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The Air Force Office of Scientific Research Technical Report Summaries is published quarterly (March, June, September, and December). It contains a brief summary of each technical report received in the Technical Information Division and submitted to the Defense Technical Information Center (DTIC) for that quarter. Three indexes, subject, personal author and title are provided to help the user locate reports that may be of interest.

AFOSR does not maintain copies of technical reports for distribution. However, you may obtain any of these reports if you are registered with DTIC, by requesting the AD number of that report from the DTIC, Cameron Station, Alexandria, Virginia, 22314.

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 organized under the Air Force Materiel Command, DCS/Science Technology.

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.

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The summaries consist of three indexes and the abstracts. From one of the 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 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.

Descriptors - Key words describing the research.

Identifiers - Commonly used designators, such as names of equipment, names of projects or acronyms, the AFOSR project and task number, and the Air Force Research Program Element number.

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Organization of the Optical Society of America Photonic Science Topical Meeting Series. Volume 6. Conference Edition: Summaries of Papers Presented at the Optical Computing Topical Meeting Held in Salt Lake City, Utah on 4-6 March 1991.
AD-A261267 REPORT DATE: 22 MAY 92 FINAL REPORT

Organization of the 1991 Society of America Photonic Science Topical Meeting Held in Monterey, California on September 26 - 28, 1991. 1991 Technical Digest Series. Volume 18. Conference Edition.
AD-A260224 REPORT DATE: 22 MAY 92 FINAL REPORT

Organosilicon Compounds and Polymers and Silicon Ceramics.
AD-A260066 REPORT DATE: 23 NOV 92 FINAL REPORT

The Overall Response of Composite Materials Undergoing Large Deformations.
AD-A259278 REPORT DATE: 15 OCT 92 FINAL REPORT

A Partly Parametric Additive Risk Model.
AD-A260395 REPORT DATE: JAN 93 FINAL REPORT

Penning Detachment: A New Frontier.
AD-A261447 REPORT DATE: 19 JAN 93 FINAL REPORT

Perception and the Temporal Properties of Speech.
AD-A261439 REPORT DATE: 11 JAN 93 FINAL REPORT

Perception/Action: An Holistic Approach.
AD-A259597 REPORT DATE: OCT 92 FINAL REPORT

Persistent Hole-Burning Spectroscopy Applications on Phthalocyanine Langmuir-Blodgett Films.
AD-PO08281 REPORT DATE: 22 MAY 92

Persistent Hole Burning Study of Core Antenna of Photosystem.
AD-PO08248 REPORT DATE: 22 MAY 92

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Persistent Photon-Gated Spectral Hole-Burning in a New Donor-Acceptor Electron Transfer System.
AD-P008267 REPORT DATE: 22 MAY 92

Persistent Spectral Hole Burning Applications for Massive Optical Neural Network Computers.
AD-P008236 REPORT DATE: 22 MAY 92

Persistent Spectral Hole-Burning Induced by Ion-Tunneling in Hydrogenated CaF₂:Pr³⁺ and SrF₂:Pr³⁺ Crystals.
AD-P008278 REPORT DATE: 22 MAY 92

Persistent Spectral Hole-Burning of Pr³⁺ Ions in (ZrO₂)_{1-x}(Y₂O₃)_x Mixed Crystals.
AD-P008298 REPORT DATE: 22 MAY 92

Perturbation Problems in Fluid Dynamics.
AD-7288934 REPORT DATE: 08 NOV 92 FINAL REPORT

Photochemical Activity of Iron Pentacarbonyl on Ag(111): Photofragmentation, Quenching and Wavelength-dependent Effect.
AD-A288648 REPORT DATE: 92 FINAL REPORT

Photochemical Hole Burning Stark Effect Studies on Octatetrahedral n-Alkane Mixed Crystals.
AD-P008244 REPORT DATE: 22 MAY 92

Photoinduced Reaction in Collinear Aligned Mg+CO₂ Complexes.
AD-A288670 REPORT DATE: 92 FINAL REPORT

Photon Echo and Time-Resolved Fluorescence Anisotropy Measurements of Organically Doped Sol-Gel Glasses.
AD-P008233 REPORT DATE: 22 MAY 92

Photon Echo Decay and Optical Storage in Pr Doped YAlO₃.
AD-P008294 REPORT DATE: 22 MAY 92

Photon-Echo in Er-Doped Fibers: A new Approach to Femtosecond Time-Domain Optical Signal Processing.
AD-P008272 REPORT DATE: 22 MAY 92

Photon-Gated Photochemical Hole Burning in Zinc-Tetrabenzoporphyrin/Aromatic Cyanide System.
AD-P008282 REPORT DATE: 22 MAY 92

The Physics of Spin Polarized Gases.
AD-A281396 REPORT DATE: 02 JAN 93 FINAL REPORT

Physiological Indices of Mental Workload.
AD-A281892 REPORT DATE: 14 DEC 92 ANNUAL REPORT

Prediction of Global Cloud Cover with a Very High Resolution Global Spectral Model.
AD-A281047 REPORT DATE: 28 DEC 92 ANNUAL REPORT

Preparation and Properties of Sol-Gel Thin Films with Porphins.
AD-P008283 REPORT DATE: 22 MAY 92

Probability and Statistics Applied to the Theory of Algorithms.
AD-A288956 REPORT DATE: DEC 92 FINAL REPORT

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Probing the Exchange Interaction Through Micelle Size. 1. Probability of Recombination of Triplet Geminate Radical Pairs.
AD-A280085 REPORT DATE: 92 FINAL REPORT

Quantitative Structure-Activity Relationships of Chlorinated Alicyclic Compounds.
AD-A281258 REPORT DATE: 31 JAN 93 ANNUAL REPORT

Quantum Flux Redistribution during Molecular Photodissociation.
AD-A288503 REPORT DATE: 15 AUG 92 ANNUAL REPORT

Rate and Confinement Effects on Cracking and Failure in Uniaxial Compression of Concrete.
AD-A281164 REPORT DATE: 10 NOV 92 FINAL REPORT

Reactivity of Tunichromes: Reduction of Vanadium (V) and Vanadium (IV) to Vanadium (III) at Neutral pH.
AD-A280083 REPORT DATE: 92 FINAL REPORT

Real-Time Adaptive Control of Mixing in a Plane Shear Layer.
AD-A281862 REPORT DATE: 31 MAY 91 FINAL REPORT

Real-Time Value-Driven Monitoring and Repair.
AD-A280959 REPORT DATE: 30 DEC 92 FINAL REPORT

Receptorial and Neural Aliasing.
AD-A281438 REPORT DATE: 30 JAN 93 FINAL REPORT

Regional Surface Waves from Mesabi Range Mine Blasts (Northern Minnesota).
AD-A288725 REPORT DATE: 28 OCT 91 FINAL REPORT

The Relationship Between Repetition Priming and Skill Acquisition.
AD-A280974 REPORT DATE: JAN 93 FINAL REPORT

