LEARNING, CONTRAST, MACHINES, MODELS, NERVOUS SYSTEM, OPTICAL IMAGES, OPTICS, PARALLEL PROCESSING, SOCIETIES, SOLUTIONS(GENERAL), TOLERANCE, UNITED STATES, VARIABLES.

IDENTIFIERS: (U) PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 148 6/15

PERGAMON PRESS INC ELMSFORD NY

(U) Annual Review of Chronopharmacology. Volume 5.

DESCRIPTIVE NOTE: Final rept. 1 Mar 88-28 Feb 89.

FEB 89

PERSONAL AUTHORS: Reinberg, A.; Smolensky, M.; Labrecque, G.

CONTRACT NO. AFOSR-88-0123

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR TR-89-0363

UNCLASSIFIED REPORT

Availability: Pergamon Press, Customer Services, Elmsford, NY 10523. HC $150.00. No copies furnished by DTIC.

ABSTRACT: (U) The Proceedings of the Third International Conference of Chronopharmacology contains 135 short reports of papers or posters presented at the meeting held in Nice, France, 14-17 March 1988. This meeting covered all aspects of chronopharmacology and was attended by over 200 participants from around the world. The proceedings are published as Volume 5 of the Annual Review of Chronopharmacology by Pergamon Press. Keywords: Proceedings; Symposia; Pharmacology. (kt)

DESCRIPTORS: (U) *PHARMACOLOGY, INTERNATIONAL, REPORTS, SYMPOSIA.

IDENTIFIERS: (U) Chronopharmacology, WUAFOSR2312A2, PE61102F.

AD-A206 145 20/4

IOWA STATE UNIV AMES DEPT OF AEROSPACE ENGINEERING

(U) Three Dimensional High Speed Boundary Layer Flows.

DESCRIPTIVE NOTE: Final rept. Sep 85-May 88.

SEP 88

PERSONAL AUTHORS: Inger, George R.

CONTRACT NO. AFOSR-85-0357

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR TR-89-0287

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report summarizes the research results obtained by a two-faceted basic theoretical investigation involving (1) fundamental analyses of three-dimensional viscous-inviscid interaction effects within high speed turbulent boundary layers and (2) study of the influence of streamwise vortex arrays on the skin friction within attached or separated laminar layer flows. Keywords: Viscous inviscid interactions, High speed, Turbulent Boundary layers, Vortex arrays. (JHD)

DESCRIPTORS: (U) *TURBULENT BOUNDARY LAYER, *VORTICES, ARRAYS, INTERACTIONS, INVISCID FLOW, SKIN FRICTION, THREE DIMENSIONAL, VISCOUS FLOW.

IDENTIFIERS: (U) WUAFOSR2307A1, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 122 12/9 12/5

BOSTON UNIV MA CENTER FOR ADAPTIVE SYSTEMS

(U) Self-Organizing Neural Network Architectures for Real-Time Adaptive Pattern Recognition.

88

PERSONAL AUTHORS: Carpenter, Gail A.; Grossberg, Stephen

CONTRACT NO. F49620-86-C-0037, F49620-87-C-0018

MONITOR: AFOSR
TR-89-0339

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub in Neural and Synergetic Computers, p42-74 1988. Sponsored in part by Contract DAAG29-85-K-0095 and NSF-DMS86-11959.

ABSTRACT: (U) The Adaptive Resonance Theory (ART) architectures that are discussed herein are neural networks that self-organize stable recognition codes in real-time in response to arbitrary sequences of input patterns. Within such an ART architecture, the process of adaptive pattern recognition is a special case of the more general cognitive process of hypothesis discovery, testing, search, classification, and learning. This latter property opens the possibility of applying ART systems to more general problems of adaptively processing large abstract information sources and data bases. This document outlines the main computational properties of these ART architectures. ART models grew out of an analysis of a simpler type of adaptive pattern recognition network which is often called a competitive learning model. Keywords: Reprints, Translations, West Germany. (kr)

DESCRIPTORS: (U) *COMPUTER ARCHITECTURE, *NEURAL NETS, *SELF ORGANIZING SYSTEMS, ADAPTIVE SYSTEMS, COGNITION, COMPUTATIONS, DATA BASES, HYPOTHESES, INPUT, LEARNING, MODELS, NETWORKS, PATTERN RECOGNITION, PATTERNS, REAL TIME, REPRINTS, RESONANCE, SEQUENCES, THEORY, TRANSLATIONS, WEST GERMANY.

IDENTIFIERS: (U) PE61102F

AD-A206 122

AD-A206 102 4/2 12/6

ATMOSPHERIC AND ENVIRONMENTAL RESEARCH INC CAMBRIDGE MA

(U) On the Use of Multiprocessing Computers for Global Numerical Weather Prediction.

DESCRIPTIVE NOTE: Final rept. Aug 88-Jan 89,

FEB 89

PERSONAL AUTHORS: Hoffman, Ross N.; Nehrkorn, T.

REPORT NO. P248-FR

CONTRACT NO. F49620-88-C-0105

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR
TR-89-0272

UNCLASSIFIED REPORT

ABSTRACT: (U) A preliminary exploration is made of the uses of multiprocessing computers for large scale NWP using spectral models. In general if global communication between processors is relatively fast and easy, then implementing spectral models is feasible. The global spectral model is recast in terms of latitude and wavenumber tasks. This approach has a number of advantages: The entire algorithm is macrotasked. Only a handful of crucial pointers need to be locked. The spectral transform calculations are localized so that arithmetic always follows the same ordering and all results are exactly reproducible. The latitude wavenumber tasking scheme is implemented and tested on the Sequent Balance, a shared memory multiple instruction multiple data device. It is argued that this scheme could be easily extended and applied to larger machines of this class and provide a good starting point for distributed memory machines. The potential of single instruction multiple data machines is huge. A proposed algorithm for this class of machine uses a processor for each horizontal grid point. Keywords: Numerical weather prediction; Multiprocessors; Atmosphere models; Weather forecasting. (edc)

AD-A206 102

AD-A206 102 CONTINUED

DESCRIPTORS: (U) *MULTIPROCESSORS, *WEATHER FORECASTING, ALGORITHMS, ATMOSPHERE MODELS, COMPUTERS, DISTRIBUTION, GLOBAL, GLOBAL COMMUNICATIONS, GRIDS(COORDINATES), HORIZONTAL ORIENTATION, LATITUDE, MACHINES, MATHEMATICAL PREDICTION, MEMORY DEVICES, NUMERICAL ANALYSIS, SPECTRA.

IDENTIFIERS: (U) Distributed memory machines, Numerical weather prediction, WUAFOSR3005A1, PE61102F.

AD A206 102

AD-A206 101 7/3 11/2 21/4

STATE UNIV OF NEW YORK AT BINGHAMTON DEPT OF CHEMISTRY

(U) Novel Organoboranes as Intermediates for Ceramic Precursors and High-Energy Fuels.

DESCRIPTIVE NOTE: Final technical rept. 1 Feb 85-31 Aug 88,

JAN 89

PERSONAL AUTHORS: Eisch, John J.

CONTRACT NO. AFOSR-85-0108

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-89-0234

UNCLASSIFIED REPORT

ABSTRACT: (U) This project investigated, as its primary objective, the influence of carbon-boron bonding in unsaturated, cyclic boranes on the energy content of this system. such insights should aid the choice of the best carbon-boron clusters to be incorporated into high-energy fuels. The synthesis and structural characterization of the following boron-containing carbocycles were undertaken: The borirene or boracyclopropene system, as exemplified by trimesitylborirene: the borole or boracyclopentadiene ring, as represented by pentaarylboroles: the borepin or boracycloheptatriene nucleus, as seen in heptaphenylborepin; the 7-borabicyclo 2.2.1 heptadiene system, again typified by its heptaraaryl derivative; and the 1-boratetrahydronaphthalene derivative, which was the thermal rearrangement product of the borepin. As estimated by chemical reactivity towards heat, oxidants and protolyzing agents, the borirene and borole nuclei display unusual stability and thus can be termed aromatic. The boroles are very reactive and possess destabilization or be antiaromatic. A rich variety of both thermal and photochemical skeletal rearrangements was uncovered with these boracyclopolyenes, indicating that tricoordinate boron has a pronounced tendency to interact either intermolecularily or intramolecularily, with pi-electrons. As a secondary

AD A206 101

AD-A206 101 CONTINUED

objective, bimetallic oxides of the type, R2M-O-M'R2, were synthesized and evaluated as hydrocarbon-soluble precursors to specialized ceramics. (aw)

DESCRIPTORS: (U) *CERAMIC MATERIALS, *FUELS, *ORGANOBORANES, *SYNTHESIS(CHEMISTRY), BIMETALS, CHEMICAL REACTIONS, DISPLAY SYSTEMS, ESTIMATES, HIGH ENERGY, NUCLEI, OXIDES, OXIDIZERS, PRECURSORS, REACTIVITIES, CHEMICAL BONDS, CLUSTERING, CYCLIC COMPOUNDS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, Borirene, Boracyclopropene, Boririne/trimesityl, Propene/boracyclo, Heptadienes, Naphthalene/1-boratetrahydro, Borepin, Heptatriene/boracyclo, Borepin/heptaphenyl, Boroles, Boracyclopolyenes, Pentadiene/boracyclo.

AD-A206 101

AD-A206 100 20/11 20/13

TEXAS A AND M UNIV COLLEGE STATION MECHANICS AND MATERIALS CENTER

(U) Experimental and Theoretical Determination of the Thermomechanical Response of Inelastic Structural Materials to High Energy Thermal Inputs.

DESCRIPTIVE NOTE: Semi-annual technical rept. Jul-Dec 88,

DEC 88

PERSONAL AUTHORS: Allen, D. H.; Pilant, M. S.

REPORT NO. MM-5485-88-10

CONTRACT NO. F49620-86-K-0016

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR TR-89-0140

UNCLASSIFIED REPORT

ABSTRACT: (U) The general objective of this research is to improve on existing theoretical models for predicting the response of inelastic aerospace structural components subjected to hostile thermal environments with emphasis on transient temperature conditions, radiation boundary conditions, extremely rapid heating rates, and possible phase change of the materials involved. For materials subjected to the conditions under study herein it is necessary to perform extremely complex experiments in order to determine the precise form of the theoretical constitutive equations. Finally, it is necessary to implement the resulting equations to boundary value problem solving algorithms in order to model the response of structural components with stress, strain, and temperature gradient fields Laser heating, Viscoplasticity, Finite element methods, Constitutive properties, Heat transfer, Thermomechanics. (mjm)

DESCRIPTORS: (U) *AEROSPACE CRAFT, *ELASTIC PROPERTIES, *HEAT TRANSFER, *STRUCTURAL MEMBERS, *THERMOMECHANICS, ADVERSE CONDITIONS, BOUNDARIES, CONSTRUCTION MATERIALS, EQUATIONS, FINITE ELEMENT ANALYSIS, HEAT, HEATING, HIGH

AD-A206 100

AD-A206 100 CONTINUED

ENERGY, HIGH RATE, LASERS, MODELS, PHASE TRANSFORMATIONS, RADIATION, RESPONSE, TEMPERATURE, TEMPERATURE GRADIENTS, THEORY, TRANSIENTS, VISCOPLASTIC PROPERTIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2302B1.

AD-A206 072 11/6.1

PITTSBURGH UNIV PA DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) Environmental Effects in Niobium Base Alloys and Other Selected Intermetallic Compounds.

DESCRIPTIVE NOTE: Annual rept. no. 1, 1 Nov 87-31 Oct 88, DEC 88

PERSONAL AUTHORS: Meier, G. H.; Thompson, A. W.

CONTRACT NO. F49620-88-C-0013, DARPA Order-6155

MONITOR: AFOSR TR-89-0366

UNCLASSIFIED REPORT

ABSTRACT: (U) Niobium aluminides and silicides as well as other intermetallic compounds have potential for use in advanced gas turbines where increased operating temperatures are necessary to obtain the targeted performance goals. These materials will be subjected to a variety of environments over a range of temperatures. Two of the principal reactants in these environments are oxygen and hydrogen. This program is concerned with the effects of oxygen and hydrogen on niobium alloys and other selected intermetallic compounds. This program consists of two parts. The investigations involving oxygen are directed toward describing the conditions which must be achieved in order to have a continuous, protective Aluminum Oxide or Silicon dioxide scale developed on niobium-base alloys and compounds, and other selected intermetallics, at temperatures between 600 and 1400 C. The studies concerned with hydrogen effects are directed toward determining solubility limits, hydrogen uptake and permeation rates, and the degree to which hydrogen degrades the mechanical properties of these materials. (aw)

DESCRIPTORS: (U) *ALUMINIDES, *INTERMETALLIC COMPOUNDS, *NIOBIUM ALLOYS, *SILICIDES, *ENVIRONMENTAL TESTS, ALUMINUM OXIDES, ENVIRONMENTAL IMPACT, GAS TURBINES, HYDROGEN, LIMITATIONS, MECHANICAL PROPERTIES, NIOBIUM, OXYGEN, PERMEABILITY, RATES, SCALE, SILICON DIOXIDE, SOLUBILITY, TEMPERATURE, CHEMICAL ATTACK(DEGRADATION).

AD-A206 072 CONTINUED

IDENTIFIERS: (U) PE61102F.

AD-A206 062 4/1

AIR FORCE GEOPHYSICS LAB HANSCOM AFB MA

(U) Plasma Simulation of Ion Acceleration by Lower Hybrid Waves in the Suprauroral Region,

SEP 88

PERSONAL AUTHORS: Retterer, John M.; Chang, Tom; Jasperse, John R.

REPORT NO. AFGL-TR-88-0250

MONITOR: AFOSR
TR-88-0250

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Ion Acceleration in the Magnetosphere and Ionosphere, p282-285 1986.

ABSTRACT: (U) The generation of lower hybrid waves below field aligned potential drops and the effect of the resulting turbulence on the ion population in the surauroral region are studied using particle plasma simulations. To describe the ion acceleration observed in the simulation, a theoretical model is developed using mode-mode coupling processes to generate the low phase velocity VLF waves with which the ions first interact. By scaling the simulation results, we show that interaction between the ions and the lower hybrid waves can account for the acceleration necessary to produce suprauroral ion conic events. Keywords: Plasma simulation; Ion acceleration; Lower hybrid waves; Suprauroral region. Reprints. (JHD)

DESCRIPTORS: (U) *AURORAE, *PLASMA WAVES, *IONOSPHERIC DISTURBANCES, ACCELERATION, COUPLING(INTERACTION), HYBRID SYSTEMS, IONS, IONOSPHERIC MODELS, PARTICLES, PLASMAS(PHYSICS), POPULATION, REPRINTS, SIMULATION, THEORY, TURBULENCE, WAVES, VERY LOW FREQUENCY.

IDENTIFIERS: (U) Ion conics, Hybrid waves.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A206 057 7/2 7/4 9/1

STANFORD UNIV CA DEPT OF MATERIALS SCIENCE AND ENGINEERING

(U) Fundamental Studies of the Mechanical Behavior of Microelectronic Thin Film Materials.

DESCRIPTIVE NOTE: Final technical rept. Jan 86-Dec 88,

JAN 89

PERSONAL AUTHORS: Nix, William D.

CONTRACT NO. AFOSR-86-0051

MONITOR: AFOSR TR-89-0365

UNCLASSIFIED REPORT

ABSTRACT: (U) It is appropriate to note that before this research program began, very little work had been done in universities on the mechanical properties of microelectronic thin film materials. As a result, much of our early work involved the development of experimental techniques, such as sub micron indentation and wafer curvature measurement, to study stresses and mechanical properties of thin films on substrates. Interest in these developments is indicated by the accepted publications and invited oral presentations listed at the end of this report. The recent MRS Symposium on Thin Films: Stresses and Mechanical Properties was an outgrowth of the research work started under this grant. Thin films, Microelectronics, Mechanical behavior. (mjm)

DESCRIPTORS: (U) *CURVATURE, *MATERIALS, *MECHANICAL PROPERTIES, *MICROELECTRONICS, *STRESSES, *SUBSTRATES, *THIN FILMS, *WAFERS, EXPERIMENTAL DESIGN, MEASUREMENT, METHODOLOGY, SYMPOSIA, UNIVERSITIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A1.

AD-A206 021 20/4

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) The Dimension of Attractors Underlying Turbulent Poiseuille Flow.

DESCRIPTIVE NOTE: Final rept. 1 Dec 87-30 Jan 89,

FEB 89

PERSONAL AUTHORS: Keefe, Laurence; Moin, Parviz

CONTRACT NO. AFOSR-88-0056

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR TR-89-0304

UNCLASSIFIED REPORT

ABSTRACT: (U) It is shown that fully developed channel flow is confined to a strange attractor. However, the dimension of the attractor is much larger than dimensions encountered in closed flows such as Benard Convection and Taylor-Couette flow. In addition, we have examined the relationship between turbulent structures and attractor geometry. In the end, what is sought from any theory of turbulence is a universal framework that allows known phenomena to be understood, calculated, and related, and a predictive capability for unknown flows or control measures. Crucial to the erection of such a structure is a knowledge of the fundamental mathematical character of turbulence. The purpose of this research has been to investigate this character to determine if chaos theory and the strange attractor can provide the foundation for such a global theory. (JES)

DESCRIPTORS: (U) *CHANNEL FLOW, CONTROL, CONVECTION, FLOW, GLOBAL, MATHEMATICAL ANALYSIS, PREDICTIONS, STRUCTURES, THEORY, TURBULENCE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A2, *POISEULLE FLOW.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 993 6/1 6/4

CITY OF HOPE BECKMAN RESEARCH INST DUARTE CA

(U) Long Term Synaptic Plasticity and Learning in Neuronal Networks.

DESCRIPTIVE NOTE: Final technical rept. 15 Aug 86-14 Nov 88,

JAN 89

PERSONAL AUTHORS: Brown, Thomas H.

CONTRACT NO. F49620-86-C-0099

PROJECT NO. 2312

TASK NO. A1

MONITOR: AFOSR
TR-89-0361

UNCLASSIFIED REPORT

ABSTRACT: (U) The purpose of this project was to understand rapidly induced and persistent forms of synaptic memory. The properties of the synaptic modifications underlying this plasticity could account for some of the adaptive and self organizing capabilities of simple and well-defined neurobiological networks in the mammalian brain. These can be studied rigorously using neurophysiolcgical and optical techniques. Sprearheading the project effort was the working hypothesis that long-term synaptic potentiation (LTP), a use-dependent enhancement of synaptic transmission, may mediate certain mnemonic functions of hippocampal circuitry and other forebrain structures. The project was organized around four categories of interrelated specific aims. First, new quantal analysis methods were developed and tested (Aim 2) using patch-clamp techniques to stu charge fluctuations of synaptic transmission during LTP at the crayfish neuromuscular junction. Accomplishment of this aim was necessary in order to be able to transfer and apply the new met to analyze and learn the biophysical mechanisms underlying LTP in hippocampal synapses (Aim 1) a much more difficult preparation to study at this level. Learning, Memory, Synaptic plasticity, Adaptive neural networks, Long term synaptic potentiation, Simulations, Modeling. (mjm)

AD-A205 993

AD-A205 993 CONTINUED

DESCRIPTORS: (U) *BRAIN, *MAMMALS, *NERVE CELLS, *NEURAL NETS, *SYNAPSIS, *MEMORY(PSYCHOLOGY), ADAPTIVE SYSTEMS, BIOPHYSICS, CIRCUITS, CRUSTACEA, DECAPODA, FUNCTIONS, HIPPOCAMPUS, HYPOTHESES, JUNCTIONS, LEARNING, METHODOLOGY, MNEMONICS, MODIFICATION, MUSCLES, NERVES, NETWORKS, NEUROPHYSIOLOGY, OPTICS, PLASTIC PROPERTIES, PREPARATION, SELF ORGANIZING SYSTEMS, SYNAPSE, TRANSMITTANCE, VARIATIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A1.