Reminding-Based Learning.
AD-A281403 REPORT DATE: 01 FEB 93 ANNUAL REPORT

Remote Sensing of Precipitation and Electrification with a Dual-Polarization, Coherent, Wideband Radar System.
AD-A280778 REPORT DATE: 15 SEP 92 ANNUAL REPORT

Remote Sensing of Precipitation and Electrification with a Dual-Polarization, Coherent, Wideband Radar System.
AD-A288834 REPORT DATE: 17 SEP 92 ANNUAL REPORT

Research Support for the Laboratory for Lightwave Technology.
AD-A281488 REPORT DATE: 31 DEC 92 FINAL REPORT

The Role of Chemical Inhibition of Gap-Junctional Intercellular Communication in Toxicology.
AD-A288996 REPORT DATE: 30 APR 92 ANNUAL REPORT

Room Temperature Persistent Spectral Hole Burning in Distributions of Optical Cavities: A Simple Fabry-Perot Model.
AD-PO08263 REPORT DATE: 22 MAY 92

Room Temperature Persistent Spectral Hole Burning using Dielectric Particles as Photonic Atoms.
AD-PO08262 REPORT DATE: 22 MAY 92

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Room-Temperature Persistent Spectral Hole Burning in Sm2+:SrFC10.5Br0.5,
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A Schema-Based Theory of Transfer,
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Sensory Sensitivities and Discriminations and Their Roles in Aviation,
AD-A288742 REPORT DATE: 30 NOV 92 ANNUAL REPORT

SIAM Conference of Optimization Theory and Applications (4th) Held in Chicago, Illinois on May 11-13, 1992.
AD-A289898 REPORT DATE: 31 AUG 92 FINAL REPORT

Signal- and Listener-based Factors in Complex Auditory Perception,
AD-A289387 REPORT DATE: 28 OCT 92 ANNUAL REPORT

Solution of Nonlinear Boundary Value Problem on Successively Refined Grids,
AD-A281385 REPORT DATE: 30 APR 92 FINAL REPORT

Solvation Effects of Organic Dyes in Polymers: Wavelength Dependence of the Stark Effect,
AD-PO08286 REPORT DATE: 22 MAY 92

Source Mechanisms and Radio Effects of Ionospheric Plasma.
AD-A289743 REPORT DATE: 01 NOV 92 ANNUAL REPORT

Spacecraft Interaction with Ambient and Self-Generated Plasma/Neutral Environment.
AD-A258647 REPORT DATE: 31 AUG 92 FINAL REPORT

Spectral and Temporal Dynamics of Nonequilibrium Phonons in YAG:Pr3+,
AD-PO08275 REPORT DATE: 22 MAY 92

Spectral Diffusion Decay for Strongly Interacting Spins in Glasses,
AD-PO08283 REPORT DATE: 22 MAY 92

Spectral Diffusion of Optical Transitions in Doped Polymer Glasses below 1 deg K,
AD-PO08229 REPORT DATE: 22 MAY 92

Spectral Hole Burning Between 2 K and Room Temperature in Sm2+ Doped Substitutionally Disordered Microcrystals,
AD-PO08259 REPORT DATE: 22 MAY 92

Spectral Hole Burning: Dynamical Approach to Spectral Diffusion Problem,
AD-PO08250 REPORT DATE: 22 MAY 92

Spectral Holes Under Pressure: Proteins and Glasses,
AD-PO08246 REPORT DATE: 22 MAY 92

Spectral Hole-Burning Between 2 K and Room Temperature in Sm2+ Doped Substitutionally Disordered Microcrystals,
AD-PO08258 REPORT DATE: 22 MAY 92

Spectral Hole-Burning in the Storage Hierarchy,
AD-PO08280 REPORT DATE: 22 MAY 92

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AD-A258848 REPORT DATE: 17 JUL 92 FINAL REPORT

Spontaneous Discovery and Use of Categorical Structure.
AD-A261656 REPORT DATE: 15 FEB 93 ANNUAL REPORT

Stark Effect on Persistent Spectral Holes Measured by Electric Field Modulation Technique.
AD-FOO8291 REPORT DATE: 22 MAY 92

Stimulated Anti-Stokes Raman Scattering in Microdroplets.
AD-A261046 REPORT DATE: 15 MAR 92 ANNUAL REPORT

Stress-Induced Enhancement of the Startle Reflex.
AD-A261492 REPORT DATE: 30 SEP 92 ANNUAL REPORT

Studies of Baroclinic Flow.
AD-A259739 REPORT DATE: OCT 92 FINAL REPORT

Study of SCN Neurochemistry using In Vivo Microdialysis in the Conscious Brain: Correlation with Circadian Activity Rhythms.
AD-A258803 REPORT DATE: 28 DEC 92 FINAL REPORT

The Study of Weak Linear Electron-Phonon Coupling in Iron-Free Hemoproteins.
AD-POO8279 REPORT DATE: 22 MAY 92

Subnanosecond Time Resolved Study of Accumulated Photon Echoes in Chlorin Doped Polymer Films at 1.2 K.
AD-POO8257 REPORT DATE: 22 MAY 92

Suppression of Dephasing by Deuteration of Amorphous Host Materials: The Case of Porphyrin-Doped Polymers.
AD-POO8285 REPORT DATE: 22 MAY 92

Temporal Accessing of Frequency-Domain Optical Storage: Specific Approaches and General Considerations.
AD-POO8286 REPORT DATE: 22 MAY 92

Theoretical and STM Studies of the Electronic Structure of Metal/Semiconductor/Hydrogen Systems.
AD-A258893 REPORT DATE: 19 NOV 92 FINAL REPORT

Theoretical Treatment of Spin-Forbidden and Electronically Nonadiabatic Processes. Methods and Applications.
AD-A261596 REPORT DATE: 10 JAN 93 FINAL REPORT

Thermal Energy Reactions of OH(-) + C12, Br2: Rate Coefficients, Product Branching Fractions, and OH Product Vibrational Populations.
AD-A259730 REPORT DATE: 92 FINAL REPORT

The Three-Dimensional Structure of Periodic Vorticity Layers Under Non-Symmetric Conditions.
AD-A260360 REPORT DATE: 92 FINAL REPORT

Three-Dimensional Vortex Simulation of Rollup and Entrainment in a Shear Layer.
AD-A260059 REPORT DATE: NOV 91 FINAL REPORT

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Time Dependent Hole Burning and Optical Coherence Experiments as Probes of Spectral Diffusion in Low Temperature Glasses.
AD-P008230 REPORT DATE: 22 MAY 92

Time-Domain Optical Data Storage Using Eu³⁺ Ions in Crystals.
AD-P008289 REPORT DATE: 22 MAY 92

Time-Resolved Hole-Burning in YLiF₄:Er³⁺ With Zeeman Scanning.
AD-P008232 REPORT DATE: 22 MAY 92