AD-A205 993

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 989 1/1

STANFORD UNIV CA

(U) Flow Control for Unsteady and Separated Flows and Turbulent Mixing.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 87-30 Sep 88,

OCT 88

PERSONAL AUTHORS: Reynolds, W. C.; Eaton, J. K.; Powell, J. D.; Hesselink, L.; Johnston, J. P.

CONTRACT NO. F49620-86-K-0020

PROJECT NO. 3484

TASK NO. A1

MONITOR: AFOSR TR-89-0232

UNCLASSIFIED REPORT

ABSTRACT: (U) A coordinated set of experimental research projects on flow control is being conducted by a team with experience in fluid mechanics and automatic control. The primary objective of this work is to develop new ways to control flows of technical interest and a generic approach to the design of flow control systems. Included are studies of mixing enhancement by excitation of jets, active control of unsteady turbulent boundary layers and separated flows, and active control of the vortical flow over delta wings using leading-edge blowing. Keywords: Boundary layer control, Flow control, Turbulent mixing, Unsteady boundary layers, Separated flow, Delta wings. (EDC)

DESCRIPTORS: (U) *BOUNDARY LAYER CONTROL, *DELTA WINGS, *TURBULENT FLOW, *UNSTEADY FLOW, AUTOMATIC, BOUNDARY LAYER, CONTROL SYSTEMS, FLOW, FLOW SEPARATION, FLUID MECHANICS, JET FLOW, LEADING EDGES, MIXING, OPTIMIZATION, TURBULENT BOUNDARY LAYER, VORTICES.

IDENTIFIERS: (U) Flow control, Active control, Blowing, PE61103D, WUAFOSR3484A1.

AD-A205 989

AD-A205 988 4/2 17/9

CLEMSON UNIV S C DEPT OF PHYSICS AND ASTRONOMY

(U) Studies of Frontal Zone Dynamics with a High-Resolution Wind Profiling System.

DESCRIPTIVE NOTE: Final rept. May 85-Sep 88,

JAN 89

PERSONAL AUTHORS: Larson, M. F.

CONTRACT NO. AFOSR-85-0216

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR TR-89-0241

UNCLASSIFIED REPORT

ABSTRACT: (U) Vertical velocity and reflectivity data obtained with the SOUSY-VHF-Radar located have been compared with the operational analysis data from the European Centre for Medium-range Weather Forecasting, with radiosonde data, as well as the standard synoptic weather maps for the region. Also, the effects of precipitation on VHF and UHF wind profiler data have been investigated. Results have shown that the radar reflectivities at 6 m wavelength are enhanced at the height where the frontal inversion is located. The UHF echoes are dominated by precipitation, even when the rainfall is light, while VHF echoes have nearly equal contributions from precipitation and the clear air, even when the rainfall is heavy. Comparison of the radar vertical velocities and the radiosonde data have made it possible to show the vertical circulations around several fronts. The results are in general agreement with the expected patterns of ascent in the warm air and descent in the cold sectors, but the detailed structures are more complicated and show a banded structure and a significant indirect circulation in connection with the fronts. Comparison of the operational analysis vertical velocities shows that some of the same features are reproduced in both data sets, but there are discrepancies with differences of up to half a day between the times of the appearance of the vertical velocity structures

AD-A205 988

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 988 CONTINUED

connected with fronts and jet stream passages over the radar. (jhd)

DESCRIPTORS: (U) *METEOROLOGICAL RADAR, *RADAR REFLECTIONS, *FRONTS(METEOROLOGY), CIRCULATION, DATA BASES, DESCENT, JET STREAMS, MAPS, METEOROLOGICAL DATA, PROFILES, RADAR, RADIOSONDES, ATMOSPHERIC MOTION, RAINFALL, REFLECTIVITY, SYNOPTIC METEOROLOGY, ULTRAHIGH FREQUENCY, WIND VELOCITY, VERTICAL ORIENTATION, VERY HIGH FREQUENCY, WEATHER, WIND.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A1.

AD-A205 988

AD-A205 987 7/2 7/4

CALIFORNIA UNIV SANTA BARBARA DEPT OF CHEMISTRY

(U) Energy Disposal in Ion-Molecule Reactions.

DESCRIPTIVE NOTE: Final rept. 15 Nov 85-14 Nov 88, JAN 89

PERSONAL AUTHORS: Bowers, Michael T.

CONTRACT NO. AFOSR-86-0059

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-89-0233

UNCLASSIFIED REPORT

ABSTRACT: (U) Work was accomplished in three areas: A: Kinetic Energy of Products of Simple Ion Molecule Reactions, B: Generation and Reactivity of Carbon cluster Ions, C: Photodissouation Dynamics of Simple Ion Neutral Clusters. Ion molecule reactions, Cluster formation, Reactivity, Photodissociation, Cluster ions. (mjm)

DESCRIPTORS: (U) *CARBON, *CLUSTERING, *DYNAMICS, *ION ION INTERACTIONS, *MOLECULES, CHEMICAL REACTIONS, DISPOSAL, ENERGY, IONS, KINETIC ENERGY, NEUTRAL, PHOTODISSOCIATION, REACTIVITIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

AD-A205 987

OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 967 20/4 12/1

COLUMBIA UNIV NEW YORK

(U) Investigation of Three-Dimensional Mesh Generation with Precise Controls.

DESCRIPTIVE NOTE: Final rept. 30 Sep 86-26 Sep 88,

JAN 89

PERSONAL AUTHORS: Eiseman, Peter R.

CONTRACT NO. AFOSR-86-0307

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR TR-89-0319

UNCLASSIFIED REPORT

ABSTRACT: (U) In the grant, a number of accomplishments were made in a variety of ways and in a variety of topics. The ways in which this was achieved were in oral communication with others, in the organization of conferences, in the journal publications, in the direction of graduate studies, and in the computer demonstration of theoretical developments. The topics include a study of shock-vortex interaction and a number of studies in grid generation. Those studies covered algebraic and interactive aspects here converged with the establishment of a powerful control point formulation for arbitrary grid generation. Keywords: Numerical grid generation. (kr)

DESCRIPTORS: (U) *GRIDS, *MESH, *NUMERICAL ANALYSIS, COMPUTERS, CONTROL, CONTROL CENTERS, DEMONSTRATIONS, FORMULATIONS, ORGANIZATIONS, PERIODICALS, PRECISION, REPORTS, SYMPOSIA, THREE DIMENSIONAL, VOICE COMMUNICATIONS, INTERACTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3, *Mesh generation.

AD-A 05 967

AD-A205 954 11/2 22/5

MASSACHUSETTS INST OF TECH CAMBRIDGE CERAMICS PROCESSING RESEARCH LAB

(U) Basic Research on Processing of Ceramics for Space Structures.

DESCRIPTIVE NOTE: Final rept. 1 Aug 84-15 Feb 88,

JAN 89

PERSONAL AUTHORS: Bowen, H. R.; Rhine, W. E.; Moffatt, W. C.; Kamiya, S.; Bishop, B. A.

CONTRACT NO. F49620-84-C-0097

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-89-0289

UNCLASSIFIED REPORT

ABSTRACT: (U) The hydrolysis of alkoxide emulsion droplets was investigated for preparing un-agglomerated, submicrometer oxide ceramic particles with a homogeneous composition. This technique was used to prepare single- and mixed-oxide powders whose overall cation composition corresponded to the initial alkoxide cation composition. Uncalcined powders were amorphous, with high surface areas and low densities; upon calcination, powders densified and became crystalline. In other studies, a water-in-oil emulsion technique was investigated for preparing SrTiO3, and two AIN precursors were synthesized from dimethylaminoalane and NH3 . Both AIN precursors gave fine, high purity AIN powders after heat-treatment a colloidally pressed sample densified to 95% of theoretical density at 1750 C. Ceramics, Composite ceramics, Cyclic annealing, Organosilicon polymeric binders, Polymer-coated SiC. (jes)

DESCRIPTORS: (U) , ANNEALING, BINDERS, CERAMIC MATERIALS, CYCLES, DENSITY, EMULSIONS, HIGH RATE, HYDROLYSIS, LOW DENSITY, OILS, ORGANIC COMPOUNDS, POLYMERS, POWDERS, PURITY, SILICON COMPOUNDS, SURFACES, WATER.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A205 954

AD-A205 948 20/11

STATCON INC SILVER SPRING MD

(U) Active Control of Flexible Space Structures Using the Nitinol Shape Memory Actuators.

DESCRIPTIVE NOTE: Final rept. 1 Feb-31 Jul 87,

OCT 87

PERSONAL AUTHORS: Baz, Amr M.; Iman, Karim R.; McCoy, John J.

CONTRACT NO. F49620-87-C-0035

PROJECT NO. K823

TASK NO. AL

MONITOR: AFOSR
TR-89-0330

UNCLASSIFIED REPORT

ABSTRACT: (U) Summarizes research progress in the feasibility demonstration of active vibration control using Nitinol shape memory actuators. Tests on straight wire and helical actuators to characterize their dynamic response are described. The experimental set-up and the range of parametric variation used in a beam vibration control are also described. Keywords: Active control, Nitinol actuators, Space structures, Vibration. (MJM)

DESCRIPTORS: (U) *ACTUATORS, *FLEXIBLE STRUCTURES, *VIBRATION, CONTROL, DYNAMIC RESPONSE, HELIXES, NICKEL ALLOYS, PARAMETRIC ANALYSIS, SHAPE, TITANIUM ALLOYS, VARIATIONS, WIRE.

IDENTIFIERS: (U) PE61102F, WUAFOSRK823A1.

AD-A205 948

AD-A205 946 20/12 9/5

ILLINOIS UNIV AT URBANA COORDINATED SCIENCE LAB

(U) III-V Heterojunction Structures and High Speed Devices.

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

FEB 89

PERSONAL AUTHORS: Morkoc, Hadis

CONTRACT NO. AFOSR-86-0111

PROJECT NO. 2305

TASK NO. C1

MONITOR: AFOSR
TR-89-0325

UNCLASSIFIED REPORT

ABSTRACT: (U) This effort explored the new phenomena in high speed semiconductor devices and structures intended for optoelectronics. A detailed investigation of the collector breakdown properties in GaAs/AlGaAs HBT's has revealed light emission at junctions edges for the first time. The spectral features when analyzed led to the determination of electron and hole threshold energies for ionization for the first time. Additional features observed may shed light into the processing mechanisms not otherwise conveniently accessible. Other areas, e. g., modulation doped FET's, extremely low resistance nonalloyed ohmic contacts, HBT's on InP, quantum wells, optical properties of bulk AlGaAs and InGaAs were among many projects that were explored. Keywords: Heterojunction bipolar transistors; Field effect transistors; Modulation doping; Gallium arsenides. (jhd)

DESCRIPTORS: (U) *BIPOLAR TRANSISTORS, *ELECTROOPTICS, *FIELD EFFECT TRANSISTORS, *GALLIUM ARSENIDES, *HETEROJUNCTIONS, *SEMICONDUCTOR DEVICES, DETERMINATION, DOPING, EDGES, ELECTRIC CONTACTS, ELECTRONS, ELECTROOPTICS, EMISSION, INDIUM PHOSPHIDES, GROUP III COMPOUNDS, GROUP V COMPOUNDS, IONIZATION, LIGHT, MODULATION, OPTICAL PROPERTIES, QUANTUM ELECTRONICS, ELECTRICAL RESISTANCE, INDIUM COMPOUNDS, ARSENIDES, ALUMINUM GALLIUM ARSENIDE.

AD-A205 946

AD-A205 946 CONTINUED

IDENTIFIERS: (U) WUAFOSR2305C1, PE61102F.

AD-A205 939 20/4 1/1

NIELSEN ENGINEERING AND RESEARCH INC MOUNTAIN VIEW CA

(U) Exploitation of Multiple Solutions of the Navier-Stokes Equations to Achieve Radically Improved Flight.

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-31 Jan 89,

FEB 89

PERSONAL AUTHORS: Nixon, David; Caruso, S. C.; Farshchi, M.

REPORT NO. NEAR-TR-398

CONTRACT NO. F49620-88-C-0097

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR
TR-89-0364

UNCLASSIFIED REPORT

ABSTRACT: (U) It is known that the nonlinear Navier Stokes equations will model most fluid flow of aeronautical interest. The existence and uniqueness of the solutions to the Navier-Stokes equations have not been proven although it is known that in certain cases only the most stable solution is obtained. This present work is concerned with identifying multiple solutions of the Navier-Stokes equations for transonic flow. The objective is to exploit the existence of these solutions rather than avoid them as has been the custom in the past. The present work has shown that the cause of multiple solutions in potential flow is a bifurcation of solutions at a specific Mach number distribution; airfoils can be designed to give such a distribution. It is also found that the presence of entropy and vorticity do not affect the occurrence of phantom solutions. A physical example of a phantom solution is explained by a study of the potential phantom solutions. (jhd)

DESCRIPTORS: (U) †TRANSONIC FLIGHT, †NAVIER STOKES EQUATIONS, AIRFOILS, DISTRIBUTION, ENTROPY, FLUID FLOW, MACH NUMBER, NONLINEAR ALGEBRAIC EQUATIONS, POTENTIAL FLOW, SOLUTIONS(GENERAL), AERODYNAMIC STABILITY,

AD-A205 946

AD-A205 939

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 939 CONTINUED

TRANSONIC FLOW, VORTICES.

IDENTIFIERS: (U) PE65502F, WUAFOSR3005A1, Bifurcation theory.

AD-A205 924 12/3 8/10

WEIDLINGER ASSOCIATES NEW YORK

(U) Uncertainties in Soil Constitutive Behavior. Revision.

DESCRIPTIVE NOTE: Final rept. 1 Mar 85-30 Sep 88,

FEB 89

PERSONAL AUTHORS: Benaroya, H.

CONTRACT NO. F49620-85-C-0045

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR
TR-89-0286

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Revision of rept. dated 19 Oct 88.

ABSTRACT: (U) A Markov chain phenomenological framework is used to model soil constitutive behavior accounting for uncertainties. The key in a Markov chain model is its transition probability (stochastic) matrix. Two lines of study have been pursued: 1) Explore the properties of stochastic matrices with the purpose of explaining different classes of behavior according to the mathematical properties of these transition matrices; and 2) Identify a relatively simple technique to estimate the transition probabilities from available experimental data. These were parallel efforts. The first is greatly enhanced by the success of the second. Keywords: Markov transition probability; Stochastic matrices; Convergence properties. (edc)

DESCRIPTORS: (U) *SOIL MODELS, *SOIL MECHANICS, CONVERGENCE, ESTIMATES, EXPERIMENTAL DATA, MARKOV PROCESSES, MATHEMATICAL MODELS, MATHEMATICS, MATRICES(MATHEMATICS), PROBABILITY, STOCHASTIC PROCESSES, TRANSITIONS.

IDENTIFIERS: (U) Constitutive behavior, Uncertainty, Transition matrices, Markov transition probability, Stochastic matrices, WUAFOSR2302C1, PE61102F.

AD-A205 939

AD-A205 924

AD-A205 923 20/4

PRINCETON UNIV NJ DEPT OF MECHANICAL AND AEROSPACE ENGINEERING

(U) The Structure and Control of Three-Dimensional Shock Wave Turbulent Boundary Layer Interactions.

DESCRIPTIVE NOTE: Final rept. 15 Jul 86-30 Sep 88,

FEB 89

PERSONAL AUTHORS: Bogdonoff, Seymour M.

REPORT NO. MAE-1851

CONTRACT NO. F49620-86-C-0094

PROJECT NO. 2307

TASK NO. A1

MONITOR: AFOSR TR-89-0285

UNCLASSIFIED REPORT

ABSTRACT: (U) The present report briefly reviews the work accomplished on the study of three-dimensional shock wave turbulent boundary layer interactions at a Mach 3. The work consisted of two major thrusts; 1) Modeling of the complex interaction and detailed experiments coordinated with extensive computations; and 2) Exploratory studies of control concepts for a 20 deg fin and crossing shock configurations. The completed works have been reported and are briefly reviewed. A brief resume is presented of incompleted results on complex interactions, new heat transfer techniques, initial spanwise boundary layer effects, and studies in a new Low Turbulence Variable Geometry facility. Keywords: Three-dimensional shock waves; Turbulent boundary layer; Supersonic flow fields; Surface heat transfer data. (edc)

DESCRIPTORS: (U) *SHOCK WAVES, *TURBULENT BOUNDARY LAYER, BOUNDARY LAYER, COMPUTATIONS, CONFIGURATIONS, CONTROL THEORY, CROSSINGS, FLOW FIELDS, HEAT TRANSFER, INTERACTIONS, SHOCK, SUPERSONIC FLOW, SURFACES, THREE DIMENSIONAL, FINS.

IDENTIFIERS: (U) WUAFOSR2307A1, PE61102F.

AD-A205 923

AD-A205 921 7/3 7/6

CARNEGIE-MELLON UNIV PITTSBURGH PA

(U) Physical-Chemical Studies of Solutions Processing of Nematic Polymers.

DESCRIPTIVE NOTE: Final rept. 1 Sep 85-31 Aug 88,

FEB 89

PERSONAL AUTHORS: Berry, Guy C.

CONTRACT NO. F49620-85-C-0140, F49620-85-C-1040

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-89-0288

UNCLASSIFIED REPORT

ABSTRACT: (U) Investigations have involved solutions of the rodlike chain poly(1,4-phenylene-2,6-benzobisthiazole), PBT, and related copolymers containing a small fraction of the phenylene replaced by bipyridyl ether. Studies include: 1) The kinetics of polymerization of PBT in the nematic phase; 2) The supramolecular structure of PBT in solution; 3) The phase equilibria of blends of PBT and nylon in solution; 4) The rheological properties of blends of PBT and nylon in solution; and 5) The properties of fully aligned monodomains if nematic solutions of PBT. The polymerization kinetics of PBT did not show any change in rate at the isotropic to an anisotropic phase transition for the solutions studied. At higher conversions (above 90%), the polymerization rate constant decreased markedly. This is attributed to effects on the diffusion of the chains along their axes, and comparisons are made to available theoretical models. Keywords: Bisthiazoles, Thiazoles, Benzyl radical. (MJM)

DESCRIPTORS: (U) *BENZYL RADICALS, *COPOLYMERS, *POLYMERIZATION, *POLYMERS, *THIAZOLES, *PHENYL RADICALS, ANISOTROPY, CHAINS, CONVERSION, DIFFUSION, EQUILIBRIUM(GENERAL), KINETICS, LIQUID CRYSTALS, LIQUID PHASES, MIXTURES, MODELS, NYLON, PHASE STUDIES, PHASE TRANSFORMATIONS, PROCESSING, RATES, RHEOLOGY, SOLUTIONS(GENERAL), THEORY.

AD-A205 921

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 921 CONTINUED

IDENTIFIERS: (U) *Thiazole/1,4-phenylene-2,6-benzo.

AD-A205 841 7/2 7/4

PURDUE UNIV LAFAYETTE IN DEPT OF CHEMISTRY

(U) Multiresonant Spectroscopy and Dynamics of Molecular Extravalent States: State-Resolved Intramolecular Relaxation of NO2 Above 9 eV,

89

PERSONAL AUTHORS: Haber, Kenneth S.; Wiedmann, Ralph T.; Campos, Francis X.; Zwanziger, Josef W.; Grant, Edward R.

CONTRACT NO. F49620-87-C-0092

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-89-0313

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics, v129 p73-81 1989.