Topics in Stochastic Systems, Failure Time Models Change-Point Problems, and Sequential Analysis.
AD-A260047 REPORT DATE: 07 DEC 92 FINAL REPORT

Top-Down Influences on Bottom-Up Processing.
AD-A261514 REPORT DATE: 12 JAN 93 ANNUAL REPORT

Towards a Formalism for Program Generation 1992 - Final Report.
AD-A261689 REPORT DATE: DEC 92 FINAL REPORT

Two- and Three-Dimensional Effects in the Supersonic Mixing Layer.
AD-A260359 REPORT DATE: APR 92 FINAL REPORT

Ultrafast Dephasing of Resorufin in D-Ethanol Glass from 1.8 - 35 K Studied by Incoherent Photon-Echo.
AD-P008234 REPORT DATE: 22 MAY 92

Ultrastructure Processing of Advanced Materials.
AD-A259805 REPORT DATE: NOV 92 FINAL REPORT

Ultrastructure Processing of Advanced Materials.
AD-A259806 REPORT DATE: NOV 92 FINAL REPORT

Ultraviolet-Optical Double-Resonance Study of the Predisassociated C sub 1 Ag State of Acetylene.
AD-A258929 REPORT DATE: 92 FINAL REPORT

Unsteady Flow Past a Pitching Airfoil at Moderately High Subsonic Free Stream Mach Numbers.
AD-A260118 REPORT DATE: 26 OCT 92 FINAL REPORT

The Use of the Air Force Cloud Cover Data to Evaluate and Improve Cloud Forecast and Parameterization in Mesoscale Meteorology Models.
AD-A260357 REPORT DATE: 25 NOV 92 ANNUAL REPORT

Using Modular Neural Networks With Local Representations to Control Dynamic Systems.
AD-A261597 REPORT DATE: 18 DEC 92 FINAL REPORT

Visual Perception of Elevation.
AD-A261394 REPORT DATE: 25 JAN 93 ANNUAL REPORT

Visual Processing of Object Velocity and Acceleration.
AD-A261048 REPORT DATE: 14 FEB 93 ANNUAL REPORT

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Vortex Simulation of Turbulent Combustion.
AD-A258745 REPORT DATE: 19 NOV 92 FINAL REPORT

Wave Propagation and Dynamic Load Transfer due to Explosive Loading in Heterogenous Granular Media with Microstructure.
AD-A258718 REPORT DATE: 30 SEP 92 FINAL REPORT

3-D Analysis and Verification of Fracture Growth Mechanisms in Fiber-Reinforced Ceramic Composites.
AD-A261483 REPORT DATE: 31 DEC 92 FINAL REPORT

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IBM RESEARCH DIV SAN JOSE CA

NOISE RATIO, SIGNALS, SITES, SPECTROSCOPY, TIME, WINGS,
MOLECULAR SPECTROSCOPY.

(U) Observation of Spectral Diffusion in Solids Using a
Single Molecule.

IDENTIFIERS: (U) Component Reports, Single, Spectral,
Pentacene, p-terphenyl, Hole burning.

MAY 92 4P

PERSONAL AUTHORS: Ambrose, W. P.; Basche, T.; Moerner,
W. E.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of
the Optical Society of America Photonic Science Topical
Meeting Series (1991). Volume 18. Conference Edition:
Summaries of papers presented at the Persistent Spectral
Hole-Burning: Science and Applications Topical Meeting
Held in Monterey, California on 28-29 September 1991', AD-
A258 883, p318-319.

ABSTRACT: (U) Recent advances in high-efficiency
fluorescence excitation spectroscopy of pentacene in p-
terphenyl crystals have improved the signal to noise
ratio for the detection of single pentacene defects, thus
confirming single pentacene detection using absorption
techniques. Using 1-10 micrometer thick crystals, tightly
focused laser beams, and high collection efficiency,
background emission noise is significantly reduced below
the fluorescence emission rate of single pentacene
defects. To observe single molecules, the laser is tuned
out into the wings of the pentacene 01 site inhomogeneous
line until the number of defects per homogeneous
linewidth is less than 1. With the improved detection
sensitivity, we have observed two classes of pentacene
defects present in both the red and blue wings of the
inhomogeneous line: less than 1 consist of stable, time-
independent defects with lifetime limited homogeneous
linewidths below 4 K, and class 11 have time varying
resonance frequencies.

DESCRIPTORS: (U) *MOLECULES, *SOLIDS, *DIFFUSION,
ABSORPTION, BACKGROUND, BLUE(COLOR), COLLECTION, CRYSTALS,
DETECTION, EFFICIENCY, EMISSION, EXCITATION, FLUORESCENCE,
FREQUENCY, LASER BEAMS, LASERS, MICROMETERS, NOISE,
NUMBERS, RATES, RATIOS, RESONANCE, SENSITIVITY, SIGNAL TO

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BORDEAUX-1 UNIV TALENCE (FRANCE)

(U) Fluorescence Excitation of Single Molecules,

MAY 92 4P

PERSONAL AUTHORS: Orrit, M.; Bernard, J.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 28-28 September 1991', AD-A256 063, p312-315.

ABSTRACT: (U) A few years ago, many people would have deemed the optical observation of single molecules nearly impossible. Yet, new experiments at room and at liquid helium temperatures have started to remove this psychological barrier. Several applications to trace detection and sensing, to spectroscopy of localized neighborhoods and to optical addressing of local spots in solids may now be envisioned. The purpose of this presentation is to show that single molecules can be studied at helium temperatures by means of a fairly simple setup, at least in the very favorable case of pentacene in terphenyl crystal. We thus hope to stimulate further work either on this model system or on more difficult ones with more sophisticated detection methods. The main difficulties in dealing with single molecules arise from the weakness of the signal. During the long accumulation times, the molecular resonance frequency must be fixed: As hole burning and spectral diffusion will interrupt the accumulation, the host-guest couple should be chosen so that both processes are minimal.

DESCRIPTORS: (U) *MOLECULES, *FLUORESCENCE, *EXCITATION, ACCUMULATION, ADDRESSING, BARRIERS, CRYSTALS, DETECTION, DIFFUSION, FREQUENCY, HELIUM, LIQUID HELIUM, LIQUIDS, MODELS, OBSERVATION, RESONANCE, SIGNALS, SOLIDS, SPECTROSCOPY, TEMPERATURE, WORK, OPTICS, ABSORPTION, FIBERS, MOLECULAR SPECTROSCOPY.

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MUNICH UNIV (GERMANY F R)

AMSTERDAM UNIV (NETHERLANDS)

(U) Hole-Burning of Dye-Molecules Adsorbed on Metal Oxide Powders.

(U) Microwave-Induced Hole Burning of the 838 NM Zero-Phonon Transition and Frequency-Dependent Dephasing of the N-V Center in Diamond.

MAY 92 4P

MAY 92 4P

PERSONAL AUTHORS: Basche, Th.; Brauchle, C.

PERSONAL AUTHORS: Glasbeek, Max; Van Gort, Eric

MONITOR: AFOSR, XC

MONITOR: AFOSR, XC

TR-92-0514, AFOSR

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SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A258 663, p308-311.

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A258 663, p304-307.

ABSTRACT: (U) First preliminary persistent spectral hole-burning (PSHB) investigations of dye-molecules adsorbed onto the disordered surfaces of metal oxides powders of porous glasses indicated that these systems seem to behave quite similar to doped glasses. The optical absorption is strongly inhomogeneously broadened due to the disorder of the surface and at 1.5 K holewidths in the 1 cm range-even an order of magnitude broader than in glasses - have been reported. In the following we will give a short summary of our latest more detailed investigations of surface adsorbed dye-molecules which on the one hand reaffirm that these systems indeed behave in many respects as 3-D disordered systems but on the other hand point to some remarkable specific features of adsorbed dye-molecules.

DESCRIPTORS: (U) *MOLECULES, *DYES, *ADSORPTION, *POWDER METALS, *OXIDES, TEMPERATURE, SURFACES, GLASS, POROSITY, DOPING, CHEMISORPTION, CHEMICAL BONDS, DIFFUSION, TUNNELING, EXCITATION, CHROMOPHORES, MOLECULAR SPECTROSCOPY.

IDENTIFIERS: (U) *Hole burning, Quinizarin, Gamma alumina, PSHB(Persistent Spectral Hole Burning), Disordered, Inhomogeneous broadening, Cresyl violet, Component Reports..

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IOWA STATE UNIV AMES

CITY COLL NEW YORK

(U) Applications of Spectral Hole-Burning Spectroscopies to the Excited Electronic States and Transport Dynamics of Photosynthetic Units.

(U) Hole-Burning Study of Optical Heating in Low-Temperature Glasses.

MAY 92 4P

MAY 92 4P

PERSONAL AUTHORS: Small, G. J.

PERSONAL AUTHORS: Gorokhovskii, A. A.; Zavit, G. S.; Palm, V. V.; Stoiovich, A. L.

MONITOR: AFOSR, XC
TR-92-0514, AFOSRMONITOR: AFOSR, XC
TR-92-0514, AFOSR

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SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 3. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991'. AD-A258 883, p300-303.

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991'. AD-A258 883, p294-297.

ABSTRACT: (U) Hole-burning methodologies suitable for the study of excited electronic state structure, energy and electron transfer dynamics, electron-phonon coupling, and heterogeneity of photosynthetic units are discussed.

ABSTRACT: (U) Zero-phonon lines (ZPL) in the spectra of impurities in solids are extremely narrow and intense. Due to these unique features, an impurity - guest can serve as a very sensitive probe of both the quasistatic structural disorder (inhomogeneous broadening) and dynamical processes (homogeneous broadening) in the matrix - host. Site selective high resolution spectroscopy, in particular, persistent hole burning, can be successfully used to remove inhomogeneous broadening and can provide useful information about relaxation and propagation of elementary excitations in solids. For glasses at low temperature actual excitations are phonons and two-level systems (TLS). The following properties of the persistent hole in the pure-electronic absorption band of an impurity introduced in a glassy matrix should be mentioned in this respect: (1) at low temperatures the width is determined mainly by the electron-TLS interaction; (2) the hole intensity and width are highly sensitive to external perturbations, particularly, to thermal ones; (3) the optical dephasing time is usually shorter than and spectral diffusion time is usually longer than the typical times determining the thermalization processes in glasses. Therefore, the hole spectra can be used as a suitable 'intrinsic thermometer' in time-resolved studies.

DESCRIPTORS: (U) *ELECTRONIC STATES, *EXCITATION, *PHOTOSYNTHESIS, *CHLOROPHYLLS, COUPLINGS, DYNAMICS, ELECTRON TRANSFER, ELECTRONICS, ELECTRONS, ENERGY, HETEROGENEITY, PHONONS, STRUCTURES, TRANSFER, TRANSPORT PROPERTIES, SPECTRA, OPTICS.

IDENTIFIERS: (U) Component Reports, *Hole burning spectroscopy, Photosynthetic units..

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CALIFORNIA UNIV BERKELEY DEPT OF PHYSICS

DESCRIPTORS: (U) *OPTICAL PROPERTIES, *GLASS, ABSORPTION, COMBUSTION, DIFFUSION, ELECTRONICS, ELECTRONS, EXCITATION, EXTERNAL, HIGH RESOLUTION, IMPURITIES, INTENSITY, INTERACTIONS, PERTURBATIONS, PHONONS, PROBES, PROPAGATION, RELAXATION, RESOLUTION, SITES, SOLIDS, SPECTRA, LOW SPECTROSCOPY, TEMPERATURE, TIME, WIDTH, HEAT, LOW TEMPERATURE, POLYSTYRENE, POLYMERS, MOLECULAR SPECTROSCOPY.

(U) Optical Pumping Detection of Anomalous NQR Spectra of Pr3+ in Pr3+:LaF3,

MAY 92 4P

PERSONAL AUTHORS: Wald, L. L.; Hahn, E. L.; Lukac, M.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

IDENTIFIERS: (U) Component Reports, *Hole Burning, ZPL(Zero-Phonon Lines), Inhomogeneous broadening, Homogeneous broadening, Dephasing, Spectral diffusion..

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectra) Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 28-28 September 1991', AD-A258 063, p290-293.

ABSTRACT: (U) The nature of inhomogeneous broadening in rare earth systems plays an important role in the dynamical optical properties of ions in crystals. For this reason much of the work on the nature of the inhomogeneous broadening in rare earth doped systems has concentrated on the investigation of ion-ion interactions such as spectral transfer and up conversion processes. Variations in homogeneous optical dephasing times across the inhomogeneous optical line have also been reported. These studies concentrate on the variations of collective effects of ion-ion interactions at different positions in the inhomogeneous optical line in relatively heavily doped rare earth systems. We report variations in optically detected NQR (ODNQR) linewidths and shifts of Pr3+ hyperfine transitions in the optical ground state as a function of position in the inhomogeneous optical line and for satellite transitions of the 1D2-3H4 transition in lightly doped (0.5 at.%) Pr3+:LaF3. A systematic increase in the broadening of the Pr hyperfine transitions is observed as the laser is tuned toward the wings of the inhomogeneous optical transition without a shift of the NQR center frequency. The principle contribution to the 200KHz (FWHM) inhomogeneous width of the Pr hyperfine levels is explained by magnetic dipole-dipole interactions between the Pr nuclei and the neighboring fluorine spins. This contribution remains

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constant across the Stark broadened optical transition. Thus we show the existence of an additional broadening mechanism.