ABSTRACT: (U) Multiresonant methods are described for the optical selection of individual vibrational states at energies near and above the first ionization threshold of NO2. These techniques are applied to resolve distinct Rydberg series converging to respective vertical ionization potentials by optical absorption from assigned vibration-rotation levels of the low-living sharp 3rho sigma2 state. Spectra of levels lying between adiabatic and vertical thresholds show evidence for vibrational autoionization. This process is found to be comparatively slow (T>30ps) for all levels but those for which autoionization via a delta v = -1 transition in the symmetric stretch, 1, is accessible. Such rates are fastest for levels just above this nv = -1 threshold, exhibiting characteristic Fano lineshapes as broad as 11/cm. (MJM)

DESCRIPTORS: (U) *IONIZATION, *IONIZATION POTENTIALS, *VIBRATION, *NITROGEN OXIDES, *DIOXIDES, ABSORPTION, DYNAMICS, OPTICAL PROPERTIES, SELECTION, SPECTRA, THRESHOLD EFFECTS, VERTICAL ORIENTATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1, *Nitrogen

AD-A205 921

AD-A205 841

AD-A205 841 CONTINUED

dioxide.

AD-A205 840 12/3

WISCONSIN UNIV-MILWAUKEE DEPT OF MATHEMATICAL SCIENCES

(U) Sieves, Signal Extraction, and Design.

DESCRIPTIVE NOTE: Final technical rept. 30 Sep 84-31 Aug 88,

JAN 89

PERSONAL AUTHORS: Beder, Jay H.

CONTRACT NO. AFOSR-84-0329

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-89-0256

UNCLASSIFIED REPORT

ABSTRACT: (U) This report reviews the research completed under this grant. The areas covered include: (a) Sieve estimation for the mean and the covariance of a Gaussian process; (b) Stochastic signal extraction and a zero-one law of M. Driscol; and (c) The problem of confounding in factorial experiments. Parts (a) and (b) have been conducted without any assumptions whatever on the 'time' parameter underlying the process. Work on part of the set of levels of each factor; in certain cases, the problem of confounding is shown to be related to the Hadamard matrix problem. Keywords: Confounding; Consistency; Factorial experiment; Gaussian process; Hadamard matrix; Reproducing kernel Hilbert space; Sieve; Simulation; Stochastic signal; Zero-one law. (jhd)

DESCRIPTORS: (U) *STOCHASTIC PROCESSES, COMBINATORIAL ANALYSIS, EXTRACTION, HILBERT SPACE, COVARIANCE, PARAMETERS, SIGNALS, SIMULATION, TIME.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5, Mathematical sieves, Zero-one law, Gaussian processes.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 839 7/2

VANDERBILT UNIV NASHVILLE TN

(U) Ab Initio Study of Excited States of CN- Stabilized in Point-Charge Lattices.

DEC 88

PERSONAL AUTHORS: Ewig, Carl W.; Tellinghuisen, Joel

CONTRACT NO. AFOSR-86-0146

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-89-0239

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v153 n2-3 p160-165, 9 Dec 88.

ABSTRACT: (U) An MCSCF approach is used to study low lying excited electronic states of CN- and CN in vacuo and in point charge lattices. The latter simulate the electrostatic potential that renders excited states of CN- stable against autoionization in ionic lattices. The results provide strong support for a 3 sigma + assignment for the excited state involved in the UV emission spectrum of CN--in alkali halide substrates. Keywords: Cyanide anion, Ab initio computations, Excited electronic states, Point charge lattices. Reprints. (MJM)

DESCRIPTORS: (U) *CYANIDES, *ELECTRONIC STATES, ANIONS, COMPUTATIONS, ELECTROSTATICS, EMISSION SPECTRA, IONIZATION, REPRINTS, ULTRAVIOLET SPECTRA.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

AD-A205 838 7/4

PITTSBURGH UNIV PA DEPT OF CHEMISTRY

(U) CO Adsorption on Pt(111) Modified with Sulfur.

DEC 88

PERSONAL AUTHORS: Kiskinova, M.; Szabo, A.; Yates, J. T., Jr

CONTRACT NO. AFOSR-82-0133, $NSF-INT85-13805

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR TR-89-0269

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v89 n12 p7599-7608, 15 Dec 88.

ABSTRACT: (U) CO adsorption on clean and S-covered Pt(111) was studied using temperature programmed desorption (TPD), electron stimulated desorption ion angular distribution (ESDIAD), LEED, and work function measurements. Special attention was paid to comparing the CO adsorption rate, binding energy, and soft bending modes on a clean surface and on p(2X2) S/Pt(111) with S coverage = 0.25 S/Pt. It was found that on p(2X2) 0.25 S/Pt(111), the CO adsorption rate is decreased by a factor of 2 and only one CO adsorption state with maximum coverage, CO=0.25 CO/Pt is detected. Chemisorption, Platinum, Carbon monoxide, Sulfur, Catalyst poisons, Electron stimulated desorption, Adsorbate vibration, Chemical reactions, Reprints. (jes)

DESCRIPTORS: (U) *CHEMICAL REACTIONS, BENDING, CARBON MONOXIDE, CATALYSTS, CHEMISORPTION, COMPUTER PROGRAMMING, DESORPTION, ELECTRONS, NUCLEAR BINDING ENERGY, PLATINUM, POISONS, REPRINTS, STIMULATION(GENERAL), SULFUR, SURFACES, TEMPERATURE, WORK FUNCTIONS, WORK MEASUREMENT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A2.

AD A205 837 12/1 20/4

NORTH CAROLINA UNIV AT CHAPEL HILL DEPT OF MATHEMATICS

(U) Nonlinear Systems of Conservation Laws.

DESCRIPTIVE NOTE: Final rept. Jul 87-Sep 88,

NOV 88

PERSONAL AUTHORS: Shearer, Michael

CONTRACT NO. AFOSR-87-0283

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR
TR-89-0076

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report covers research in the following three areas: 1) Non-strictly hyperbolic conservation laws: Change of type of equations modelling three phase flow in porous media, solution of Riemann problems; 2) Plastic flow in two dimensions: Linear stability of homogeneous deformations, justification of the quasudynamic approximation; and 3) Glimm's method for the vibrating string' discovery of exact solutions related to a periodic motion. (kr)

DESCRIPTORS: (U) *CONSERVATION, *NONLINEAR SYSTEMS, *PLASTIC FLOW, *THREE PHASE FLOW, DEFORMATION, HOMOGENEITY, LINEARITY, MOTION, POROUS MATERIALS, STABILITY, VIBRATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A9, *Conservation laws.

AD-A205 837

AD-A205 836 7/2 7/4

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF CHEMISTRY

(U) Spin-Forbidden Radiative Decay Involving Quasidegenerate States. Application to the Beta 1 Sigma+ Yields a 3 Pi Transition in MgO,

DEC 88

PERSONAL AUTHORS: Yarkony, David R.

CONTRACT NO. AFOSR-86-0110, $NSF-CHE84-21381

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-89-0238

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v89 n12 p7324-7333, 15 Dec 88.

ABSTRACT: (U) In recent years the lowlying electronic states of Magnesium oxide have been the object of considerable experimental and theoretical interest. The work has centered on characterization of the nonrelativistic Born-Oppenheimer electronic sigma states and has shown that for the low-lying 1 sigma + states a multiconfiguration reference description is essential. The primary goals of this work include the determination of interstate spin orbit couplings and spin forbidden electronic transition moments necessary for the characterization of the B 1 sigma + yields a3 pi radiative transition. Reprints. (MJM)

DESCRIPTORS: (U) *ELECTRON TRANSITIONS, *ELECTRONIC STATES, *MAGNESIUM OXIDES, *RADIATIVE TRANSFER, CONFIGURATIONS, COUPLINGS, MOMENTS, ORBITS, REPRINTS, SPINNING(MOTION), TRANSITIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

AD-A205 836

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 835 7/2 7/4

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF CHEMISTRY

(U) On the Electronic Structure of the He + H2 System: Characterization of, and Nonadiabatic Interactions between, the 1 1A' and 2 1A' Potential Energy Surfaces,

OCT 88

PERSONAL AUTHORS: Perry, Jason K.; Yarkony, David R.

CONTRACT NO. AFOSR-86-0110

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR TR-89-0237

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v89 n8 p4945-4953, 15 Oct 88.

ABSTRACT: (U) The reactions of atoms with diatomic molecules in which one of the reactants is electronically excited have long provided fertile gorund for the study of electronically non-adiabatic chemistry. Studies in these areas have been characterized by the close interplay of theory and experiment. The helium-hydrogen system will be considered in this work. As a four electron, three atom system, it is a prime candidate for theoretical studies. While reactions each represent electronic quenching there is an important distinction. Keywords: Reprints, Hydrogen, Helium. (mjm)

DESCRIPTORS: (U) *DIATOMIC MOLECULES, *ELECTRONS, *HELIUM, *HYDROGEN, ATOMS, ELECTRONICS, INTERACTIONS, QUENCHING, REACTANTS(CHEMISTRY), REPRINTS, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3.

AD A205 835

AD-A205 834 7/6

GORDON RESEARCH CONFERENCES INC KINGSTON RI

(U) Report to the Air Force Office of Scientific Research on Grant Number AFOSR-88-0108 for the Partial Support of the 1988 Gordon Conference on Polymers (West).

DESCRIPTIVE NOTE: Final rept. Jan-Jun 88,

JAN 89

PERSONAL AUTHORS: Cruickshank, Alexander M.

CONTRACT NO. AFOSR-88-0108

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-89-0261

UNCLASSIFIED REPORT

ABSTRACT: (U) The technical program of the 1988 Gordon Conference on Polymers (Wes t) came together exactly as outlined in the proposal requesting support. The final program as it occurred is appended. There were sixteen speakers: Seven from the U.S. three from Israel, two from West Germany, and one each from Australia, Canada, Japan and the United Kingdom. While this Gordon Conference has a charter to cover the entire area of polymers, from chemical synthesis to solid-state properties, that is naturally a difficult goal to achieve. The guiding principal in the organization of this particular conference was that this broad coverage could be best achieved if there were a unifying sub-theme running through these different areas. The main sub-theme for this conference was surfaces, interfaces and microstructured polymers. Polymers, Surfaces. (jes)

DESCRIPTORS: (U) *POLYMERS, AUSTRALIA, CANADA, GREAT BRITAIN, ISRAEL, JAPAN, SOLID STATE ELECTRONICS, SYNTHESIS(CHEMISTRY), WEST GERMANY

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

AD-A205 834

AD-A205 833 20/5

FLORIDA UNIV GAINESVILLE QUANTUM THEORY PROJECT

(U) Theory and Implementation of the MBPT Density Matrix. An Application to One-Electron to One-Electron Properties.

JUN 88

PERSONAL AUTHORS: Trucks, Gary W.; Salter, E. A.; Sosa, Carlos; Bartlett, Rodney J.

CONTRACT NO. AFOSR-88-0041

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR TR-88-1317

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v147 n4 p359-366 10 Jun 88.

ABSTRACT: (U) To circumvent the problem of spin contamination in unrestricted Hartree Fock based coupled cluster (CC) calculations. A new method is presented for calculations for certain classes of open-shell systems. The approach ensures that the proper spin component of the resulting correlated wave function is projected out in the energy evaluation by the use of a reference function constructed from suitably chosen restricted open-shell Hartree-Fock or other orbitals. This single-reference open-shell spin-restricted CC method is applied to the calculation of ionization potentials in the N2 molecule, and it is shown that highly accurate results can be obtained in a 5s4pld basis. The mean error for all the principal ionization potentials of N2 compared to experiment is 0.45%. Reprints. (jhd)

DESCRIPTORS: (U) *MOLECULAR ENERGY LEVELS, *SPIN STATES, *MOLECULAR ORBITALS, ACCURACY, CONTAMINATION, CLUSTERING, IONIZATION POTENTIALS, HARTREE FOCK APPROXIMATION, REPRINTS, TEST AND EVALUATION, WAVE FUNCTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A4, Couple clusters.

AD-A205 833

AD-A205 832 20/8

CORNELL UNIV ITHACA NY LAB OF ATOMIC AND SOLID STATE PHYSICS

(U) Versatile Apparatus for Low-Energy and Hyperthermal Energy Ion Scattering Spectroscopies.

DEC 88

PERSONAL AUTHORS: McEachern, R. L.; Adler, D. L.; Goodstein, D. M.; Kimmel, G. A.; Litt, B. R.

CONTRACT NO. AFOSR-88-0069

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR TR-89-0240

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Review of Scientific Instruments, v59 n12 p2526-2567 Dec 88.

ABSTRACT: (U) An apparatus is designed and constructed to combines hyperthermal energy ion scattering (<100eV) with low-energy ion scattering (a few hundred eV to several keV). The UHV scattering chamber possesses a full range of sample preparation and characterization capabilities, including LEED, Auger spectroscopy, a Kelvin probe for work function measurements, and facilities for gas or alkali-metal deposition. The differentially pumped beamline provides well-collimated, monoenergetic beams of gas or alkali-metal ions ranging in energy from <10keV. To illustrate the qualitative changes in the scattering behavior observed over this range, experimental results are presented for Na+ scattered off the Cu (110) surface with the incident ion energy ranging from 56eV to 4keV. A comparison is shown between 1 keV K+ and 1 keV Ar+ scattered from the same surface. Keywords: Hyperthermal energy ion beams; Ion beam optics; Electrostatic Analyzer. Reprints. (jhd)

DESCRIPTORS: (U) *ELECTROSTATIC ANALYZERS, *ION BEAMS, *SCATTERING, ALKALI METALS, AUGER ELECTRON SPECTROSCOPY, ELECTRON DIFFRACTION, CHAMBERS, DEPOSITION, ENERGY, HIGH TEMPERATURE, IONS, LOW ENERGY, OPTICS, REPRINTS, WORK

AD-A205 832

AD-A205 832 CONTINUED

FUNCTIONS, WORK MEASUREMENT.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A2.

AD-A205 797 13/2 20/11

BDM CORP MCLEAN VA

(U) A New Perspective on Rutting in Flexible Pavements.

DESCRIPTIVE NOTE: Final rept.,

FEB 89

PERSONAL AUTHORS: Harrop-Williams, K. O.

REPORT NO. BDM/MCL-89-0108-TR

CONTRACT NO. F49620-88-C-0019

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR
TR-89-0326

UNCLASSIFIED REPORT

ABSTRACT: (U) This report represents a new approach to the prediction of rutting in flexible pavements. It recognizes the prominent role played by the granular layer in the stress distribution and strain accumulation in flexible pavements and diverts from the conventional continuum approach to modeling stresses in the layer. Fundamentally, the conventional requirement for the existence of the second derivatives of strains in the granular layer is replaced by a stress continuity equation that provides for stress transfer between particles through these contacts. This is developed assuming that deformation is due primarily to particle movements and is shown to be based on a nonlinear stress-strain relationship unique for granular material. In order to evaluate the rutting in a flexible pavement, the particulate theory of stress transfer is extended to predict stresses in multilayered systems consisting of granular and elastic layers. Knowledge of the nature of stress transfer and stress strain response is next incorporated into a theory for strain accumulation with repetitive loading. (sdw)

DESCRIPTORS: (U) *FLEXIBLE MATERIALS, *PAVEMENTS, *STRESS STRAIN RELATIONS, CONTINUITY, DEFORMATION, DISTRIBUTION, EQUATIONS, GRANULES, LAYERS, MODELS,

AD-A205 797 CONTINUED

NONLINEAR SYSTEMS, PARTICLES, PARTICULATES, REQUIREMENTS, RESPONSE, STRESSES, THEORY, TRANSFER.

IDENTIFIERS: (U) WUAFOSR2302C1, PE61102F.

AD-A205 797 20/5

YALE UNIV NEW HAVEN CONN

(U) Internal Energy Distribution of OCS Desorbing from a Hot Platinum Surface.

88

PERSONAL AUTHORS: Groeger, Wolfgang; Fenn, John B.

CONTRACT NO. AFOSR-87-0323

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-89-0291

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v93 n1 p344-349 1988.

ABSTRACT: (U) Rotational and vibrational energy distributions in OCS molecules desorbed from a hot platinum surface have been characterized by Fourier transform infrared spectrometry (FTIS) of radiation at 2062/cm from molecules that are vibrationally excited in the nu1 stretch mode. Measurements were performed at surface temperatures from 670 to 1270 K. The extent of equilibrium with the platinum surface was incomplete for rotation and bending vibration, but the nu1 stretch mode seemed to be completely accommodated. For surface temperatures above 900 K the lower rotational levels were somewhat overpopulated relative to the Boltzman distribution that characterized the higher levels. Computer simulations could be best-fit to the measured spectra when mode-specific temperature values were taken as T sub R = 0.65 T sub s, T sub nu1 = and T sub nu2 = 0.45 T sub s. Experimental data were insufficient to specify T sub nu3, but the computer simulations showed that at achievable resolution the spectral features were insensitive to its value. Carbonyl sulfide; Reprints. (jhd)

DESCRIPTORS: (U) *CARBONYL COMPOUNDS, *DESORPTION, *PLATINUM, *SULFIDES, *SURFACE CHEMISTRY, BENDING, COMPUTERIZED SIMULATION, DISTRIBUTION, ENERGY.

AD-A205 794

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 794 CONTINUED

EXPERIMENTAL DATA, FOURIER TRANSFORMATION, HIGH TEMPERATURE, INFRARED SPECTROSCOPY, INTERNAL, LOW LEVEL, REPRINTS, MOLECULAR ROTATION, SURFACE TEMPERATURE, MOLECULAR VIBRATION.

IDENTIFIERS: (U) WUAFOSR2308B1, PE61102F, *Carbonyl sulfide, Carbon oxysulfide.

AD-A205 793 21/2

YALE UNIV NEW HAVEN CONN

(U) Microjet Burners for Molecular-Beam Sources and Combustion Studies,

SEP 88

PERSONAL AUTHORS: Groeger, Wolfgang; Fenn, John B.

CONTRACT NO. AFOSR-87-0323

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-89-0290

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Review of Scientific Instruments, v59 n9 p1971-1979 Sep 88.

ABSTRACT: (U) A novel microjet burner is described in which combustion is stabilized by a hot wall. The scale is so small that the entire burner flow can be passed through a nozzle only 0.2 mm or less in diameter into an evacuated chamber to form a supersonic free jet with expansion so rapid that all collisional processes in the jet gas are frozen in a microsecond or less. This burner can be used to provide high-temperature source gas for free jet expansion to produce intense beams of internally hot molecules. A more immediate use would seem to be in the analysis of combustion products and perhaps intermediates by various kinds of spectroscopies without some of the perturbation effects encountered in probe sampling of flames and other types of combustion devices. As an example of the latter application of this new tool, we present infrared emission spectra for jet gas obtained from the combustion of oxygen-hydrocarbon mixtures both fuel-lean operation. Reprints. (jes)

DESCRIPTORS: (U) *BURNERS, *COMBUSTION, *JET FLOW, COLLISIONS, COMBUSTION PRODUCTS, EXPANSION, STABILIZATION, EMISSION SPECTRA, FLAMES, SUPERSONIC FLOW, JET ENGINE FUELS, MIXTURES, GASES, HIGH TEMPERATURE, INFRARED SPECTRA, INTERNAL, NOZZLE GAS FLOW, MOLECULAR SPECTROSCOPY, MOLECULAR BEAMS, MOLECULES, OPERATION,

AD-A205 794

AD-A205 793

AD-A205 793 CONTINUED

REPRINTS, SOURCES, WALLS.

IDENTIFIERS: (U) Microjet burners, WUAFOSR2303B1, PE61102F.

AD-A205 793

AD-A205 792 21/2

AEROCHEM RESEARCH LABS INC PRINCETON NJ

(U) Ion-Molecule Reactions in Sooting Acetylene-Oxygen Flames,

88

PERSONAL AUTHORS: Calcote, H. F.; Keil, D. G.

REPORT NO. AEROCHEM-TP-454-B

CONTRACT NO. F49620-83-C-0150

PROJECT NO. 2308

TASK NO. A2

MONITOR: AFOSR
TR-89-0292

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Combustion and Flame, v74 p131-146 1988.

ABSTRACT: (U) Ion concentration profiles up to mass 557 amu were measured in a sooting acetylene-oxygen flame at an equivalence ratio of 3.0, a total pressure of 2.67 kPa, and an unburned gas velocity of 50 cm per second. The mass spectrometer was calibrated for mass by seeding flames with isotopes of several metals and by using deuterated acetylene, which also allowed us to measure the number of hydrogen atoms in each hydrocarbon ion. The ion concentration sensitivity of the mass spectrometer was calibrated by comparing the individual ion currents with the ion current obtained in operation as a high-pass mass filter (that is, transmitting only those ions whose masses were greater than a specific mass) and by relating these currents to the total ion concentrations determined using a Langmuir probe. Ion-molecule reactions, including those with large ions, were demonstrated to be rapid under these flame conditions. Keywords: Ion-molecule reaction, Mechanisms of soot formation, Combustion, Premixed flames. Reprints. (JES)

DESCRIPTORS: (U) *ACETYLENE, *COMBUSTION, ATOMS, CHEMICAL REACTIONS, FLAMES, GASES, HIGH PASS FILTERS, HYDROCARBONS, HYDROGEN, ION DENSITY, IONIC CURRENT, IONS.

AD-A205 792

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 792 CONTINUED

ISOTOPES, LANGMUIR PROBES, MASS, MASS SPECTROMETERS, METALS, MIXING, MOLECULES, OXYGEN, PROFILES, REPRINTS, RESPONSE, SEEDING, SENSITIVITY, SOOT, VELOCITY.

IDENTIFIERS: (U) WUAFOSR2308A2, PE61102F.

AD-A205 792

AD A205 718 20/4

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) Bifurcating Jets at High Reynolds Numbers.

DESCRIPTIVE NOTE: Technical rept,

DEC 88

PERSONAL AUTHORS: Parekh, D. E.; Leonard, A.; Reynolds, W. C.

REPORT NO. TF-35

CONTRACT NO. F49620-84-K-0005, F49620-86-K-0020

PROJECT NO. 3484

TASK NO. A1

MONITOR: AFOSR TR-89-0282

UNCLASSIFIED REPORT

ABSTRACT: (U) There is much interest in the use of controlled excitations to manage various types of flows. This work focuses on use of dual-mode forcing to alter dramatically the structure of round turbulent jets. Properly-combined axial and helical excitations can cause a round jet to split into two distinct jets. This Y-shaped jet, known as a bifurcating jet, exhibits spreading angles as high as 80 deg. Vortex rings are formed at the jet exit and propagate along the two branches of the jet. A vortex-filament code was developed for simulating the large-scale features of bifurcating jets. The motion and interaction of the vortex structures in this flow are tracked in a three-dimensional, Lagrangian coordinate system. This simulation showed that inviscid vortex interactions cause the dramatic changes in jet development and that spreading angle increases with axial Strouhal number. The experimental apparatus consists of an acoustically-excited, 2-cm-diameter air jet. The jet evolution is documented by flow visualization at velocities up to 75 m/s, Reynolds numbers up to 100,000, and Mach numbers up to 0.22. Instantaneous and phase-average cross-sections of the jet reveal the effects of forcing amplitude on the structure and spreading angle of axially-excited, helically-excited,

AD-A205 718

AD-A205 718 CONTINUED

and bifurcating jets. The primary conclusions of this experiment are that: 1) Dual-mode acoustic excitation can produce bifurcation in air jets at high Reynolds numbers and that the jet spreading angle increases with both excitation amplitudes; and 2) The excitation amplitude required to produce bifurcation increases with Reynolds number, but the corresponding excitation Strouhal number is invariant (EDC)

DESCRIPTORS: (U) *EXCITATION, *JET FLOW, *VORTICES, ACOUSTIC WAVES, AIR FLOW, AMPLITUDE, ANGLES, AXIAL FLOW, COORDINATES, CROSS SECTIONS, DUAL MODE, FLOW VISUALIZATION, HELIXES, HIGH RATE, INTERACTIONS, INVISCID FLOW, LAGRANGIAN FUNCTIONS, MACH NUMBER, MOTION, REYNOLDS NUMBER, RINGS, COMPUTERIZED SIMULATION, STRUCTURAL PROPERTIES, SPLITTING, THREE DIMENSIONAL, TURBULENT FLOW, VELOCITY.

IDENTIFIERS: (U) Flow control, Bifurcating jets, Spreading angles, Strouhal number, Acoustic excitation, Forcing amplitude, Controlled excitation, PE61103D, WUAFOSR3484A1.

AD-A205 716 20/9 20/5

MICHIGAN UNIV ANN ARBOR DEPT OF NUCLEAR ENGINEERING

(U) Population Inversions in Ablation Plasmas Generated by Intense Electron Beams.

DESCRIPTIVE NOTE: Final rept. 1 Nov 85-31 Oct 88,

NOV 88

PERSONAL AUTHORS: Gilgenbach, R. M.; Kammash, T.; Brake, M. L.

CONTRACT NO. AFOSR-86-0012

PROJECT NO. 2301

TASK NO. A8

MONITOR: AFOSR TR-89-0294

UNCLASSIFIED REPORT

ABSTRACT: (U) Experiments during the past three years have concerned the generation and spectroscopic study of electron beam-driven carbon plasmas in order to explore the production of optical and ultraviolet radiation from nonequilibrium populations. The output of MELBA (Michigan Electron Long Beam Accelerator), has been connected to an electron beam diode consisting of an aluminum (or brass) cathode stalk and a carbon anode. Magnetic field coils have been designed, procured, and utilized to focus the electron beam. A side viewing port permitted spectroscopic diagnostics to view across the surface of the anode. Spectroscopic diagnosis has been performed using a 1 m spectrograph capable of operation from the vacuum ultraviolet through the visible. This spectrograph is coupled to a 1024 channel optical multichannel analyzer. Spectra taken during the initial 400 ns period of the e-beam pulse showed a low effective charge plasma with primarily molecular components (C2, CH) as well as atomic hydrogen and singly ionized carbon (CII). When the generator pulse was crowbarred after the first 400 ns, the spectra revealed a continuation of the low charge state plasma. At times greater than 400 ns in non-crowbarred shots, the spectra revealed a highly ionized plasma with a very large intensity line at 2530 Angstroms due to CIV (5g-4f), and lower intensity lines due to CIII

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 716 CONTINUED

and CII. This CIV line emission increased with time, peaking sharply between 750 ns and 900 ns, and decayed rapidly in less than 100 ns. Emission from these high ionization states may be due to electron beam-plasma instabilities, as this emission was accompanied by high levels of radio frequency and microwave emission. (jhd)

DESCRIPTORS: (U) *ABLATION, *CARBON, *EMISSION SPECTRA, *PUMPING(ELECTRONICS), *PLASMAS(PHYSICS), *VACUUM ULTRAVIOLET RADIATION, *ELECTRON IMPACT SPECTRA, ALUMINUM, ANODES, ATOMIC STRUCTURE, BRASS, DIAGNOSIS(GENERAL), DIODES, ELECTRON BEAMS, EMISSION, HYDROGEN, INTENSITY, INVERSION, IONIZATION, LINE SPECTRA, MAGNET COILS, MAGNETIC FIELDS, MICROWAVES, POPULATION, PRODUCTION, PULSES, RADIOFREQUENCY, SIDES, SPECTROSCOPY, SURFACES, ULTRAVIOLET RADIATION, VIEWERS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A8, Multichannel analyzers, Population inversions

AD-A205 713 11/4

TEXAS A AND M UNIV COLLEGE STATION DEPT OF AEROSPACE ENGINEERING

(U) Ultrasonic Nondestructive Evaluation of Damage in Continuous Fiber Composites.

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

NOV 87

PERSONAL AUTHORS: Kinra, Vikram K

CONTRACT NO. AFOSR-84-0066

PROJECT NO. 2302

TASK NO. B2

MONITOR: AFO[illegible]
TR [illegible]0315

UNCLASSIFIED REPORT

ABSTRACT: (U) It is well-known that composite materials develop a complex damage state when they are subjected to monotonic or fatigue loading. The damage has, in general, two effects on the propagation of an ultrasonic wave: it decreases the stiffness and increases the attenuation. The central objective of this work has been to correlate damage states with changes in the two ultrasonic parameters (wavespeed and attenuation). We have developed a new technique for measuring the wavespeed and attenuation in the thickness direction, in extremely thin laminates. We have also developed a technique for the excitation and detection of Lamb waves in the lengthwise direction. Thus, both the in-plane and out-of-plane measurements can be made. Composites, Velocity, Damage, Attenuation, Ultrasonic nondestructive evaluation. (jes)

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *FIBER REINFORCED COMPOSITES, *NONDESTRUCTIVE TESTING, ATTENUATION, DAMAGE, LAMINATES, MEASUREMENT, PARAMETERS, STIFFNESS, THICKNESS, THINNESS, ULTRASONIC TESTS, ULTRASONICS, WAVES.

IDENTIFIERS: (U) WUAFOSR2302B2, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 649 3/1

EASTERN MONTANA COLL BILLINGS DEPT OF PHYSICAL SCIENCES

(U) Study of the Infrared Celestial Background.

DESCRIPTIVE NOTE: Final rept. 1 Feb 85-31 Jan 88.

SEP 88 67P

PERSONAL AUTHORS: Bentley, Alan F.

CONTRACT NO. AFOSR-85-0139

PROJECT NO. 2311

TASK NO. A1

MONITOR: AFOSR
TR-89-0318

UNCLASSIFIED REPORT

ABSTRACT: (U) The following revised objectives were formulated: to determine the nature of infrared sources observed; to carry out theoretical investigations on the nature and evolution of selected infrared sources; and to establish the statistical distribution of infra-sources in space to a sensitivity limit and spatial resolution consistent with available observing equipment and techniques. The research objectives follow: Research on infrared sources in the W40 complex was published. Results of radio and infrared observations of OH/IR stars in the Galaxy were published. A theoretical study of the possibilities for observation of galaxies in the process of formation in the early universe was published in the Proceedings of the Montana Academy of Science. The results of a series of observations made on Nova Vulpeculae 1984 2 were published. Preliminary results on our studies of the infrared properties of the nuclei of planetary nebulae were presented. A theoretical model has been constructed for transfer of cosmic ray energy to emission nebulae. (jhd)

DESCRIPTORS: (U) *BACKGROUND RADIATION, *EXTRATERRESTRIAL RADIATION, *INFRARED RADIATION, *ASTRONOMY, ASTRONOMICAL GEODESICS, COSMIC RAYS, EMISSION, ENERGY, GALAXIES, LIMITATIONS, NEBULAE, NUCLEI, OBSERVATION, RESOLUTION, SENSITIVITY, SOURCES, SPATIAL DISTRIBUTION, STARS.

AD-A205 649

AD-A205 649 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2311A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 644 21/3 20/9

JET PROPULSION LAB PASADENA CA

(U) *MPD Thruster Erosion Research.*

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

NOV 88

PERSONAL AUTHORS: King, David Q.; Callas, John L.

REPORT NO. JPL-D-6020

CONTRACT NO. AFOSR-ISSA-87-0046, NAS7-918

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR
TR-89-0331

UNCLASSIFIED REPORT

ABSTRACT: (U) The multimegawatt MPD (Magnetoplasma Dynamic) thruster is an electric engine capable of orbital transfer and maneuvering of large payloads driven by a megawatt class space power supply. The MPD thruster is capable of specific impulses from 1,500 to 8,000 s. The high specific impulse means this system can perform missions using much less propellant than chemical systems. A five MW MPD electric system, propellant and payload from one shuttle launch must be replaced by the equivalent of four fully loaded Centaur G' stages. Thus, the savings in propellant and launch costs are very substantial. This report discusses 3 aspects of MPD thruster Physics: 1) A significant operational problem which has limited the useful operation of the device is discussed. This is severe erosion of the insulator at the cathode insulator junction. A technique which appears to solve the problem has been tested, and is described. 2) A preliminary analyses of anode sheath is presented. 3) Analysis of the discharges two dimensional nature is explored for the case where transverse gradients are considered but transverse velocity is assumed to be zero. This situation applies to high aspect ratio devices. The analyses concludes with: a) a formalish that provides a means to qualitatively evaluate Ohmic dissipation from simple measurements of magnetic Hall effect on

AD-A205 644 CONTINUED

magnetosonic choking (where thermodynamics is ignored).
Keywords: Cathode lifetime. (EDC)

DESCRIPTORS: (U) *ELECTRIC ENGINES, *THRUSTERS, ANODES, ASPECT RATIO, CATHODES, COSTS, COST EFFECTIVENESS, DISSIPATION, ELECTRICAL EQUIPMENT, EROSION, GRADIENTS, HALL EFFECT, HIGH RATE, INTENSITY, LAUNCHING, LIFE EXPECTANCY(SERVICE LIFE), MAGNETIC FIELDS, MANEUVERABILITY, MEASUREMENT, ORBITS, PAYLOAD, PHYSICS, PLASMAS(PHYSICS), POWER SUPPLIES, SPACE SHUTTLES, SPACE SYSTEMS, SPECIFIC IMPULSE, TRANSFER, TRANSVERSE, TWO DIMENSIONAL, VELOCITY.

IDENTIFIERS: (U) MPD thrusters, Magnetoplasmmadynamics, Anode sheaths, Ohmic dissipation, Magnetosonic choking, PE61102F, WUAFOSR2308A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 605 6/1 6/15

ILLINOIS UNIV AT THE MEDICAL CENTER CHICAGO COLL OF MEDICINE

(U) Role of Adenosine Analogs and Growth Hormone in Waking and Sleep.

DESCRIPTIVE NOTE: Final technical rept. 15 Sep 85-15 Sep 88.

FEB 89

PERSONAL AUTHORS: Radulovacki, Miodrag

CONTRACT NO. AFOSR-85-0349

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR
TR-89-0362

UNCLASSIFIED REPORT

ABSTRACT: (U) We have tried to establish the mechanism of hypnotic action of adenosine by pursuing several lines of investigation. First, we have found that when rats are deprived of rapid-eye-movement sleep (REMS) there is an increase in adenosine A1 receptors in two brain structures, he cerebral cortex and the corpus striatum. At the same time there was no change in brain adenosine concentration. Secondly, we have tested the hypothesis that hypnotic action of benzodiazepines, which block the transport of adenosine stimulation of adenosine receptors. We found that chronic administration of diazepam stimulated adenosine receptors. We found that chronic administration of diazepam stimulated adenosine receptors which was evident by a decreased number of A1 receptors in the hippocampus and A2 receptors in the striatum. Finally, we studied the effects on sleep in rats of various types of adenosine receptor stimulants and blockers and obtained results that were in accordance with our previous reports. (AW)

DESCRIPTORS: (U) *ADENOSINE, *GROWTH SUBSTANCES, *HORMONES, *HYPNOTICS AND SEDATIVES, *SLEEP, ANALOGS, BRAIN, CEREBRAL CORTEX, CONCENTRATION(CHEMISTRY), HIPPOCAMPUS, HYPOTHESES, RATS, SENSE ORGANS,

AD-A205 605 CONTINUED

STIMULATION(PHYSIOLOGY), STIMULI, DIAZEPAM.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2, Awake, Sleep wake cycles.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 603 7/3 7/4

NEW ORLEANS UNIV LA DEPT OF CHEMISTRY

(U) Computational Determination of the Structures and Some Properties of Tetrahedrane, Prismane, and Some of Their Aza Analogues.

DESCRIPTIVE NOTE: Journal article,

89

PERSONAL AUTHORS: Politzer, Peter; Seminario, Jorge M.

CONTRACT NO. AFOSR-88-0068

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-89-0371

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v93 n2 p588-592 1989.

ABSTRACT: (U) We have carried out an ab initio self consistent field computational study of tetrahedrane, prismane, and nine of their aza analogues, in which C-H units have been replaced by nitrogens structures optimized at the 3-21G level were used to compute molecular electrostatic potential as guides to reactive behavior, and bond deviation indexes as quantitative indicators of bond strain. Within each set of azaprismane isomers, the most stable is the one having the fewest N-N bonds. The exceptional length of these bonds, approximately 1.59 A, may reflect a tendency to rupture. In the tetrahedranes, the bonds are quite highly strained but become less so as the number of nitrogens increases. The degrees of bond strain are not as great in the prismanes and do not necessarily diminish as more nitrogens are introduced. There are negative electrostatic potentials associated with the C-C bonds in tetrahedrane and prismane, indicating that these bonds can serve as initial sites for electrophilic attack. These potentials are greatly weakened or eliminated by the introduction of nitrogens. In the azatetrahedranes an azaprismane, there are strong and extensive negative regions near the nitrogens, suggesting significant basicity. Strained molecules, Tetrahedrane, Electrostatic potentials, Ab initio, self consistent field computations, Bond strain, Reprints. (mjm)

DESCRIPTORS: (U) *BONDING, *ELECTROSTATIC CHARGE, *NITROGEN, *HYDROCARBONS, ATTACK, COMPUTATIONS, CONSISTENCY, DETERMINATION, ELECTROSTATICS, INDEXES, INDICATORS, MOLECULES, REGIONS, REPRINTS, RUPTURE, STRUCTURES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3, *Tetrahedrane, *Prismane.

DTIC REPORT BIBLIOGRAPHY 'EARCH CONTROL NO. EVI32L

AD A205 602 12/2

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MATHEMATICS

(U) Numerical Conformal Mapping and Applications

DESCRIPTIVE NOTE: Annual rept 1 Dec 87-30 Nov 88,

JAN 89

PERSONAL AUTHORS: Trefethen, Lloyd N.

CONTRACT NO AFOSR 87-0102

PROJECT NO 2304

TASK NO A3

MONITOR AFOSR
TR 89-0350

UNCLASSIFIED REPORT

ABSTRACT. (U) Progress was made in three principal areas: (1) Conformal mapping of highly elongated polygons. Conventional methods of conformal mapping break down when applied to highly distorted regions, as arise frequently in applications. In the first year of research under this grant, Prof Trefethen and Louis Howell developed a modified Schwarz-Christoffel formula to handle highly elongated polygons. In the second year this work was completed and written up for publication in the 'SIAM Journal on Scientific and Statistical Computing'; (2) Conformal mapping of circular polygons. Work by Trefethen and Howell is underway on the problem of extending Schwarz-Christoffel methods to the mapping of 'circular polygons' bounded by straight sides and circular arcs; (3) Applications in numerical linear algebra. The efficient solution of large nonsymmetric linear algebra problems Ax = b is an important but incompletely understood area of numerical analysis. Because the eigenvalues of A are generally complex, some algorithms for this problem are based on conformal mapping, complex approximation, and other techniques of complex analysis. One particular algorithm combining both conformal mapping and complex approximation is discussed in a new paper by Trefethen, and this has led to an investigation in greater generality of the behavior of non-normal matrices with complex spectra. (FR)

AD A205 602

AD-A205 602 CONTINUED

DESCRIPTORS: (U) *ALGORITHMS, *CONFORMAL MAPPING, *LINEAR ALGEBRA, *NUMERICAL ANALYSIS, CIRCULAR, DISTORTION, EFFICIENCY, EIGENVALUES, PAPER, POLYGONS, REGIONS, SOLUTIONS(GENERAL), SPECTRA, STATISTICS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A3.

AD A205 602

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD A205 598 12/1

YALE UNIV NEW HAVEN CT DEPT OF ELECTRICAL ENGINEERING

(U) Development and Analysis of Arma Parameter Estimation Schemes in the Presence of Noise.

DESCRIPTIVE NOTE: Annual rept. 1 Nov 87-1 Nov 88.