DESCRIPTORS: (U) *IONS, *OPTICAL PUMPING, *DETECTION, *SPECTRA, *PRASEODYMIUM, *LANTHANUM, *FLUORIDES, ARTIFICIAL SATELLITES, CONSTANTS, CONVERSION, CRYSTALS, FLUORINE, FREQUENCY, FUNCTIONS, GROUND STATE, INTERACTIONS, ION ION INTERACTIONS, LASERS, NUCLEI, OPTICAL PROPERTIES, TRANSFER, TRANSITIONS, VARIATIONS, WIDTH, WINGS, WORK, RARE EARTH ELEMENTS, DOPING, DEUTERIUM, HYDROGEN, DIPOLES, MAGNETIC PROPERTIES, MOLECULAR SPECTROSCOPY.

IDENTIFIERS: (U) Component Reports, Inhomogeneous broadening, Dephasing, Hole burning, *NQR.

TOKYO UNIV (JAPAN)

(U) Persistent Spectral Hole-Burning of Pr³⁺ Ions in (ZrO₂) 1-x(Y₂O₃)x Mixed Crystals,

MAY 92 4P

PERSONAL AUTHORS: Tanaka, K.; Okuno, T.; Suenoto, T.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 28-28 September 1991', AD-A258 663, p286-289.

ABSTRACT: (U) Many Persistent spectral hole-burning (PSHB) experiments on various organic glasses and polymers doped with organic molecules reveal that the temperature dependence of the homogeneous linewidth (tau h) is T^{1.3} at low temperature (0.3 K - 20 K). In contrast to organic molecules, very few PSHB data exist for rare earth ions in inorganic materials while data by fluorescence line-narrowing (FLN) above approx. 10K are considerably accumulated. Macfarlane and Shelby observed PSHB in Pr³⁺ and Eu³⁺ -doped silicate glasses and reported that tau h of them have a T^{1.0} dependence. Similar results were obtained by Van der Zaag et al. In pure crystals, tau h is theoretically expected to have a T⁷ - dependence in the low temperature region and a T² - dependence above the Debye temperature (Raman process).

DESCRIPTORS: (U) *PRASEODYMIUM, *GLASS, *ZIRCONIUM, CONTRAST, CRYSTALS, FLUORESCENCE, INORGANIC MATERIALS, IONS, LOW TEMPERATURE, MATERIALS, MOLECULES, OXIDES, YTTRIUM, ORGANIC MATERIALS, DOPING, RARE EARTH ELEMENTS, ACCUMULATION, EUROPIUM, MOLECULAR SPECTROSCOPY, OPTICS, POLYMERS, REGIONS, SILICATES, TEMPERATURE.

IDENTIFIERS: (U) Component Reports, *Persistent spectral hole burning, Hole burning, Homogeneous linewidths, Yttria Stabilized Zirconia.

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OKLAHOMA STATE UNIV STILLWATER CENTER FOR LASER RESEARCH

(U) Accumulated Photon Echoes as a Probe of Radiationless Relaxation Processes in Nd-Doped Glasses,

MAY 92 4P

PERSONAL AUTHORS: Ver Steeg, Keith W.; Reeves, Roger J.; Powell, Richard C.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

STORAGE, POWER, RATES, SOLIDS, STORAGE, STORES, TEMPERATURE, TIME, TIME DOMAIN, TRANSITIONS, WORK, RELAXATION, DOPING, NEODYMIUM, IONS, PHASE, INORGANIC MATERIALS, OPTICS, MOLECULAR SPECTROSCOPY, BINARY NOTATION, YAG LASERS.

IDENTIFIERS: (U) Component Reports, Accumulated, *Radiationless, Dephasing rates, Inhomogeneous line broadening, Amorphous, Hole burning, Binary information.

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A258 663, p282-285.

ABSTRACT: (U) Accumulated photon echoes (APE) were used to measure the dephasing rates of Nd³⁺ in various inorganic glasses as a function of excitation wavelength, sample temperature, and laser power. Although dephasing processes of optical transitions in solids are of considerable interest, they are poorly understood, largely due to the lack of experimental data on femtosecond and picosecond time scales. The APE technique using sub-picosecond laser sources has made it possible to measure in the time domain dephasing rates of inhomogeneously broadened transitions in amorphous systems. This technique therefore acts as a complement to dephasing experiments done in the frequency domain, such as spectral holeburning. Other researchers have used similar stimulated echo techniques to optically store binary information in solid state materials. Thus the results of this work provide information useful to the understanding of fundamental physical processes affecting the characteristics of spectral holeburning and in addition they may have direct application to optical storage techniques based on photon echoes.

DESCRIPTORS: (U) *ECHOES, *PHOTONS, *PROBES, *GLASS, ADDITION, EXCITATION, EXPERIMENTAL DATA, FREQUENCY, FREQUENCY DOMAIN, FUNCTIONS, LASERS, MATERIALS, OPTICAL

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WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

THEORY, TIME, TRANSITIONS, MOLECULAR SPECTROSCOPY, HOMOGENEITY.

(U) Molecular Theory of Inhomogeneous Broadening in Glasses.

IDENTIFIERS: (U) Component Reports, *Inhomogeneous broadening, Linewidths, Hole burning, Condensed phase system.

MAY 82 4P

PERSONAL AUTHORS: Skinner, J. L.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A288 863, p278-281.

ABSTRACT: (U) The absorption spectra of impurities in liquids, glasses, and crystals are often inhomogeneously broadened. This means that different impurities reside in different environments, which are static on the relevant time scale, and which perturb the energy levels of the impurities to produce a distribution of transition energies. This inhomogeneous broadening overwhelms the intrinsic linewidth of an individual impurity (the homogeneous linewidth), and is therefore a complicating feature of high-resolution spectroscopy. On the other hand, from a technological perspective inhomogeneous broadening is interesting because it is necessary for hole-burning, and hence for optical storage. And from a scientific perspective it is also interesting since it provides a probe of the local disorder in complicated condensed phase systems. In this talk I will discuss a molecular theory of inhomogeneous broadening in an attempt to understand this effect within a microscopic statistical mechanics framework.

DESCRIPTORS: (U) *GLASS, *MOLECULAR STRUCTURE, ABSORPTION, ABSORPTION SPECTRA, COMBUSTION, CRYSTALS, DISTRIBUTION, ENERGY, ENERGY LEVELS, ENVIRONMENTS, HANDS, HIGH RESOLUTION, IMPURITIES, LIQUIDS, MECHANICS, OPTICAL STORAGE, PHASE, PROBES, RESOLUTION, SCALE, SPECTRA, SPECTROSCOPY, STATICS, STATISTICAL MECHANICS, STORAGE.

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MAINZ UNIV (GERMANY F R)

LUND INST OF TECH (SWEDEN)

(U) Hole Burning in Long Chain Molecular Aggregates,

(U) Photon Echo Decay and Optical Storage in Pr Doped YAlO₃,

MAY 92 4P

MAY 92 4P

PERSONAL AUTHORS: Hirschmann, R.; Friedrich, J.

PERSONAL AUTHORS: Kroll, Stefan; Kachru, Ravinder

MONITOR: AFOSR, XC

TR-92-0514, AFOSR

MONITOR: AFOSR, XC

TR-92-0514, AFOSR

UNCLASSIFIED REPORT

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SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A258 863, p272-275.

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A258 863, p268-271.

ABSTRACT: (U) The salts of pseudocyanine (PIC) have very specific optical properties. Under certain conditions (concentration, temperature) the PIC-molecules form linear aggregates in solution. Since the coupling between the molecules comprising the aggregate is very strong, the excited states are delocalized over a large range. A coherence length on the order of 1000 Å is not uncommon. These excitonic states carry momentum and, hence, the physics of these systems shows novel phenomena as compared to small probe systems. Such phenomena are, for instance, extreme motional narrowing of inhomogeneous line broadening and a very specific temperature dependence of the homogeneous width due to exciton-phonon scattering processes in which both, energy as well as momentum, have to be conserved.

DESCRIPTORS: (U) *MOLECULES, COHERENCE, COUPLINGS, ENERGY, EXCITONS, LENGTH, MOMENTUM, OPTICAL PROPERTIES, PHONONS, PHYSICS, PROBES, SALTS, SCATTERING, TEMPERATURE, WIDTH, MOLECULAR STRUCTURE, LONG RANGE(DISTANCE), MOLECULAR SPECTROSCOPY, ABSORPTION.

IDENTIFIERS: (U) Component Reports, *Hole burning, *Long chains, Inhomogeneous line broadening, *PIC(Pseudocyanine), Linear aggregates, Spectral diffusion..

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ABSTRACT: (U) Homogeneous dephasing processes and optical storage in Pr doped YAlO₃ crystals have been examined using photon echoes produced by gated continuous wave laser excitation. The two-pulse photon echo decay time of the 3 H₄ - 1 D₂ transition in 0.1% Pr³⁺:YAlO₃ has been measured as a function of excitation pulse energy. The excitation energy dependence of the decay time is essentially the same for the first and the second pulse in the excitation sequence. This is different from the behaviour recently observed in Eu³⁺:Y₂O₃ and Tb³⁺:LiYF₄, where mainly the second pulse intensity affected the two-pulse photon echo decay time. By frequency chirping write and read pulses, photon echo data storage and recall of about 50 bits at a single location have been performed using a continuous wave dye laser and a copropagating geometry for the excitation beams. Single-shot storage and recall was performed with very good signal-to-noise ratio. The bit rate in the data sequence was approx. 20 MHz. The decay rate and storage experiments are separately described below.

DESCRIPTORS: (U) *ECHOES, *OPTICAL STORAGE, *PHOTONS, CONTINUOUS WAVE LASERS, CONTINUOUS WAVES, CRYSTALS, DECAY, DYE LASERS, DYES, ENERGY, EXCITATION, FREQUENCY, FUNCTIONS, GEOMETRY, INTENSITY, LASERS, NOISE, PULSES, RATES, RATIOS, RECALL, SEQUENCES, SIGNAL TO NOISE RATIO.

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SIGNALS, STORAGE, TIME, TRANSITIONS, EUROPIUM, TERBIUM,
LITHIUM, HYDROGEN, DEUTERIUM, ACOUSTOOPTICS, OPTICS.

IDENTIFIERS: (U) Component Reports, Yttrium aluminum
trioxide, Gating, Chirping..

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TOKYO INST OF TECH (JAPAN)

(U) Effect of Intersystem Crossing Enhancement on the Hole-
Burning Process of Metal-Free Porphyrin,

MAY 92 4P

PERSONAL AUTHORS: Sakakibara, Youichi; Tani, Toshiro;
Kaizu, Youkoh

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of
the Optical Society of America Photonic Science Topical
Meeting Series (1991). Volume 16. Conference Edition:
Summaries of papers presented at the Persistent Spectral
Hole-Burning: Science and Applications Topical Meeting
Held in Monterey, California on 26-28 September 1991', AD-
A258 883, p284-287.

ABSTRACT: (U) The photochemical reaction in the hole-
burning process of metal-free porphyrins has been
ascribed to the photoinduced tautomerism of central two
protons through the triplet state. For further
understanding of the reaction mechanism, one of the
useful approaches is to modify the lifetimes of the
excited states without changing energy levels. The
population of electronic states under laser-excitation
will be influenced considerably, but the electronic
structure itself will not change so much. The quantum
yield of the hole-formation will be also influenced if it
depends mainly on the population of the state where the
reaction starts. In this study, we modified the lifetimes
by enhancing the intersystem crossing rates with a
paramagnetic effect of copper(II) atom. The starting
point of the reaction will be discussed with the quantum
yields and the population of the states.

DESCRIPTORS: (U) *METALS, *PORPHYRINS, ATOMS, COPPER,
CROSSINGS, ELECTRONIC STATES, ELECTRONICS, ENERGY, ENERGY
LEVELS, EXCITATION, LASERS, PHOTO-CHEMICAL REACTIONS,
POPULATION, PROTONS, RATES, STARTING, STRUCTURES, YIELD,
QUANTUM ELECTRONICS, PARAMAGNETISM, DIMERS, POLYMETHYL
METHACRYLATE, SPECTROSCOPY.

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IDENTIFIERS: (U) Component Reports, *Hole burning, Free, Enhancement, Intersystems, Photoinduced tautomerism, Triplet states, Lifetimes, Hole formation, Tetra-tolylporphyrin..

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ACADEMIA SINICA BEIJING (CHINA)

(U) The New Systems of Organic Photon-Gated Photochemical Hole Burning.

MAY 92 4P

PERSONAL AUTHORS: Duoyuan, Wang; Lingzhi, Hu; Huizhu, He; Lizeng, Zhao; Xin, Mi

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 18. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 28-28 September 1991', AD-A258 683, p280-283.

ABSTRACT: (U) Recent material research has been devoted to search for two color or photon-gated photochemical hole burning mechanisms in inorganic as well as organic materials. A mechanism for photon-gated spectral hole burning by donor-acceptor electron transfer in a material composed of meso-tetra-p tolyl-(tetrazoporphyrinato) zinc (TZT) (Donor) with halomethanes(acceptor) in poly(methylmethacrylate) (PMMA) thin film at 1.4K was reported by Carter et al.

DESCRIPTORS: (U) *ORGANIC MATERIALS, *PHOTONS, ELECTRON TRANSFER, ELECTRONS, FILMS, MATERIALS, THIN FILMS, TRANSFER, PHOTOCHEMICAL REACTIONS, MOLECULAR SPECTROSCOPY, INORGANIC MATERIALS, GATES(CIRCUITS), SPECTRA, ZINC, POLYMETHYL METHACRYLATE.

IDENTIFIERS: (U) Component Reports, *Hole burning, P-tolyl(tetrazoporphyrinato)zinc, Halomethanes..