JAN 89

PERSONAL AUTHORS: Nehorai, Arye

CONTRACT NO. AFOSR 88-0080

PROJECT NO. 2304

TASK NO. A6

MONITOR: AFOSR TR-89-0329

UNCLASSIFIED REPORT

ABSTRACT: (U) The original proposal focussed on the development and analysis of single-sensor parameter estimation schemes for ARMA (Autoregressive Moving Average) signals in noise. In the single sensor problem, we solved several new problems for these signals and also added sine wave signals in noise. Furthermore, we extended the research to multi-sensor (or sensor array) estimation algorithms which are useful for direction-of-arrivals estimation. All the proposed algorithms have been tested by computer simulation to verify their operation. Topics include: Single sensor algorithms; Performance analysis of algorithms; Sensor array processing. Keywords: Signal processing; Transfer functions. (edc)

DESCRIPTORS: (U) *PARAMETRIC ANALYSIS, *SIGNAL PROCESSING, ALGORITHMS, ARRAYS, ARRIVAL, COMPUTERIZED SIMULATION, DATA PROCESSING, DETECTORS, DIRECTIONAL, ESTIMATES, MULTISENSORS, NOISE, PARAMETERS, PERFORMANCE TESTS, REGRESSION ANALYSIS, SIGNALS, SINE WAVES, TRANSFER FUNCTIONS.

IDENTIFIERS: (U) ARMA(Autoregressive Moving Average), Signals in noise, Direction of arrival, PE61102F, WUAFOSR2304A6

AD A205 598

AD-A205 597 7/2 7/4

JOHNS HOPKINS UNIV BALTIMORE MD

(U) Collaborative Experimental and Theoretical Study of the Photodissociation and Reactions of the Azide Radical.

DESCRIPTIVE NOTE: Interim rept 1 Feb 88-31 Jan 89.

FEB 89

PERSONAL AUTHORS: Dagdigian, Paul J.; Alexander, Millard H.

CONTRACT NO. F49620-88-C-0056

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-89-0320

UNCLASSIFIED REPORT

ABSTRACT: (U) A theoretical investigation of the energetics of the dissociation of ground state hydrazoic acid HN3 and the azide radical N3 has been carried out through complete active space SCF and multi-reference configuration interaction calculations with large basis sets. Of particular interest was (a) The determination of the bond dissociation energies of HN3 and N3, (b) The location of the geometry and topology of the transition state for spin-forbidden decomposition and the corresponding activation energy, and (c) The investigation of the magnitude and origin of exit channel barriers in the spin-allowed decomposition pathway. Keywords: Hydrazoic acid, Azide radical, Photodissociation, Electronic quenching, Chemical reaction. (mjm)

DESCRIPTORS: (U) *AZIDES, *CHEMICAL DISSOCIATION, *CHEMICAL REACTIONS, *HYDRAZOIC ACID, *PHOTODISSOCIATION, ACTIVATION ENERGY, BARRIERS, CHANNELS, CHEMICAL BONDS, DISSOCIATION, ELECTRONICS, ENERGETIC PROPERTIES, ENERGY, EXITS, QUENCHING, THEORY, TOPOLOGY, TRANSITIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

AD A205 597

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD A205 593 17/9 4/1

UTAH STATE UNIV LOGAN CENTER FOR ATMOSPHERIC AND SPACE SCIENCES

(U) Mesospheric Wind Measurement

DESCRIPTIVE NOTE: Final technical rept. 30 Jun 86-29 Sep 88.

SEP 88

CONTRACT NO. AFOSR-86 0241

PROJECT NO. 2917

TASK NO A2

MONITOR: AFOSR TR-89-0283

UNCLASSIFIED REPORT

ABSTRACT: (U) This grant involves the construction of MENTOR, an RF interferometer radar to study acoustic-gravity waves in the mesopause region of the earth's atmosphere, under the Department of Defense-University Research Instrumentation Program. The subcontractor for the construction of MENTOR has completed the radar and put it in the field. All the electronics are fielded in an 8'x8'x20' shipboard container, with the antenna arrays deployed close by. The electronics consists of a 50 kW transmitter, 8 receivers, and 150 Mips of on-line computer. The radar antenna consists of a 32-Yagi antenna array configured as 16 Yagis for transmit and 16 Yagis for receive. The transmit array is deployed on one side of the shipboard container and operated as a single in-phase beam; the 16 separate Yagis for receive are sampled as 8 rows of 4 Yagis each. (EDC)

DESCRIPTORS: (U) *GRAVITY WAVES, *RADIO INTERFEROMETERS, *MESOPAUSE, *RADAR ANTENNAS, *WIND, ACOUSTIC WAVES, ANTENNA ARRAYS, COMPUTERS, CONTAINERS, DEPLOYMENT, EARTH ATMOSPHERE, ELECTRONICS, MEASUREMENT, MESOSPHERE, ON LINE SYSTEMS, RADAR TRANSMITTERS, RADAR RECEIVERS, RADIOFREQUENCY, SHIPBOARD, YAGI ANTENNAS.

IDENTIFIERS: (U) MENTOR radar, Radar interferometers, PE61102F, WUAFOSR2917A2.

AD A205 593

AD-A205 592 4/1

ALASKA UNIV FAIRBANKS GEOPHYSICAL INST

(U) Gravity Wave and Turbulence Studies Using a High-Resolution ST Radar.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jan-31 Dec 88,

FEB 89

PERSONAL AUTHORS: Fritts, David C.

CONTRACT NO. F49620-87-C-0024

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR TR-89-0284

UNCLASSIFIED REPORT

ABSTRACT: (U) Research during the past year included both theoretical and observational studies of gravity waves and their effects in the lower and middle atmosphere. Theoretical studies examined the stability conditions of inertio-gravity waves in order to address the most likely form of wave instability conditions of inertio-gravity waves in order to address the most likely form of wave instability and saturation as well as the atmospheric structures leading to ducting and wave energy transports. Ongoing theoretical studies are addressing nonlinear wave interactions and wave interactions and wave forcing via geostrophic adjustment. Observational work has dealt with mesospheric momentum fluxes at high latitudes and with continuing studies of wave and turbulence effects using a variety of data sets. Future work will address increasingly the sources and variability of such motions. (FR)

DESCRIPTORS: (U) *ATMOSPHERES, *GRAVITY WAVES, *HIGH LATITUDES, *INTERACTIONS, *RADAR, ADDRESSING, DATA BASES, ENERGY TRANSFER, LOW ALTITUDE, MESOSPHERE, MOMENTUM, NONLINEAR SYSTEMS, STABILITY, THEORY, TURBULENCE, WAVES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A1.

AD-A205 592

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 589 20/11

ILLINOIS UNIV AT CHICAGO CIRCLE DEPT OF CIVIL ENGINEERING MECHANICS AND METALL URG)

(U) Geometrical Foundations of Mesomechanics and Lagrangian Formalism.

DESCRIPTIVE NOTE: Final rept.,

JAN 89

PERSONAL AUTHORS: Chudnovsky, A.; Kunin, B.

CONTRACT NO AFOSR-88-0034

PROJECT NO 2302

TASK NO B2

MONITOR: AFOSR TR-89-0307

UNCLASS) REPORT

ABSTRACT: (U) Results of a scouting program of research in foundations of mesomechanics are presented. A special case of Weyl's geometry was employed to derive equations of thermoelasticity on pure geometrical ground; this demonstrates the potential of using Weyl's geometry as a model of the geometry of the material space. Experimental methods of finding fractal dimensions of fracture surfaces were examined (for various materials) together with a method of fracture profile simulation; the results contribute to developing experimental techniques of studying metric properties of the material space. A new dynamic crack propagation equation was derived on the basis of the least action principle; this is a first step of applying the Lagrangian formalism to deriving equations of continuous damage evolution. (KR)

DESCRIPTORS: (U) *GEOMETRY, *THERMOELASTICITY, DAMAGE, EQUATIONS, EVOLUTION(GENERAL), EXPERIMENTAL DESIGN, FRACTURE(MECHANICS), GROUND LEVEL, METHODOLOGY, PROFILES, PURITY, SIMULATION, SURFACES.

IDENTIFIERS (U) PE61102F, WUAFOSR2302B2, *Mesomechanics.

AD-A205 589

AD-A205 588 22/5

ANALATOM INC SUNNYVALE CA

(U) An Instrument for the Simultaneous Measurement of Velocity, Temperature and Density in Unseeded Air Flows.

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-31 Jan 89,

JAN 89

PERSONAL AUTHORS: Laufer, Gabriel

REPORT NO. GL-88-2

CONTRACT NO. F49620-88-C-0126

PROJECT NO. 3005

TASK NO. A1

MONITOR: AFOSR TR-89-0310

UNCLASSIFIED REPORT

ABSTRACT: (U) The development and the design of advanced hypersonic vehicles such as the National Aerospace Plane (NASP) or the Space Shuttle will strongly depend on computer simulation mainly because some of the flight conditions experienced by these vehicles will be difficult or prohibitively expensive to create in ground facilities. Computer simulation will be used to reduce the need for expensive test time or will replace those experimental tests which can not be performed. However, computer simulations require validation before their results can be accepted. These validation tests, which must be performed in hypersonic and turbulent air flows, require the simultaneous measurement of air temperature, density and velocity at a high temporal and spatial resolution which will allow to resolve turbulence structures. (JES)

DESCRIPTORS: (U) *AEROSPACEPLANES, *HYPERSONIC VEHICLES, *SPACE SHUTTLES, AIR FLOW, ATMOSPHERIC TEMPERATURE, COMPUTERIZED SIMULATION, EXPERIMENTAL DESIGN, FACILITIES, FLIGHT, GROUND LEVEL, HIGH RESOLUTION, HYPERSONIC FLOW, MEASUREMENT, RESOLUTION, SPATIAL DISTRIBUTION, STRUCTURES, SYNCHRONISM, TEST AND EVALUATION, TEST METHODS, TIME,

AD-A205 588

AD-A205 588 CONTINUED

TURBULENCE, TURBULENT FLOW, VALIDATION, VELOCITY.

IDENTIFIERS: (U) PE65502F, WUAFOSR3005A1.

AD-A205 587 20/4

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG DEPT OF ENGINEERING SCIE NCE AND MECHANICS

(U) Three-Dimensional Structure of Boundary Layers in Transition to Turbulence.

DESCRIPTIVE NOTE: Final rept. 1 Mar 87-30 Jun 88,

FEB 89

PERSONAL AUTHORS: Thornwald, Herbert

CONTRACT NO. F49620-87-K-0005

PROJECT NO. 2307

TASK NO. A2

MONITOR: AFOSR
TR-89-0303

UNCLASSIFIED REPORT

ABSTRACT: (U) The Floquet theory of secondary instability in shear flows has been further developed and applied to a variety of flows. The linear theory has been extended to explain and quantitatively analyze the observed combination resonance in boundary layers. Numerical methods for the study of secondary instability in unbounded flows have been developed and applied to the viscous and inviscid mixing layer. The linear theory has been formulated for a variety of spatially periodic flows that include Gortler vortices and oblique waves. Applications await accounting for nonparallel effects. A new approach to analyzing nonparallel flows based on parabolic partial differential equations has been successfully applied to the primary stability problem. A perturbation method has been successfully applied to the primary stability problem. A perturbation method has been developed to reveal the nonlinear interactions that lead to breakdown of the laminar flow. This method permits prediction of the transition location in a given disturbance environment. Keywords: Boundary layer transitions; Instability, Gortler vortices. (jhd)

DESCRIPTORS: (U) *BOUNDARY LAYER FLOW, *BOUNDARY LAYER TRANSITION, *VORTICES, INTERACTIONS, INVISCID FLOW, LAMINAR FLOW, LAYERS, LINEARITY, MIXING, NONLINEAR

AD-A205 587 CONTINUED

SYSTEMS, NUMERICAL METHODS AND PROCEDURES, PARABOLAS, PARTIAL DIFFERENTIAL EQUATIONS, PERTURBATIONS, RESONANCE, SHEAR PROPERTIES, STABILITY, THREE DIMENSIONAL FLOW, TURBULENCE, VISCOUS FLOW, WAVES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2307A2, Floquet theory, Gortler vortices, Parabolic partial differential equations.

AD-A205 587

AD-A205 586 11/2 7/3

ULTRASYSTEMS INC IRVINE CA CHEMICALS AND MATERIALS RESEARCH DEPT

(U) Heterocycles Based on Group III, IV, and V Elements Precursors for Novel Glasses and Ceramics.

DESCRIPTIVE NOTE: Annual progress rept. no. 3,

MAY 88

PERSONAL AUTHORS: Paciorek, K. L.; Nakahara, J. H.; Kratzer, R. H.

CONTRACT NO. F49620-85-C-0042

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-89-0281

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this program is to explore the feasibility o f synthesizing novel heterocyclics from the group of elements consisting of B, C, N, Al, Si, and P, the ultimate goal being the production of processible precursors leading to novel ceramics of unusual properties. The initial efforts under the program were devoted to development of processible preceramic systems leading to aluminum nitride ceramics. This involved the synthesis of novel trimethylsilylamino-substituted aluminum compounds and the study of their reactions. During the current reporting period the investigations of processible precursors of aluminum nitride were further pursued. Work was also directed at identification of processes leading to the formation of processible Al-N-B systems amenable to transformation into AlN.BN ceramics. Keywords: Ceramics; Synthesis chemistry. (kt)

DESCRIPTORS: (U) *ALUMINUM COMPOUNDS, *CERAMIC MATERIALS, *HETEROCYCLIC COMPOUNDS, *NITRIDES, PRECURSORS, PRODUCTION, SYNTHESIS, SYNTHESIS(CHEMISTRY), BORON, METHYL RADICALS, SILICON, AMINES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

AD-A205 586

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 585 12/3

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF STATISTICS

(U) Multivariate Analysis and Its Applications.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 87-31 Dec 88,

FEB 89

PERSONAL AUTHORS: Rao, C. R.

CONTRACT NO. AFOSR-88-0030

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR TR-89-0276

UNCLASSIFIED REPORT

ABSTRACT: (U) During the period of October 1, 1987-December 31, 1988, research was carried out in several new areas of multi-variate analysis of interest to the Air Force. They have applications in manufacturing technology, automation, expert systems, pattern recognition and machine intelligence. About 59 Technical Reports were issued for publication in journals and presenting at conferences. A list of the Technical Reports together with the abstracts is given in the Appendix to this report. A brief outline of some of the important contributions is given. Keywords: Probability distributions, Discriminant analysis, Linear models, Bibliographies. (KR)

DESCRIPTORS: (U) *MULTIVARIATE ANALYSIS, AIR FORCE, ARTIFICIAL INTELLIGENCE, BIBLIOGRAPHIES, DISCRIMINATE ANALYSIS, LINEARITY, MANUFACTURING, MATHEMATICAL MODELS, PATTERN RECOGNITION, PROBABILITY DISTRIBUTION FUNCTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A5.

AD-A205 585

AD-A205 572 7/4

CINCINNATI UNIV OH DEPT OF CHEMISTRY

(U) X-Ray Absorption Spectroscopy of Electrochemically Generated Species.

DESCRIPTIVE NOTE: Annual rept. 1 Jan 88-31 Feb 89,

JAN 89

PERSONAL AUTHORS: Elder, Richard C.; Heineman, William R.

CONTRACT NO. AFOSR-88-0089

PROJECT NO. 2303

TASK NO. A1

MONITOR: AFOSR TR-89-0301

UNCLASSIFIED REPORT

ABSTRACT: (U) Our research concerns the study of the change in the coordination environment and bond length about transition metals in complexes incorporated in a variety of media using EXAFS spectroelectrochemistry. These systems include: Fe(bipy)3(ClO4)2, Ru(bipy)3C12, and Cu(dmp)2Bf$ (bipy=2,2 bipyridine, dmp=2,9dimethyl-1,10-phenanthroline) in solution at reticulated vitreous carbon electrodes, and incorporated in Nafion films on gold Mylar and colloidal graphite gold Mylar electrodes; K3Fe(CN)6, Co(phen)3C13, Fe(bipy)3(clO4)2, and K3Cu(bcp-s)2 (phen=1,10-phenanthroline, bcp-s=2,9 dimethyl-4,7-diphenyl-1,10-phenanthroline disulfonic acid) incorporated in the solid polyelectrolytes poly(dimethyldiallylammonium chloride) and poly(acrylamide0 on gold minigrid electrode in a humidistatic cell; and Prussian Blue, KFe(Fe(CN)6), cyanometalate films electrochemically deposited onto gold Mylar electrodes. (JES)

DESCRIPTORS: (U) *BONDING, *ELECTROCHEMISTRY, *DEPOSITION, *POLYETHYLENE TEREPHTHALATE, CARBON, POLYMERIC FILMS, RETICULAR FORMATION, TRANSITION METALS, VITREOUS STATE, X RAY ABSORPTION ANALYSIS, X RAY SPECTROSCOPY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A1.

AD-A205 572

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 571 7/4

STANFORD UNIV CA DEPT OF CHEMISTRY

(U) Theory and Experimental and Chemical Instabilities.

DESCRIPTIVE NOTE: Interim rept.,

JAN 89

PERSONAL AUTHORS: Ross, John

CONTRACT NO. AFOSR-87-0120

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-89-0306

UNCLASSIFIED REPORT

ABSTRACT: (U) Progress is reported in research on theory and experiments in chemical instabilities including: Thermodynamics of Chemical Systems far from Equilibrium; Critical Slowing Down phase Relations and Dissipation in Driven Oscillatory Systems; Universal Bifurcation Structures in Driven Oscillators; Deviations from Minimum Entropy Production at Steady States of Reacting Chemical Systems Arbitrarily Close to Equilibrium; Profiles and Front Widths of Chemical Waves in the Iron-Catalyzed Belousov-Zhabotinskii Reaction; Noise in Neural Networks: Thresholds, Hysteresis, and Neuromodulation of Signal-to-NOise; and Statistical-Mechanical Theory of Many-body Effects in Reaction Rates. (JES)

DESCRIPTORS: (U) *CHEMISTRY, *HYSTERESIS, *N BODY PROBLEM, *STABILITY, CHEMICALS, ENTROPY, EQUILIBRIUM(GENERAL), NEURAL NETS, OSCILLATION, OSCILLATORS, PRODUCTION, RATES, REACTION TIME, STEADY STATE, THEORY, THERMODYNAMICS, WAVES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1

AD-A205 571

AD-A205 570 7/4 20/5

YALE UNIV NEW HAVEN CONN

(U) Spectrometric Studies of Gas Phase Collision Processes.

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

FEB 89

PERSONAL AUTHORS: Fenn, J. B.

CONTRACT NO. AFOSR-87-0323

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-89-0309

UNCLASSIFIED REPORT

ABSTRACT: (U) Measurements have been made of the total radiation intensity from free jets of carbon dioxide and carbon that were excited in the source by a corona discharge. The radiation per molecule, obtained from the ratio of total intensity to source density, increases sharply when source temperature and pressure are such as the produce clustering in a jet of unexcited gas. We believe this enhancement may be due to interaction between aligned dipoles in adjacent cluster molecules. Measurements of the terminal rotational temperature of carbon monoxide and CO2, both pure in admixture with each other and/or argon indicate that CO always relaxes more slowly. There is no evidence of coupling between the rotational modes of the two species. Keywords: Gas dynamics, Infrared spectrometry, Rotational relaxation, Super-radiance, Collisions, Phase studies vapor phases. (aw)

DESCRIPTORS: (U) *CARBON, *CARBON DIOXIDE, *CARBON MONOXIDE, *COLLISIONS, *ELECTRICAL CORONA, *GAS DYNAMICS, *RADIATION, *VAPOR PHASES, ARGON, CLUSTERING, DENSITY, INFRARED SPECTROMETERS, INTENSITY, MOLECULES, PHASE STUDIES, RATIOS, RELAXATION, ROTATION, SOURCES, SPECTROMETRY, TEMPERATURE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

AD A205 570

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 567 7/2

CALIFORNIA INST OF TECH PASADENA DEPT OF CHEMISTRY

(U) Femtosecond Real Time Probing of Reactions. 2. The Dissociation Reaction of ICN.

NOV 88

PERSONAL AUTHORS: Dantus, Marcos; Rosker, Mark J.; Zewail, Ahmed H.

CONTRACT NO. AFOSR-87-0071

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-89-0160

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v8S n10 p6128-6140, 15 Nov 88.