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NIPPON TELEGRAPH AND TELEPHONE CORP IBARAKI OPTO-ELECTRONIC LABS

(U) Stark Effect on Persistent Spectral Holes Measured by Electric Field Modulation Technique.
 IDENTIFIERS: (U) Component Reports, *Persistent spectral holes, Inhomogeneous, Host matrix, Hole burning, Lorentzian Function, Tetraphenylporphine, Polyvinylbutyral.

MAY 92 4P

PERSONAL AUTHORS: Shimada, Toshiyuki; Suzuki, Hiroyuki

MONITOR: AFOSR, XC
 TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A258 863, p258-259.

ABSTRACT: (U) An external field applied to dye doped polymers which have inhomogeneous dispersion in their absorption spectra causes a shift in the absorption of the dye molecules. This, in turn, changes the line shapes of persistent spectral holes). The Stark effect has been applied to optical storage) and optical computing). It has been also used as a powerful tool for investigating such physical profiles of materials as the difference between the effective molecular electric dipole moments in the host matrix in the ground and excited states which is related to hole burning. In this paper, we used an electric field modulation technique to measure the Stark effect on wide and shallow spectral holes. The technique enables us to detect weak Stark effects on spectral holes in dye doped Polymers using a weak electric field at about 8 K.

DESCRIPTORS: (U) *ELECTRIC FIELDS, *MODULATION, *STARK EFFECT, ABSORPTION, ABSORPTION SPECTRA, DIPOLE MOMENTS, DIPOLES, DYES, EXTERNAL, MATERIALS, MOLECULES, MOMENTS, OPTICAL STORAGE, POLYMERS, PROFILES, SHAPE, SPECTRA, STORAGE, TOOLS, MEASUREMENT, DOPING, DISPERSIONS, COMPUTER APPLICATIONS, OPTICS, EXCITATION, GROUND STATE, MOLECULAR SPECTROSCOPY, PHOTONS, PERTURBATIONS, FREQUENCY, LASERS.

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AKADEMIYA NAUK SSSR MOSCOW

REGENSBURG UNIV (GERMANY F R)

(U) Light- and Thermoinduced Spectral Diffusion in Organic Amorphous Systems Measured via Hole Burning Stark Spectroscopy.

(U) Crystalline Model Systems Probing Dynamics and Electric-Field Effects.

MAY 92 4P

MAY 92 4P

PERSONAL AUTHORS: Al'shits, E. I.; Kharlamov, B. M.; Ulit'sky, N. I.

PERSONAL AUTHORS: Attenberger, T.; Bogner, U.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

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SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 18. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 28-28 September 1991', AD-A258 663, p252-255.

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 18. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 28-28 September 1991', AD-A258 663, p248-251.

ABSTRACT: (U) Spectral diffusion (SD) is extensively investigated in the past years by means of hole burning method. In particular, evidences of thermo- and light-induced SD are found. At the same time authors have found a strong dependence of the burned hole width on the burning fluence. As known, the classical model of a burning kinetics (hole broadening in this model is connected with saturation of the hole in the distribution function of impurity centers) predicts enough weak hole broadening at the initial stage of burning. It leads to a conclusion about possible additional mechanisms of hole broadening on an initial burning stage. One of such mechanisms can be SD, induced by the burning light (LSD).

DESCRIPTORS: (U) *DIFFUSION, *SPECTRA, *ORGANIC MATERIALS, SPECTROSCOPY, MOLECULAR SPECTROSCOPY, LIGHT, THERMAL PROPERTIES, MEASUREMENT, KINETICS, IMPURITIES, CHLORINE, POLYMERS.

IDENTIFIERS: (U) Component Reports, Hole burning, Amorphous, Induced, Hole broadening, Polyvinylbutyral, Stark spectroscopy.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L
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CALIFORNIA UNIV BERKELEY DEPT OF PHYSICS

(U) Fluorine Spin Diffusion Barrier in Pr³⁺:LaF₃ Observed
by Cross Relaxation.

MAY 92 4P

PERSONAL AUTHORS: Wald, L. L.; Hahn, E. L.; Lukac, M.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991), Volume 18, Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 28-28 September 1991', AD-A288 663, p244-247.

ABSTRACT: (U) Photon echo measurements made at 2 OK on the 3H₄ - ID₂ transition in Pr³⁺:LaF₃ show that magnetic dipolar couplings between the Pr and F nuclei account for the 56 kHz homogeneous linewidth of this transition. The homogeneous broadening arises from the enhanced 141 Pr nuclear moment (I=5/2) interacting with the local field fluctuations of the 19 F nuclear moments undergoing mutual spin flip transitions. Such resonant fluctuations should, in the absence of a fluorine spin diffusion barrier, produce a homogeneous linewidth of about 200 kHz which is, in fact, roughly what is observed for the inhomogeneous broadening of the Pr³⁺ hyperfine levels and is considerably broader than that obtained by the photon echo measurements. Shelby et al 2 proposed a simple model analogous to the spin diffusion barriers responsible for narrowing the homogeneous lines in certain electron paramagnetic resonance transitions. In such systems, the field produced by the electron magnetic dipole moment (orders of magnitude larger than the enhanced nuclear moment associated with the ground state of Pr³⁺ in LaF₃) de-tunes the nearest neighbors from each other, prohibiting mutual spin flips among them. Thus, the fields produced by the neighboring spins are static and their interaction with the paramagnetic ion contributes to the inhomogeneous linewidth and not to homogeneous broadening.

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DESCRIPTORS: (U) *BARRIERS, *DIFFUSION, *FLUORINE, *IONS, *PRASEODYMIUM, *LANTHANUM COMPOUNDS, COUPLINGS, DIPOLE MOMENTS, DIPOLES, ECHOES, ELECTRON PARAMAGNETIC RESONANCE, ELECTRONS, GROUND STATE, INTERACTIONS, MAGNETIC DIPOLES, MEASUREMENT, MODELS, MOMENTS, NUCLEAR MOMENTS, NUCLEI, PARAMAGNETIC RESONANCE, PHOTONS, RESONANCE, STATICS, TRANSITIONS, SPIN STATES, RELAXATION, HOMOGENEITY, MONTE CARLO METHOD, OPTICS.

IDENTIFIERS: (U) Component Reports, *Lanthanum fluoride, Cross relaxation, Broadening, Linewidths, Hyperfine levels, Frozen core.

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CALIFORNIA UNIV RIVERSIDE DEPT OF CHEMISTRY

(U) Elucidation of Photophysics and Photochemistry in Polyacene Photoadducts.

MAY 92

4P

PERSONAL AUTHORS: Iannone, Mark A.; Scott, Gary W.

MONITOR: AFOSR, XC

TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 28-28 September 1991'. AD-A258 663, p240-243.

ABSTRACT: (U) Recently we have reported studies of low-temperature spectroscopy of a series of polyacene photoadducts. A principal technique has been that of photochemical hole burning at 1.5K. The photochemistry involves the photodecomposition of the adduct back to the constituent polyacenes. In the present paper we extend this work on the photophysics and photochemistry of AT and also report new results on BRAT. For AT, photodecomposition occurs in Si over a relatively high barrier, typically at temperatures >200K or at high excess excitation energies ($\lambda < 280$ nm). Decomposition may also occur from upper triplet or singlet states, well-above the energies of the lowest excited states in these manifolds.