ABSTRACT: (U) Experimental results obtained for the dissociation reaction ICN yield(I...CN) yield I + CN using femtosecond transition-state spectroscopy (FTS) are presented. The process of the I-CN bond breaking is clocked, and the transition states of the reaction are observed in real time. From the clocking experiments, a 'dissociation' time of 205 + or - 30 fs was measured and was related to the length scale of the potential. The transition states live for only approx. 50 fs or less, and from the observed transients we deduce some characteristics of the relevant potential energy surfaces (PES). These FTS experiments are discussed in relation to both classical and quantum mechanical models of the dynamical motion, including features of the femtosecond coherence and alignment of fragments during recoil. The observations are related to the radial and angular properties of the PES. Keywords: Cyanides, Iodine, Reprints. (MJM)

DESCRIPTORS: (U) *CYANIDES, *DISSOCIATION, *IODINE, *QUANTUM THEORY, ALIGNMENT, ANGLES, DYNAMICS, FRAGMENTS, LENGTH, MODELS, MOTION, POTENTIAL ENERGY, REAL TIME, REPRINTS, RESPONSE, SCALE, SPECTROSCOPY, SURFACES, TRANSITIONS.

AD A205 567

AD-A205 567 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

AD-A205 567

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 566 7/3 7/4

OKLAHOMA STATE UNIV STILLWATER DEPT OF CHEMISTRY

(U) Projection Methods for Obtaining Intramodular Energy Transfer Rates from Classical Trajectory Results: Application to 1 2-Difluoroethane.

NOV 88

PERSONAL AUTHORS: Raff, Lionel M.

CONTRACT NO. AFOSR-86-0043

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-89-0159

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v89 n9 p5680-5691, 1 Nov 88

ABSTRACT: (U) A general method for analyzing the results of classical trajectory calculation to obtain the details of intramolecular energy transfer is described. The method is based on the determination of the time dependence of the normal mode velocities by projection of the instantaneous Cartesian velocities onto the normal mode vectors. It is shown that the method obviates the need to arbitrarily define a 'bond' or 'mode' energy as a means of following the energy flow. Average mode energies are computed using the virial theorem. For a given potential surface, the results are exact within the framework of the classical approximation. The method is applied to a study of intramolecular energy transfer in 1,2-difluorethane. Decay rates and pathways of energy flow for initial excitation of each of the 18 vibrational modes are reported. The results obtained from the time variation of the normal mode velocities are used to extract a first-order, mode-to-mode energy transfer rate coefficient matrix. The mode-to-mode coefficients are shown to provide an excellent means of collating the energy transfer information. Their values yield a quantitative description of the energy transfer rates and a clear picture of the relative importance of the available pathways for energy flow in the system.

AD-A205 566

AD-A205 566 CONTINUED

Keywords: Fluorine compound, Ethanes; Reprints. (MJM)

DESCRIPTORS: (U) *ENERGY TRANSFER, *ETHANES, *TRAJECTORIES, *FLUORINE COMPOUNDS, COMPUTATIONS, DECAY, ENERGY, FLUORINE, MOLECULAR PROPERTIES, RATES, REPRINTS, SURFACES, TIME, TIME DEPENDENCE, VALUE, VARIATIONS, VELOCITY, YIELD.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3, *Ethane/1,2-difluoro.

AD-A205 566

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 565 7/2 7/4

SRI INTERNATIONAL MENLO PARK CA

(U) Autoionization of H2 Induced by a Doubly Excited Triplet State.

DESCRIPTIVE NOTE: Publication for Nov 86-Nov 88,

JUN 88

PERSONAL AUTHORS: Bjerre, N.; Keiding, S. R.; Lembo, L. J. ; Helm, H.

CONTRACT NO. F49620-87-K-0002

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-89-0161

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Physical Review Letters, v60 n24 p2465-2468, 13 Jun 88.

ABSTRACT: (U) The photoionization of molecular hydrogen has been extensively studied in recent years. For the singlet states, a variety of schemes for multiphoton excitation from the ground state has been developed. The spectroscopy of the triplet states usually starts from the metastable c3 piu-state, which can be populated in electron impact excitation of a slow molecular beam or by resonant charge exchange in alkali vapor of a fast beam of H2+. The latter technique is used in the present work. All the bound triplet states observed so far are singly excited Rydberg states in the sense that their configuration is well described as an H2+ core in the electronic ground state with a loosely bound outer electron. When photoionization proceeds via such a Rydberg state, it usually follows rather strict propensity rules in the vibrational quantum number. Vibrational autoionization of pure Rydberg states becomes less and less efficient with increasing nu. Therefore it is quite remarkable that we in the present experiment observe strong one-photon ionization with a change of as much as ten vibrational quanta. Reprints. (MJM)

AD-A205 565 CONTINUED

DESCRIPTORS: (U) +ELECTRON IMPACT SPECTRA, +HYDROGEN, +PHOTOIONIZATION, +QUANTUM THEORY, ALKALI METALS, CHARGE TRANSFER, ELECTRONS, EXCITATION, EXTERNAL, GROUND STATE, IONIZATION, MOLECULAR BEAMS, MOLECULES, PHOTONS, REPRINTS, RESONANCE, SPECTROSCOPY, VAPORS, VIBRATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 564 7/6 11/2 11/6

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF CHEMISTRY

(U) Polyphosphazenes and their Relationship to Ceramics and Metals.

JAN 89

PERSONAL AUTHORS: Allcock, Harry R.

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-89-0152

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chapt. 53 in Ultra Structure Processing to Advanced Materials p705-713, 1988.

ABSTRACT: (U) One of the main principles that underlies the emerging research in solid-state science is that new materials, with new combinations of properties, may be accessible through synthetic chemistry in the interfacial region that lies between ceramics, metals, and polymers. Thus, polymers that contain main-group inorganic elements in the skeleton or side groups are prospective hybrids of polymers and ceramics. Polymers that contain transition metals may possess properties common to both macromolecules and bulk metals (e.g., electrical conductivity or catalytic activity). Also, main-group ceramics that contain metal atoms or ions may have magnetic or electrical properties that are reminiscent of metals. In our research program, we have concentrated on the interfacial area between polymers and ceramics as well as between polymers and metals. A review of developments in the author's laboratory on the way in which changes in the side groups attached to a polyphosphazene chain move the properties in the direction of organic polymers, ceramics, or semiconductors. Keywords: Synthesis, Organosilicon, Phthalocyanine, (TCNQ), Tetracyano Quinodimethane, Crosslinking chemistry. Reprints. (AW)

DESCRIPTORS: (U) *CERAMIC MATERIALS, *METALS, *PHOSPHAZENE, *POLYMERS, ATOMS, CATALYSTS, CHAINS,

AD-A205 564 CONTINUED

CROSSLINKING(CHEMISTRY), ELECTRICAL CONDUCTIVITY, ELECTRICAL PROPERTIES, HYBRID SYSTEMS, INTERFACES, IONS, LABORATORIES, MACROMOLECULES, MAGNETIC PROPERTIES, ORGANIC COMPOUNDS, PHTHALOCYANINES, REGIONS, REPRINTS, SEMICONDUCTORS, SIDES, SILICON COMPOUNDS, SOLID STATE ELECTRONICS, SYNTHESIS(CHEMISTRY), TRANSITION METALS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 537 7/2 7/4

SRI INTERNATIONAL MENLO PARK CA CHEMICAL KINETICS DEPT

(U) (3 + 2) Resonance Enhanced Multiphoton Ionization of I and Br Formed from the Infrared Multiphoton Decomposition of CF3I and CF3Br.

88

PERSONAL AUTHORS: Robertson, Robert M.; Golden, David M.; Rossi, Michel J.

CONTRACT NO. F49620-86-K-0001

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-89-0295

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl of Chemical Physics, v89 n5 p2925-2931, 1 Sep 88.

ABSTRACT (U) Resonance enhanced multiphoton ionization (REMPI) has been used to study the products of the infrared multiphoton decomposition (IRMPD) of CF3I in a very low-pressure photolysis (VLPphi) cell. The strongest REMPI signals are due to the ground state I(2P3/2) and the spin-' orbit excited state I(2P1/2). The origins of I and I were determined from the time and IR laser fluence dependences of the EMPI signal. I is formed by visible single photon dissociation of vibrationally excited CF3I and by visible multiphoton dissociation of I2 and thermal CF3I. The ionization efficiency of I has been determined relative to NH3 for our probe laser conditions, and the sticking coefficient of I with gold surfaces has been determined. The REMPI spectra of the products of the IRMPD of CF3Br is also presented. Keywords: Carbon trifluoride, Bromine compounds, Iodine compounds, Reprints. (MJM)

DESCRIPTORS: (U) *BROMINE COMPOUNDS, *CARBON, *DISSOCIATION, *FLUORIDES, *IODINE COMPOUNDS, *PHOTOIONIZATION, COEFFICIENTS, DECOMPOSITION, EFFICIENCY, GOLD, INFRARED RADIATION, IONIZATION, LASERS, LOW PRESSURE, PHOTOLYSIS, PHOTONS, PROBES, REPRINTS, SPECTRA,

AD-A205 537 CONTINUED

SURFACES, VISIBILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1, *Carbon trifluoroiodide.

AD A205 537

AD-A205 537

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 536 7/2 7/3 7/4

SRI INTERNATIONAL MENLO PARK CA CHEMICAL KINETICS DEPT

(U) In situ Radical Detection under Very Low Pressure Photolysis Conditions Using Resonance-Enhanced Multiphoton Ionization. Kinetics of CF3 Radicals Produced from IR Multiphoton Dissociation of Hexafluoroacetone.

88

PERSONAL AUTHORS: Robertson, Robert M.; Golden, David M.; Rossi, Michel J.

CONTRACT NO. F49620-86 K-0001

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-89-0296

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub in Jnl of Physical Chemistry, v92 n19 p5338-5347 1988.

ABSTRACT: (U) Resonance enhanced multiphoton ionization (REMPI) and mass spectrometry have been used to measure the kinetics of CF3 radicals inside of a very low pressure photolysis (VLPphi) cell. Infrared multiphoton dissociation (IRMPD) of hexa-fluoroacetone (HFA) is used to generate the radicals according to CF3COCF3 yields CF3 + CF3CO. REMPI spectra of vibrationally hot and thermalized CF3 radicals are presented. The absolute density of CF3 in the reactor is determined from the REMPI signal by using mass spectral data. This puts the calibration on the absolute basis necessary to treat competing unimolecular and bimolecular reactions of CF3 free radical. Measuring the CF3 density as a function of time between pulses of the IR laser and of HFA flow rate allows direct determination of the first and second-order loss rates for CF3. The CF3CO radical is stable under our conditions and engages in recombination back to HFA at higher radical densities. Keywords: Acetones, Fluorine compounds, Carbon trifluoride, Reprints. (MJM)

DESCRIPTORS: (U) *ACETONES, *CARBON, *DISSOCIATION, *FLUORINE COMPOUNDS, *PHOTOIONIZATION, *PHOTOLYSIS, CALIBRATION, DENSITY, DETECTION, DETERMINATION, FLOW RATE, FLUORIDES, INFRARED RADIATION, LASERS, LOW PRESSURE, MASS SPECTRA, MASS SPECTROMETRY, MOLECULES, PHOTONS, REACTION KINETICS, RECOMBINATION REACTIONS, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1, *Carbon trifluoride, *Hexafluoroacetone.

AD-A205 536 CONTINUED

AD A205 536

AD-A205 536

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 534 7/4 7/5

SRI INTERNATIONAL MENLO PARK CA CHEMICAL KINETICS DEPT

(U) Reaction Probability for the Spontaneous Etching of Silicor by CF3 Free Radicals.

88

PERSONAL AUTHORS: Robertson, Robert M.; Golden, David M.; Rossi, Michel J.

CONTRACT NO. F49620-86-K-0001

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR
TR-89-0299

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub in Jnl of Vacuum Science and Technology, B: Microelectronics Processing and Phenomena, v6 n6 p1632-1640 Nov/Dec 87.

ABSTRACT: (U) The spontaneous thermal etching of silicon by Carb on Trifluoride free radicals has been studied in a very-low-pressure photolysis reactor. The radical is produced by infrared multiphoton dissociation of either hexafluoracetone or Carbon Trifluoride, and is allowed to react with a temperature-controlled silicon sample (560-745 K). Mass spectrometry is used to measure the extent of dissociation of the precursor gas and the formation of product molecules, Hexafluoroethane and Silicon tetrafluoride The etch rate of the silicon is determined from the SiF4 production. Resonance-enhanced multiphoton ionization of CF3 is used to determine the density and time history of the radical in the reactor. The measurements of the etch rate and CF3 density are combined to derive the reaction probability CF3 etches silicon much slowly than F atoms and at a rate comparable to molecular F2 A carbon layer, that is deposited on the silicon by the radicals, inhibits, but does not stop, further etching. Experiments on the etching of silicon by F2 were performed both to validate the reactor design and to prepare the silicon surface for the CF3 studies. Reprints. (aw)

AD-A205 534 CONTINUED

DESCRIPTORS: (U) *ETCHING, *SURFACE REACTIONS, *PHOTOLYSIS, CARBON, PHOTODISSOCIATION, FLUORIDES, FREE RADICALS, GASES, INFRARED RADIATION, LAYERS, MASS SPECTROMETRY, MOLECULES, PHOTONS, PRECURSORS, PROBABILITY, RATES, REPRINTS, RESPONSE, SILICON, SURFACES, THERMAL PROPERTIES, REACTION KINETICS, ACETONES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1, Carbon trifluoride.

AD-A205 534

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 533 7/2

SRI INTERNATIONAL MENLO PARK CA CHEMICAL KINETICS DEPT

(U) Kinetics of Surface Reactions of CF3 Radicals,

87

PERSONAL AUTHORS: Robertson, Robert M.; Rossi, Michel J.; Golden, David M.

CONTRACT NO. F49620-86-K-0001

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-89-0298

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl of Vacuum Science and Technology, A: Vacuum, Surfaces, and Films, v5 n6 p3351-3358 Nov/Dec 87.

ABSTRACT: (U) The kinetics of reactions of CF3 radicals on various substrate materials has been studied in a gold coated, stainless steel, very low pressure photolysis (VLPphi) cell as a function of temperature and radical concentration. The substrate materials were gold, stainless steel, copper, copper oxide, and silica. The CF3 radicals were generated from CF3I by IR-multiphoton decomposition. The reaction products observed with a mass spectrometer included HF, CO, CO2, COF2, SiF4, and C2F6. Rate constants were obtained as a function of temperature. CF3 reacted most rapidly on copper oxide surfaces; the other metal surfaces were less reactive, and the silica surfaces were least reactive. Previous studies from this laboratory that had reported the reaction of CF3, on fused silica are reinterpreted as reactions of CF3, on the stainless-steel heater assembly. Keywords: Carbon trifluoride, Reprints. (MJM)

DESCRIPTORS: (U) *CARBON, *COATINGS, *COPPER COMPOUNDS, *FLUORIDES, *GOLD, *OXIDES, *PHOTOLYSIS, *SILICON DIOXIDE, *STAINLESS STEEL, ASSEMBLY, CONSTANTS, COPPER, HEATERS, LOW PRESSURE, MASS SPECTROMETERS, MATERIALS, METALS, RATES, REACTANTS(CHEMISTRY), REPRINTS, SUBSTRATES, SURFACE REACTIONS, SURFACES.

AD-A205 533

AD-A205 533 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1, *Carbon trifluoride, *Copper oxides.

AD-A205 533

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 532 7/2

SRI INTERNATIONAL MENLO PARK CA CHEMICAL KINETICS DEPT

(U) Sticking Coefficient of the SiH2 Free Radical on a Hydrogenated Silicon-Carbon Surface.

JAN 89

PERSONAL AUTHORS: Robertson, Robert M.; Rossi, Michel J.

CONTRACT NO. F49620-86-K-0001

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-89-0300

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Applied Physics Letters, v54 n2 p185-187, 9 Jan 89.

ABSTRACT: (U) The sticking coefficient of SiH2 on a hydrogenated silicon carbon surface is measured in a low-pressure pulsed photolysis experiment. Thermal and vibrationally excited SiH2 are created by infrared multiphoton decomposition of n-butylsilane. The first-order wall loss rates of the radicals are determined from the time dependence of the resonance-enhanced multiphoton ionization signal. The sticking coefficients of SiH2 (approx. 0.1) and vibrationally hot SiH2 (>0.5) are determined from the measured first-order loss rate constants and the calculated wall collision rate constant. Keywords: Silicon dihydride, Reprints. (MCM)

DESCRIPTORS: (U) *PHOTOLYSIS, *HYDRIDES, *SILICON COMPOUNDS, *CARBON, COEFFICIENTS, COLLISIONS, CONSTANTS, DECOMPOSITION, INFRARED RADIATION, LOSSES, LOW PRESSURE, PHOTONS, PULSES, RATES, REPRINTS, TIME DEPENDENCE, WALLS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1, *Silicon dihydride.

AD-A205 532

AD-A205 531 7/3

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Mechanism of the Claisen Rearrangement of Allyl Vinyl Ethers.

89

PERSONAL AUTHORS: Dewar, Michael J.; Jie, Caoxian

CONTRACT NO. AFOSR-86-0022

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR TR-89-0279

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical Society, v111 n2 p511-519 1989.

ABSTRACT: (U) AM1 calculations are reported for the Claisen rearrangements of allyl vinyl ether and 23 derivatives. The reactions are predicted, correctly, to take place preferentially via chair-type transition states and to lead preferentially to E isomers. While some of the reactions are predicted to take place by two alternative paths, corresponding to alternative synchronous and nonsynchronous mechanisms, involving transition states that are, respectively, aromatic and biradicaloid, the distinction here is only marginal, and most of the reactions took place by a single unique path of intermediate type. Keywords: Claisen rearrangement, Chemical radicals, Cyclic compounds, Molecular structure, Unsaturated carbonyl compounds, Pericyclic reactions, Reprints. (aw)

DESCRIPTORS: (U) *ISOMERS, *ETHERS, *VINYL RADICALS, CHEMICAL RADICALS, CYCLIC COMPOUNDS, MOLECULAR STRUCTURE, PATHS, REPRINTS, TRANSITIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, *Allyl vinyl ethers, Claisen rearrangement.

AD-A205 531

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 530 7/4

TEXAS UNIV AT AUSTIN DEPT OF CHEMISTRY

(U) Extension of AM1 to the Halogens,

88

PERSONAL AUTHORS: Dewar, Michael J.; Zoebisch, Eve G.

CONTRACT NO. AFOSR-86-0022

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-89-0277

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Molecular Structure (Theochem), v180 p1-21 1988.

ABSTRACT: (U) AM1 parameters are reported for the halogens (Fluorine, Chlorine, Bromine, Iodine). Results for a large number of halogen-containing organic molecules agree well with experiment, the agreement being generally better than for MNDO. The mean AM1 errors in heats of formation and other properties are now similar to those for compounds containing only the organic elements (C,H,O,N) and intermolecular interactions are now reproduced in a reasonable manner. While it is an improvement over MNDO, AM1 fails in the case of hypervalent compounds and it also underestimates the stabilities of pi complexes derived from halogen cations. Keywords: Computations, Heats of formation, Bond angles, Bond length, Ionization potentials, Dipole moments, Binding energies, Quantum, Chemistry, Tables data, Reprints. (aw)

DESCRIPTORS: (U) *QUANTUM CHEMIST[illegible]ALOGENS, ANGLES, BONDING, BROMINE, CATIONS, CHLORINE, COMPUTATIONS, DIPOLE MOMENTS, FLUORINE, INTERACTIONS, IODINE, IONIZATION POTENTIALS, LENGTH, MOLECULE MOLECULE INTERACTIONS, NUCLEAR BINDING ENERGY, REPRINTS, STABILITY, TABLES(DATA).

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, AM1 Computations.

AD-A205 530

AD-A205 529 7/3 7/6

STATE UNIV OF NEW YORK AT BINGHAMTON DEPT OF CHEMISTRY

(U) Conductive and Optically Non-Linear Polymeric Langmuir-Blodgett Films of Poly(3-Dodecylthiophene),

88

PERSONAL AUTHORS: Logsdon, Peter B.; Pfleger, Jiri; Prasad, Paras N.

CONTRACT NO. F49620-87-C-0042

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-89-0280

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Synthetic Metals, v26 p369-381 1988.

ABSTRACT: (U) Monolayer film formation at the air/water interface was investigated for both electrochemically and chemically prepared poly(3-dodecylthiophene) using surface pressure molecular area isotherms. Only the electrochemically prepared polymer formed a stable monolayer, which was successfully transferred using the horizontal lifting method. The transferred Langmuir-Blodgett films were characterized by u.v.-visible spectroscopy, quartz crystal microbalance measurements, electrical conductivity measurements and femtosecond degenerate four wave mixing studies of the third-order optical non-linearity. The third-order optical susceptibility of undoped poly(3-dodecylthiophene) was found to be chi(3)approx. 10 to the 9th esu, large enough to allow the first reported observation of a degenerate four-wave mixing signal from ultrathin Langmuir-Blodgett films. In situ iodine-doping studies of u.v.-visible absorption, electrical conductivity and third-order nonlinear optical susceptibility were carried out. Upon doping, the conductivity increased by more than eight orders of magnitude and the chi(3) value decreased to within ten percent of the original value. Keywords: Thiophenes, Reprints. (MJM)

AD-A205 529

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 529 CONTINUED

DESCRIPTORS: (U) *ELECTRICAL CONDUCTIVITY, *NONLINEAR SYSTEMS, *OPTICAL PROPERTIES, *THIOPHENES, *POLYMERIC FILMS, AIR WATER INTERACTIONS, DOPING, ELECTRICAL MEASUREMENT, ELECTROMAGNETIC SUSCEPTIBILITY, FILMS, HORIZONTAL ORIENTATION, LAYERS, LIFT, REPRINTS, STABILITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3, *Thiophene/ poly3-dodecyl.

AD-A205 525 20/3

STATE UNIV OF NEW YORK AT ALBANY

(U) High Electric Field Phenomena in Insulation.

DESCRIPTIVE NOTE: Final rept. 15 Nov 86-14 Nov 88, JAN 89

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

CONTRACT NO. AFOSR-87-0063

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR TR-89-0266

UNCLASSIFIED REPORT

ABSTRACT: (U) The present study extends previous work to include electron radiation-induced changes in monoisopropyl biphenyl (MIPB)-impregnated polypropylene film as well as the effects of neutron/gamma radiation on dry polypropylene films. Effects that were quite similar were induced by both electron and neutron radiation on the properties of interest of the polypropylene films. Impregnation of the film with MIPB had a mitigatory effect on the degradation of the properties. This report also contains the results of a simultaneous electrical and thermal aging study of a capacitor-grade polypropylene film. The data obtained in this study was fitted to models that will enable realistic prediction of lifetimes under operating conditions. Keywords: Monoisopropyl biphenyl (MIPB) Polypropylene film. (jes)

DESCRIPTORS: (U) *ELECTRIC FIELDS, *ELECTRICAL PROPERTIES, *ELECTRICAL INSULATION, AGING(MATERIALS), BIPHENYL, DEGRADATION, IMPREGNATION, LIFE SPAN(BIOLOGY), NEUTRONS, POLYPROPYLENE, PREDICTIONS, RADIATION, RADIATION EFFECTS, SYNCHRONISM, THERMAL PROPERTIES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A7.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 507 6/4 23/3

BOSTON UNIV MA CENTER FOR ADAPTIVE SYSTEMS

(U) Stereo Boundary Fusion by Cortical Complex Cells: A System of Maps, Filters, and Feedback Networks for Multiplexing Distributed Data.

89

PERSONAL AUTHORS: Grossberg, Stephen; Marshall, Jonathan A.

CONTRACT NO. DAAG29-85-K-0095, F49620-87-C-0018

MONITOR: ARO, AFOSR
22399.30-MA, TR-89-0337

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Neural Networks v2 p29-51 1989.

ABSTRACT: (U) A neural network model of multiple-scale binocular fusion and rivalry in visual cortex is described and simulated on the computer. The model consists of 3 parts: A distributed spatial representation of binocular input patterns among simple cells that are organized into ocular dominance columns; an adaptive filter from simple cells to complex cells; and a nonlinear on-center off-surround shunting feedback network that joins together the complex cells. This data structure generates complex cell receptive fields which multiplex input position, orientation, spatial frequency, positional disparity, and orientational disparity, and which are insensitive to direction-of-contrast in the image. Multiple copies of this circuit are replicated in the model using receptive fields of different sizes. Within each circuit, the simple cell and complex cell receptive field sizes covary. Together these circuits define a self-similar multiple-scales network. The self-similarity property across spatial scales enable the network to exhibit a size-disparity correlation, whereby simultaneous binocular fusion and rivalry can occur among the spatial scales corresponding to a given retinal region. It is shown that a laminar organization of the model interactions among the complex cells gives rise to conceptually simple growth rules for intercellular connections. Keywords: Binocular vision; Data fusion; Multiplexing; Binocular rivalry; Computational map;

AD-A205 507

AD-A205 507 CONTINUED

Ocular dominance columns; Nonlinear feedback network. Reprints. (EDC)

DESCRIPTORS: (U) *NEURAL NETS, *SPACE PERCEPTION, *VISUAL CORTEX, ADAPTIVE FILTERS, BOUNDARIES, CELLS(BIOLOGY), COMPUTATIONS, COMPUTERIZED SIMULATION, DATA BASES, DATA PROCESSING, DISTRIBUTED DATA PROCESSING, EYE, FEEDBACK, FREQUENCY, GROWTH(GENERAL), INPUT, INTERACTIONS, MAPS, MATHEMATICAL MODELS, MULTIPLEXING, NETWORKS, NONLINEAR SYSTEMS, PATTERNS, POSITION(LOCATION), REPRINTS, RETINA, SCALE, SIZES(DIMENSIONS), SPATIAL DISTRIBUTION, VISUAL PERCEPTION.

IDENTIFIERS: (U) Binocular rivalry, Visual fields, Binocular fusion, Data fusion, Ocular dominance.

AD-A205 507

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 503 1/3

POLYTECHNIC UNIV FARMINGDALE NY DEPT OF AEROSPACE ENGINEERING

(U) Optimum Aeroelastic Characteristics for Composite Supermaneuverable Aircraft.

DESCRIPTIVE NOTE: Final technical rept. 1 Jun 87-31 Sep 88.

NOV 88

PERSONAL AUTHORS: Oyibo, Gabriel A.; Bentson, James; Weisshaar, T. A.

REPORT NO. POLY-AE-88-8

CONTRACT NO. F49620-87-C-0046

MONITOR: AFOSR TR-89-0127

UNCLASSIFIED REPORT

ABSTRACT: (U) The investigation of an aeroelastically induced constrained warping phenomenon for a composite, supermaneuverable type aircraft wing has continued in this second year of the study. The first year investigation was concentrated mainly on the static phenomena and the search for closed form solutions for free vibration of aircraft wings having constrained warping in the presence of elastic coupling. The wing is analytically modelled as a straight flat laminated plate. Various forms of highly simplified aerodynamic loads are employed in the analysis. The free vibrations and stability aspects of this phenomenon are examined to obtain some physical insights and to determine its importance and /or design implications. Analytical tools employed include an affine transformation concept which was formulated previously (by the present principal investigator) as well a non-dimensionalization scheme. Keywords: Aeroelastic optimization, Aeroelasticity, Aeroelastic tailoring, Unsteady aerodynamics.

DESCRIPTORS: (U) *AEROELASTICITY, *COMPOSITE AIRCRAFT, *WINGS, AERODYNAMIC CHARACTERISTICS, AERODYNAMIC LOADING, AERODYNAMIC STABILITY, COUPLING(INTERACTION), ELASTIC PROPERTIES, FLAT PLATE MODELS, LAMINATES, MATHEMATICAL ANALYSIS, OPTIMIZATION, SIMPLIFICATION, STATICS, UNSTEADY

AD-A205 503 CONTINUED

FLOW, VIBRATION.

IDENTIFIERS: (U) Supermaneuverable aircraft, Affine transformations, Aeroelastic tailoring, PE61102F, WUAFOSR2302B1.

OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 462 1/3

STANFORD UNIV CA THERMOSCIENCES DIV

(U) An Experimental Study of the Effect of Streamwise Vortices on Unsteady Turbulent Boundary-Layer Separation.

DESCRIPTIVE NOTE: Technical rept.,

DEC 88

PERSONAL AUTHORS: Humphreys, W. W.; Reynolds, W. C.

REPORT NO. TF-42

CONTRACT NO. F4962-86-K-0020

PROJECT NO. 3484

TASK NO. A1

MONITOR: AFOSR
TR-89-0275

UNCLASSIFIED REPORT

ABSTRACT: (U) This experiment studied the effect of streamwise vortices on unsteady turbulent boundary-layer separation. The objectives were to document the flow field, to characterize the time response of the boundary layer, and to understand the actual mechanisms by which the streamwise vortices modify boundary-layer behavior. A new configuration for non-obtrusive three-component Laser Doppler Anemometry (LDA) determined the phase averaged velocity and Reynolds stress components, in an unsteady water tunnel, at a momentum thickness Reynolds number of 1840. The streamwise vortices were created by three pairs of half-delta wing vortex generators, while the boundary-layer separation was controlled through impulsively initiated opposite-wall suction, which created a strong adverse pressure gradient. The time response of the freestream velocity demonstrates that convection is the primary mechanism by which vortex generators modify the response of the boundary layer. There is an initial fast response throughout the boundary layer which is unaffected by the presence of vortex generators, followed by a slow or convective response, the magnitude of which is substantially modified by the presence of the vortex generators. Flow control, Unsteady turbulent layers.

AD-A205 462

AD-A205 462 CONTINUED

Aircraft, Vortex generators. (jes)

DESCRIPTORS: (U) *AIRCRAFT, *BOUNDARY LAYER, *TURBULENT BOUNDARY LAYER, ADVERSE CONDITIONS, BEHAVIOR, CONTROL, CONVECTION, FLOW, FLOW FIELDS, FREE STREAM, MOMENTUM, MOMENTUM TRANSFER, PRESSURE GRADIENTS, QUICK REACTION, REACTION TIME, RESPONSE, REYNOLDS NUMBER, SEPARATION, STRESSES, THICKNESS, TURBULENT FLOW, UNSTEADY FLOW, VELOCITY, VORTEX GENERATORS, VORTICES.

IDENTIFIERS: (U) PE61103D, WUAFOSR3484A1.

AD-A205 462

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 449 21/2 7/4

YALE UNIV NEW HAVEN CONN

(U) Nonlinear Spectroscopy of Multicomponent Droplets and Two- and Three-Dimensional Measurements in Flames.

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

JAN 89

PERSONAL AUTHORS: Chang, Richard K.; Long, Marshall B.

CONTRACT NO. AFOSR-88-0100

PROJECT NO. 2308

TASK NO. A3

MONITOR: AFOSR
TR-89-0267

UNCLASSIFIED REPORT

ABSTRACT: (U) Our progress in the area of nonlinear spectroscopy of droplets includes the following: (1) demonstration that shape distortion of totally transparent liquid droplets can result via the electrostrictive force associated with the gradient of the laser intensity, which is greatest at the internal focal spot just within the droplet shadow face; (2) investigation of the quenching of the stimulated Raman scattering from droplets after the high intensity laser has reached the laser-induced breakdown threshold and produced a dense, high temperature plasma which can absorb the stimulated Raman radiation; (3) studies on the dependence of the intensity threshold to generate stimulated Raman scattering on the linewidth of the laser, which can be operated in a single mode or a multimode; and (4) development of a fluorescence imaging technique which is capable of demarcating the liquid phase of the deformed droplet after radiation by a carbon dioxide laser has caused the droplet to undergo vaporization. Stimulated raman scattering, Stimulated brillouin scattering, Laser induced breakdown. (mjm)

DESCRIPTORS: (U) *CARBON DIOXIDE LASERS, *DROPS, *NONLINEAR SYSTEMS, *SPECTROSCOPY, *FLAMES, DEFORMATION, DENSE GASES, DISTORTION, ELECTROSTRICTION, FLUORESCENCE, HIGH RATE, HIGH TEMPERATURE, IMAGES, INTENSITY, INTERNAL,

AD-A205 449

AD-A205 449 CONTINUED

LASERS, LIGHT SCATTERING, LIQUID PHASES, LIQUIDS, MEASUREMENT, PHONONS, PLASMAS(PHYSICS), QUENCHING, RADIATION, RAMAN SPECTRA, SHAPE, STIMULATION(GENERAL), THREE DIMENSIONAL, THRESHOLD EFFECTS, TRANSPARENCE, VAPORIZATION.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308A3.

AD-A205 449

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 423 7/2 7/4

CALIFORNIA INST OF TECH PASADENA

(U) Molecular State Evolution after Excitation with an Ultra-Short Laser Pulse: A Quantum Analysis of NaI and NaBr Dissociation.

NOV 88

PERSONAL AUTHORS: Engel, Volker; Metiu, Horia; Almeida, Raphael; Marcus, R. A.; Zewail, Ahmed H.

CONTRACT NO. AFOSR-87-0071, $NSF-CHE87-13619

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-89-0312

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Chemical Physics Letters, v152 n1 p1-7, 4 Nov 88.

ABSTRACT: (U) In recent experiments Rose, Rosker and Zewail have used a femtosecond pulse to dissociate Sodium Iodide and Sodium Bromide, and a second pulse to probe the transition state by LIF. Here we show that quantum calculations, on a model system with no adjustable parameters, reproduce the principal observed features. Ultra short laser pulse; femtosecond; Transition state; Laser induced fluorescence; Atom; Molecule; Reprints. (mjm)

DESCRIPTORS: (U) *BROMIDES, *DISSOCIATION, *IODIDES, *LASER INDUCED FLUORESCENCE, *QUANTUM STATISTICS, *SODIUM, ATOMS, EVOLUTION(GENERAL), MODELS, MOLECULES, PARAMETERS, PROBES, PULSED LASERS, PULSES, REPRINTS, SHORT PULSES, TRANSITIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B1, *Sodium iodide, *Sodium bromide.

AD-A205 423

AD-A205 415 7/2 11/6.1

OHIO STATE UNIV RESEARCH FOUNDATION COLUMBUS

(U) Strength and Structure of Ga(1-x)In(x)As Alloys.

DESCRIPTIVE NOTE: Final rept. 1 Sep 85-30 Nov 88,

JAN 89

PERSONAL AUTHORS: Faber, Katherine T.; Hirth, John P.; Ready, Dennis

CONTRACT NO. F49620-85-C-0129, $$ARPA Order-5526

PROJECT NO. 2917

TASK NO. A3

MONITOR: AFOSR TR-89-0265

UNCLASSIFIED REPORT

ABSTRACT: (U) The role of isovalent dopants in the high temperature deformation of GaAs has been studied in the temperature range 550 C to 1150 C. Additions of In, Sb, and B increase the high temperature hardness and the critical resolved shear stress for deformation at a given strain rate and result in lowering the dislocation density of as-grown liquid-encapsulated Czochralski GaAs crystals. Phosphorus, because of its minor influence on the lattice strain, provides little enhancement of the yield stress. The results are consistent with a solute hardening model where the solute atom surrounded tetrahedrally by four Ga or As atoms comprise the hardening cluster. Codoping with In and Si is less effective than the isovalent solutes, In, B, and Sb, and produces softening at high temperatures. Transmission electron microscopy provides evidence consistent with the athermal contribution to the friction stress arising from a solid solution hardening effect. Cursory studies on solid solution in II-VI compounds, specifically, Cd1-xMnXTe, demonstrate similar results. The role of dislocation damage in strained layer superlattices has also been modeled. Gallium arsenides, Antimony, Boron indium compounds, Gallium indium arsenides, Cadmium tellurides, Manganese compounds (mjm)

DESCRIPTORS: (U) *ANTIMONY, *BORON COMPOUNDS, *CADMIUM

AD-A205 415

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 415 CONTINUED

TELLURIDES, *GALLIUM ARSENIDES, *GROUP II-VI COMPOUNDS, *INDIUM COMPOUNDS, *MANGANESE COMPOUNDS, ARSENIDES, ATOMS, CLUSTERING, DAMAGE, DEFORMATION, DENSITY, DISLOCATIONS, ELECTRON MICROSCOPY, FRICTION, HARDENING, HARDNESS, HIGH TEMPERATURE, MODELS, OPTIMIZATION, PHOSPHORUS, SHEAR STRESSES, SOFTENING POINTS, SOLID SOLUTIONS, SOLUTES, SOLUTIONS(MIXTURES), STRAIN RATE, STRESSES, TEMPERATURE, TRANSMITTANCE, YIELD.

IDENTIFIERS: (U) PE61102F, WUAFOSR2917A3, OSURF-RF764977, OSURF-RF717636, *Gallium indium arsenides.

AD-A205 414 20/5

STATE UNIV OF NEW YORK AT STONY BROOK DEPT OF CHEMISTRY

(U) Report of the Gordon Research Conference on Multiphoton Processes Held in New London, New Hampshire on 13-17 June 1988.

DESCRIPTIVE NOTE: Final rept. 1 Jun 86-31 May 87,

JUL 88

PERSONAL AUTHORS: Cruickshank, Alexander M.

CONTRACT NO. AFOSR-88-0201

PROJECT NO. 2301

TASK NO. A4

MONITOR: AFOSR
TR-89-0255

UNCLASSIFIED REPORT

ABSTRACT: (U) The program of the Conference covered all aspects of Multiphoton Processes in atoms and molecules. There were sessions devoted to multiphoton ionization of atoms, multiphoton ionization in intense laser fields, multiphoton ionization of atoms, multiphoton in intense laser fields, multiphoton ionization and dissociation processes in small molecules, multiphoton dissociation processes in larger molecules (including picosecond processes), and general interest sessions. Symposia. (jhd)

DESCRIPTORS: (U) *PHOTODISSOCIATION, *PHOTOIONIZATION, ATOMIC PROPERTIES, INTENSITY, LASERS, MOLECULAR PROPERTIES, PHOTONS, SYMPOSIA

IDENTIFIERS: (U) PE61102F, WUAFOSR2301A4, Multiphoton processes, Picosecond time

AD A205 415

AD A205 414

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 413 25/4 20/1 5/8

ARIZONA UNIV TUCSON

(U) Coordinated Noninvasive Studies (CNS) Project.

DESCRIPTIVE NOTE: Final rept. 15 Sep 85-31 Oct 88,

NOV 88

PERSONAL AUTHORS: Lauter, Judith

CONTRACT NO. AFOSR-85-0379

PROJECT NO. 2313

TASK NO. A6

MONITOR: AFOSR
TR-89-0264

UNCLASSIFIED REPORT

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

ABSTRACT: (U) Research activities during this period include: Data collection related to the interface between complex-sound production and perception, specifically, studies on speech acoustics including two experiments on voice-onset-time variability in productions by speakers of several languages, and a series on acoustical characteristics of emotional expression; data collection regarding individual differences in the effect of stimulus characteristic on relative ear advantages; continuing data analysis and new collections documenting individual differences in auditory evoked potentials, with details related to auditory-systems asymmetries preliminary tests regarding the match between behavioral measures of relative ear advantages and quantitative-electroencephalographic asymmetries observed during auditory stimulation; pilot testing using a combination of Nuclear Magnetic Resonance's (NMR) anatomical-imaging and chemical-spectral-analysis capabilities to study physiological activation in the human brain. (KR)

DESCRIPTORS: (U) *ACOUSTICS, *AUDITORY PERCEPTION, *DATA ACQUISITION, *SPEECH, ACTIVATION, BEHAVIOR, BRAIN, DATA PROCESSING, EAR, EMOTIONS, HEARING, HUMANS, PHYSIOLOGY, PILOT STUDIES, STIMULATION(PHYSIOLOGY).

AD-A205 413

AD-A205 413 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A6, CNS(Coordinated Noninvasive Studies).

AD-A205 413

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 387 7/2

CALIFORNIA INST OF TECH PASADENA

(U) Circular Dichroism in Photoelectron Angular Distributions from Two-Color (1+1) REMPI (Resonantly Enhanced Multiphoton Ionization) of NO.

DESCRIPTIVE NOTE: Rept. 1 Nov 87-1 Nov 88,

DEC 8'

PERSONAL AUTHORS: Appling, J. R.; White, M. G.; Dubs, R. L.; Dixit, S. N.; McKoy, V.

CONTRACT AFOSR-87-0039

PROJECT 2303

TASK B3

MONITOR: AFOSR TR-89-0178

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. Chemical Physics, v87 n12 p6927-6933, 14 Dec 87.

ABSTRACT: (U) A detailed experimental and theoretical study of dichroic effects in photoelectron angular distributions is reported for (1+1), two-color REMPI of NO via the A2sigma+, v=0 state. Optically aligned A state rotational levels are probed through ionization by circularly polarized light. Resultant photoelectron angular distributions exhibit significant left-right asymmetry, the phase and magnitude of which are shown to be related to the curvature of the excited state MJ distribution. Theoretical calculations involving a full ab initio treatment of the ionization dynamics result in circularly dichroic angular distribution (CDAD) parameters in good agreement with those derived experimentally. Additional effects including hyperfine depolarization and coherence are also discussed in relation to the observed CDAD data. Nitrogen oxide. Reprints (mjm)

DESCRIPTORS: (U) *DICHROISM, *NITROGEN OXIDES, *PHOTOIONIZATION, ANGLES, CIRCULAR, COMPUTATIONS, DISTRIBUTION, DYNAMICS, IONIZATION, LIGHT, PHOTOELECTRONS.

AD-A205 387

AD-A205 387 CONTINUED

POLARIZATION, REPRINTS, ROTATION, THEORY.

IDENTIFIERS: (U) WUAFOSR2303B3, PE61102F.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 368 7/3

NORTH DAKOTA STATE UNIV FARGO

(U) Relative Energies of Silaethylene and Methylsilylene.

DESCRIPTIVE NOTE: Rept. for 1 Nov 86-31 Oct 89,

88

PERSONAL AUTHORS: Grev, Roger S.; Scuseria, Gustavo E.; Scheiner, Andrew C.; Schaeffer, Henry F., III; Gordon, Mark S.

CONTRACT NO. AFOSR-87-0049

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR
TR-89-0164

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical Society, v110 n22 p7337-7339 1988.

ABSTRACT: (U) The energy difference between silaethylene (H2Si=CH2) and methylsilylene (SiHMe) has been determined with ab initio quantum chemical techniques. Large basis sets and a variety of methods for the inclusion of electron correlation effects have been employed. In direct contrast to the recent theoretical and experimental results of Shin, Irikura, Beauchamp, and Goddard, which suggested silaethylene was 10 kcal/mol more stable than methylsilylene, we find the energy difference to be nearer 4 kcal/mol. Ethylenes, Silanes, Methyl radicals, Reprints. (mjm)

DESCRIPTORS: (U) *ETHYLENES, *METHYL RADICALS, *QUANTUM CHEMISTRY, *SILANES, CHEMICAL ENGINEERING, CONTRAST, CORRELATION, ELECTRONS, ENERGY, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B3, *Silaethylene, *Silyene/methyl.

AD-A205 368

AD-A205 361 4/1 20/13

COLORADO STATE UNIV FORT COLLINS DEPT OF ATMOSPHERIC SCIENCE

(U) On the Fundamental Solution of the Radiative Transfer Equation.

SEP 88

PERSONAL AUTHORS: Flatau, Piotr J.; Stephens, Graeme L.

CONTRACT NO. AFOSR-88-0143

PROJECT NO. 2310

TASK NO. A1

MONITOR: AFOSR
TR-89-0244

UNCLASSIFIED REPORT

Availability: Document partially illegible.

SUPPLEMENTARY NOTE: Pub. in Geophysical Research, v93 nD9 p11,037-11,050, 20 Sep 88.

ABSTRACT: (U) This paper outlines the general solution of the one-dimensional, azimuthally averaged radiative transfer equation in terms of a matrix exponential. The link between this fundamental solution and those more commonly used in radiative transfer is established. The formulation is developed for a general vertically inhomogeneous atmosphere with sources. Several new concepts, based on properties of the matrix exponential, are described in the context of radiative transfer, including the use of the commutator and product integrals. It is also demonstrated how the matrix exponential formulation provides for new insights, not only into improvements of the numerical efficiency and stability of the solution, but also into the understanding of radiative transfer through a layered atmosphere. The various concepts introduced in this paper are illustrated throughout by the two-stream simplification of the general radiative transfer equation. Reprints. (jhd)

DESCRIPTORS: (U) *RADIATIVE TRANSFER, ATMOSPHERES, EFFICIENCY, MATRICES(MATHEMATICS), LAYERS, NUMERICAL ANALYSIS, REPRINTS, SOLUTIONS(GENERAL), STABILITY,

AD A205 361

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 361 CONTINUED

EXPONENTIAL FUNCTIONS, TRANSFER FUNCTIONS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A1.

AD-A205 360 20/1

DELAWARE UNIV NEWARK DEPT OF MATHEMATICAL SCIENCES

(U) Two Methods for Solving the Inverse Acoustic Scattering Problem.

DESCRIPTIVE NOTE: Technical rept. Feb 88-Feb 89, 88

PERSONAL AUTHORS: Kirsch, A.; Kress, R.; Monk, P.; Zinn, A.

CONTRACT NO. AFOSR-86-0087

PROJECT NO. 2304

TASK NO. A9

MONITOR: AFOSR TR-89-0257

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Inverse Problems, v4 p749-770 1988.

ABSTRACT: (U) The inverse problem considered is to determine the shape of a sound -soft two-dimensional time-harmonic acoustic scatterer from the knowledge of the scattered far-field pattern. Two methods are described for approximately solving this improperly posed problem. They compare both the theory and the numerical performance of the methods. Reprints. (jhd)

DESCRIPTORS: (U) *ACOUSTIC SCATTERING, *INVERSE SCATTERING, FAR FIELD, HARMONICS, INVERSION, NUMERICAL ANALYSIS, PATTERNS, REPRINTS, SOUND, TIME, TWO DIMENSIONAL.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A9, Inverse problem.

AD-A205 359 7/3 7/4

COLUMBIA UNIV NEW YORK

(U) Excited-State Resonance Raman Spectroscopy as a Probe of Alumina-Sodium Dodecyl Sulfate Hemimicelles.

DESCRIPTIVE NOTE: Interim rept. 1987-1988,

89

PERSONAL AUTHORS: Somasundaran, P.; Kunjappu, Joy T.; Kumar, Challa V.; Turro, Nicholas J.; Barton, Jacqueline K.

CONTRACT NO. AFOSR-88-0043

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-89-0260

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Langmuir, v5 n1 p215-218 1989.

ABSTRACT: (U) Excited state resonance Raman spectroscopy has been shown to be a sensitive technique to monitor the formation of hemimicelles. The alumina sodium dodecyl sulfate hemimicelles are examined by excited state Raman spectroscopy, for the first time, by observing the Raman spectrum of tris (2,2 bipyridyl) ruthenium (II) incorporated in the solid liquid interface under in situ equilibrium conditions. The study clearly shows several transitions are sensitive to the evolution and structure of hemimicelles. Ionic surfactants; Raman spectroscopy; hemimicelles; alumina sodium dodecyl sulfate; Reprints. (mjm)

DESCRIPTORS: (U) *ALUMINUM OXIDES, *DODECANE, *RAMAN SPECTROSCOPY, *SODIUM SULFATES, ENERGY LEVELS, EQUILIBRIUM(GENERAL), EVOLUTION(GENERAL), EXCITATION, INTERFACES, LIQUIDS, METHODOLOGY, MONITORING, RAMAN SPECTRA, REPRINTS, RESONANCE, RUTHENIUM, SENSITIVITY, SOLIDS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, *Sulfate/ alumina-sodium dodecyl.

AD-A205 359

AD-A205 358 7/3

CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF CHEMISTRY

(U) Carbonylation Chemistry of the Tantalum Silyl (Eta5-C5Me5)Cl3TaSiMe3. Synthesis, Characterization, and Reaction Chemistry of (Eta5-C5Me5)Cl3Ta(Eta2-COSiMe3) and Derivatives.

89

CONTRACT NO. AFOSR-85-0228

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR
TR-89-0259

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of the American Chemical Society, v111 n1 p149-164 1989.

ABSTRACT: (U) The potent reactivity of early transition metal, lanthanide, and actinide alkyl derivatives toward carbon monoxide has led to numerous theoretical and experimental investigations. The eta-acyl complexes that result from this reactivity have also generated wide interest, particularly with regard to their electro philicity, which has been ascribed to carbene or carbenium ion character at the acyl carbon atom. This characteristic is expressed in a variety of ways, as in the migration of an alkyl or hydride ligand to the eta-acyl, with ketone or aldehyde formation. This paper describes the carbonylation chemistry of the electron deficient (formally 14-electron) tantalum silyl Cp C13 TaSiMe3. These investigations have provided an eta-silaacyl complex, Cp C13 Ta(eta2-COSiMe3), that is quite reactive toward a variety of nucleophilic reagents and cleanly gives a number of stable addition products. Reprints. (mjm)

DESCRIPTORS: (U) *CHEMICAL REACTIONS, *TANTALUM COMPOUNDS, *SILANES, ADDITION, ALDEHYDES, CARBON MONOXIDE, ELECTRONS, HYDRIDES, IONS, KETONES, LIGANDS, POTENCY, REACTIVITIES, REPRINTS, STABILITY, SYNTHESIS(CHEMISTRY), THEORY, TRANSITION METALS.

AD-A205 358

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 358 CONTINUED

IDENTIFIERS: (U) PE61102F, WUAFOSR2303B2, *Tantalum/ silyl.

AD-A205 357 7/4

CALIFORNIA INST OF TECH PASADENA

(U) Laser Femtochemistry,

DEC 88

PERSONAL AUTHORS: Zewail, Ahmed H.

CONTRACT NO. AFOSR-87-0071

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR TR-89-0270

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Science, v242 p1645-1653, 23 Dec 88.

ABSTRACT: (U) Femtochemistry is concerned with the very act of the molecular motion that brings about chemistry, chemical bond breaking, or bond formation on the femtosecond 10 to the -15th time scale. With lasers it is now possible to record snapshots of chemical reactions with sub-angstrom resolution. This strobing of the transition-state region between reagents and products provides real time observations that are fundamental to understanding the dynamics of the chemical bond. Keywords: Femtochemistry; Lasers; Chemical reactions; Chemical bond; Molecular beam; Transition state; Reprints. (MJM)

DESCRIPTORS: (U) *BONDING, *CHEMICAL BONDS, *CHEMICAL REACTIONS, *DYNAMICS, *LASERS, CHEMISTRY, MOLECULAR BEAMS, MOLECULES, MOTION, REAL TIME, REPRINTS, TRANSITIONS.

IDENTIFIERS: (U) WUAFOSR2303B1, PE61102F, *Femtochemistry.

AD-A205 296 11/6.1

CARNEGIE MELLON UNIV PITTSBURGH PA DEPT OF METALLURGICAL ENGINEERING AND MATE RIALS SCIENCE

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

DESCRIPTIVE NOTE: Interim technical rept. 1 Oct 87-30 Sep 88.

JAN 89

PERSONAL AUTHORS: Aaronson, H. I.; Furuhara, T.; Mou, Y.

CONTRACT NO. AFOSR-84-0303

PROJECT NO. 2306

TASK NO. A1

MONITOR: AFOSR
TR-89-0235

UNCLASSIFIED REPORT

ABSTRACT: (U) A TEM investigation of the interphase boundary structure of (hcp) grain boundary alpha allotriomorphs in a titanium-7.15 W/O chromium alloy has shown that whether these crystals are Burgers or non-Burgers-related with respect to their bounding (bcc) beta matrix grains their interfacial structures are partially coherent. No misfit dislocations are observed at either type of interface. Instead, two types of ledge are present. One type is widely and irregularly spaced and heavily kinked; this appears to be growth ledges. The other type are quite straight and both closely and uniformly spaced; this is likely to be structural ledges. Habit plane measurements on the broad faces of alpha plates support the presence of structural ledges. These ledges have a Burgers vector of a/6 (111) parallel to the terrace plane, indicating that they can perform as significant compensators of misfit dislocations. Studies on the interphase boundary structure of the BCC/HCP massive transformation in a silver-26 A/O aluminum alloy have reached the point where a technique for preparing thin foils in a manner which permits a significant number of interfaces to be imaged has finally been achieved. Studies of this structure have now been inititiated. (AW)

AD-A205 296 CONTINUED

DESCRIPTORS: (U) *TITANIUM ALLOYS, ALUMINUM ALLOYS, BOUNDARIES, COMPENSATORS, CRYSTAL SUBSTRUCTURE, CRYSTALS, DECOMPOSITION, DISLOCATIONS, FOILS(MATERIALS), GRAIN BOUNDARIES, INTERFACES, PHASE STUDIES, PLATES, STRUCTURES, THINNESS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2306A1.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 295 7/4

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) Solid State 29Si and 11B NMR (Nuclear Magnetic Resonance) Studies of Sol-Gel Derived Borosilicates,

88

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

CONTRACT NO. AFOSR-85-0345

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-89-0248

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Non-Crystalline Solids, v101 p249-254 1988.

ABSTRACT: (U) Gels in the system Silicondioxide-Boric Oxide were prepared from metal alkoxides. The structural evolution of these gels as a function of thermal treatment was studied by high field 29 Si and 11B NMR spectroscopy, using magic angle spinning. The results corroborate earlier work on this system using infrared spectroscopy to follow the formation of borosiloxane bonds during heat treatment. While incorporation of boron into the silica backbone is negligible in gels dried at room temperature only, thermal treatment drives the borosiloxane bond formation with removal of excess water. Initial boron environments. Further heating causes the condensation of boron into symmetric trigonal =B-O-Si triple bond sites. Boron is fully incorporated by 450C. In addition to the symmetric trigonal boron environment of borosiloxane bonds, a small signal is also observed from IIB nuclei in asymmetric trigonal environments in the gels heated to > or = 450 C, presumably infrared spectroscopy. Reprints. (AW)

DESCRIPTORS: (U) *GELS, *BORON COMPOUNDS, *SILICATES, ALKOXY RADICALS, ANGLES, ASYMMETRY, CHEMICAL BONDS, BORON, CONDENSATION, ENVIRONMENTS, EVOLUTION(GENERAL), HEAT TREATMENT, INFRARED SPECTROSCOPY, METAL COMPOUNDS, NUCLEAR MAGNETIC RESONANCE, NUCLEI, REPRINTS, SIGNALS, SILICON DIOXIDE, SPECTROSCOPY, SPINNING(MOTION), MOLECULAR STRUCTURE, SYMMETRY, WATER.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3, Borosiloxanes.

AD-A205 295

AD-A205 294 7/3 7/4

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) Self-Diffusion in the Compressed, Highly Viscous Liquid 2-Ethylhexyl Benzoate,

88

PERSONAL AUTHORS: Walker, N. A.; Lamb, D. M.; Adamy, S. T. ; Dare-Edwards, M. P.

CONTRACT NO. AFOSR-85-0345

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-89-0247

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Physical Chemistry, v92 n12 p3675-3679 1988.

ABSTRACT: (U) The self diffusion coefficients, densities and viscosities of liquid 2 ethylhexyl benzoate are reported as a function of pressure from 1 to 4500 bar within the temperature equation are used to analyze the data. The RHS model indicates a high degree of rotational translational coupling which increases as density increases. The non spherical shape and conformational flexibility of the molecule is proposed as the cause of this behavior. The Stokes Einstein equation is found to hold over five orders of magnitude changes in self diffusion and viscosity. Diffusion; High pressure; Hydrodynamic behavior; Benzoates; Ethyl radicals; Hexyl radicals; Reprints. (mjm)

DESCRIPTORS: (U) *BENZOATES, *ETHYL RADICALS, *HEXYL RADICALS, *HYDRODYNAMICS, *VISCOSITY, DENSITY, DIFFUSION, DIFFUSION COEFFICIENT, EQUATIONS, HIGH PRESSURE, REPRINTS, SELF OPERATION, TEMPERATURE.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3, *Benzoate/2-ethylhexyl.

AD-A205 293 7/2 7/3

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) Thermotropic Ionic Liquid Crystals. 7. Calculation of Sodium-23 Quadrupole Coupling Constants in Lamellar Phases of Sodium Alkanoates,

APR 87

PERSONAL AUTHORS: Phillips, M. L.; Jonas, J.

CONTRACT NO. AFOSR-85-0345

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR TR-89-0249

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Pub. in Jnl. of Chemical Physics, v86 n7 p4294-4295, 1 Apr 87.

ABSTRACT: (U) The 23Na quadrupole coupling constants (QCC) were calculated for a quasi-crystalline model of the neat phase of anhydrous amphiphiles. The magnitude of the QCC in short chain sodium alkanoates and its dependence on the lateral packaging area of the polar heads was accurately predicted by assuming the charges to lie in a double-layered square array of interdigitated ion pairs. Quadrupole coupling constant; Thermotropic ionic liquid crystals; Reprints. (mjm)

DESCRIPTORS: (U) *QUADRUPOLE MOMENT, *ALKANES, *SODIUM COMPOUNDS, COUPLING(INTERACTION), IONS, PHASE, REPRINTS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. EVI32L

AD-A205 292 7/2

ILLINOIS UNIV AT URBANA DEPT OF CHEMISTRY

(U) Fluids, Gels and Glasses Under Extreme Conditions of Pressure and Temperature.

DESCRIPTIVE NOTE: Final rept. 1 Oct 85-31 Oct 88.

FEB 89

PERSONAL AUTHORS: Jonas, Jiri

CONTRACT NO. AFOSR-85-0345

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR
TR-89-0263

UNCLASSIFIED REPORT

ABSTRACT: (U) The NMR and Raman techniques were used to investigate the hydrolysis and condensation mechanism in B203-Si02; A1203-Si02; and Na20-A1203-Si02 systems. The solid state NMR techniques were employed together with BET methods to follow the thermal treatment of the gels. In addition to the NMR and Raman techniques, the SANS method was employed to study the effects of fluoride anion catalyst on the sol-gel process involving TMOS. High pressure NMR studies of the dynamic structure of the highly viscous liquids focused on three projects: i) The self-diffusion behavior, and the applicability of hydrodynamic equations at the molecular level for a model lubricant - 2-ethylhexylbenzoate; ii) The effect of the dipole moment on the hydrodynamic behavior of highly polar fluids; iii) The effect of molecular flexibility on the relationship between molecular properties and shear viscosity at extreme conditions of pressure. Boron oxides, Silicon dioxide, Sol gel process, Viscous liquids, Raman, High pressure, Structure property relationship, Aluminum oxide, Sodium oxide. (mjm)

DESCRIPTORS: (U) *ALUMINUM OXIDES, *BORON OXIDES, *FLUIDS, *GELS, *OXIDES, *SILICON DIOXIDE, *SODIUM, *GLASS, ANIONS, BEHAVIOR, CATALYSTS, CONDENSATION, DIFFUSION COEFFICIENT, DIPOLE MOMENTS, DYNAMICS, EQUATIONS, FLUORIDES, HEAT TREATMENT, HIGH PRESSURE,

AD-A205 292 CONTINUED

HYDRODYNAMICS, HYDROLYSIS, LIQUIDS, LUBRICANTS, MODELS, MOLECULAR PROPERTIES, MOLECULAR STATES, POLAR REGIONS, PRESSURE, RAMAN SPECTRA, SHEAR PROPERTIES, VISCOSITY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2303A3.

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Bolling Air Force Base, Washington DC
20332