DESCRIPTORS: (U) *PHOTOCHEMICAL REACTIONS, *POLYMERS, BARRIERS, DECOMPOSITION, EXCITATION, LOW TEMPERATURE, PHOTODECOMPOSITION, SPECTROSCOPY, TEMPERATURE, WORK, PHOTONS, ABSORPTION, ELECTRONIC STATES, MOLECULAR SPECTROSCOPY.

IDENTIFIERS: (U) Component Reports, *Polyacene photoadducts, Elucidation, Photophysics, Hole burning, Singlet, Triplet..

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EIDGENOESSISCHE TECHNISCHE HOCHSCHULE ZURICH (SWITZERLAND)

(U) Solvation Effects of Organic Dyes in Polymers: Wavelength Dependence of the Stark Effect.

MAY 92

4P

PERSONAL AUTHORS: Vauthey, Eric; Holliday, Keith; Wei, Changjiang; Renn, Alois; Wild, Urs P.

MONITOR: AFOSR, XC

TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 28-28 September 1991'. AD-A258 663, p238-239.

ABSTRACT: (U) The wavelength dependence of the electric field effect on holes burnt in the absorption spectrum of Nile red (NR) and cresyl violet (CV) in polyvinylbutyral (PVB) and polyvinylformal (PVF) films has been investigated. The holes were detected using the holographic method.

DESCRIPTORS: (U) *ORGANIC MATERIALS, *DYES, *POLYMERS, *SPECTRA, *POLYMERS, ABSORPTION, ELECTRIC FIELDS, FILMS, SOLVATION, STARK EFFECT, FREQUENCY, HOLOGRAPHY, MOLECULAR SPECTROSCOPY.

IDENTIFIERS: (U) Component Reports, Wavelengths, Hole burning, Nile red, Cresyl violet, Polyvinylbutyral, Polyvinylformal..

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IOWA STATE UNIV AMES DEPT OF CHEMISTRY

(U) Marker Mode Structure in the Primary Donor State of Bacterial Reaction Centers,

MAY 92 3P

PERSONAL AUTHORS: Lyle, P.; Small, G. J.; DiMugno, T. J.
; Norris, J. R.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A288 663, p233-235.

ABSTRACT: (U) Underlying structure for the primary donor absorption profiles of isolated reaction centers Rhodospseudomonas viridis and Rhodobacter sphaeroides (P860 and P870) has recently been uncovered by transient hole burning experiments. A Franck-Condon progression of an intermolecular special pair marker mode (ω_{sp}) was found to originate in the low energy shoulder of the absorption spectra and peak at the one quantum transition. The theory of Hayes and Small for fitting hole burned spectra was extended to include the coupling of the marker mode. Briefly, the theory defines a single site absorption function as being made up of a sum of 0, 1, ..., phonon lineshape functions composed of a gaussian distribution for the low energy side and a lorentzian for the high energy side. By constructing a gaussian distribution whose full-width at half maximum is equal to the inhomogeneous broadening and convolving with the single site absorption function, the absorption spectrum is obtained. By further convolving these functions with an exponential decay function of the single sites centered at the burn frequency the absorption spectra after burning a time τ is obtained.

DESCRIPTORS: (U) *ABSORPTION SPECTRA, *MARKERS, *PHONONS, *BACTERIA, ABSORPTION, COUPLINGS, DECAY, ENERGY, FITTINGS,

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FREQUENCY, FUNCTIONS, HIGH ENERGY, LOW ENERGY, PROFILES, SITES, SPECTRA, STRUCTURES, THEORY, TIME, TRANSIENTS, TRANSITIONS, WIDTH, DONORS(MEDICINE), LORENTZ FORCE.

IDENTIFIERS: (U) Component Reports, Mode, Primary, Rhodospseudomonas Viridis, Rhodobacter sphaeroides, Hole burning, Franck-Condon, quantum, Gaussian distribution, Lorentzian, Inhomogeneous broadening, Exponential, Reaction centers..

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STATE UNIV OF NEW YORK AT STONY BROOK DEPT OF CHEMISTRY

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Electro-Optical, Multi-Stable Switches Based on Persistent Spectral Holes.

(U) Spectral Diffusion Decay for Strongly Interacting Spins in Glasses.

MAY 92 1P

MAY 92 4P

PERSONAL AUTHORS: Hanson, David M.

PERSONAL AUTHORS: Zurcher, U.; Silbey, R.

MONITOR: AFOSR, XC

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

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SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 18. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 28-28 September 1991', AD-A258 863, p232-232.

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ABSTRACT: (U) Photochemical or photophysical transformations induced by highly monochromatic laser radiation can drastically reduce the concentration of molecules absorbing at a particular wavelength within an inhomogeneously broadened absorption band. These spectral holes can be broadened, removed, shifted or split by the application of an external electric field under appropriate conditions. This property provides a nonlinear response in sample transmission, absorption, or diffraction and can be coupled with feedback to produce novel electro-optical devices. These devices include electrically activated, frequency selective, monostable, bistable, or multistable switches.

DESCRIPTORS: (U) *SWITCHES, *ELECTROOPTICS, ABSORPTION, DIFFRACTION, ELECTRIC FIELDS, EXTERNAL, FEEDBACK, FREQUENCY, LASERS, MOLECULES, RADIATION, RESPONSE, TRANSFORMATIONS, PHOTOCHEMICAL REACTIONS, HOMOGENEITY, NONLINEAR ANALYSIS, BISTABLE DEVICES, HOLOGRAPHY, GRATINGS(SPECTRA), MOLECULAR SPECTROSCOPY.

IDENTIFIERS: (U) Component Reports, *Multistable switches, *Persistent spectral holes, Photophysical, Monochromatic, Wavelengths, Monostable, Hole-burning..

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AKADEMIYA NAUK SSSR MOSCOW

(U) Kinetics of Hole Burning in Inhomogeneously Broadened Spectra: the Origin of Nonexponentiality and Problem of Burning Efficiency.

MAY 92 4P

PERSONAL AUTHORS: Al'shits, E. I.; Kharlamov, B. M.; Ulitaky, N. I.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

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ABSTRACT: (U) High inhomogeneous broadening of impurity spectra in amorphous media reflects one type of dispersion, characteristic for disordered systems: dispersion of electronic transition frequency. In principle, there can exist a pronounced dispersion of other parameters: homogeneous line width (gamma), Debye-Waller factor (alpha), hole burning efficiency(phi), etc. The problem of the burning efficiency dispersion (BED) was extensively discussed in the recent years (and references therein). The nonexponentiality of the burning kinetics was treated in some publication as an evidence of such dispersion. But burning kinetics is always nonexponential in strongly inhomogeneously broadened systems, if a burning laser line width delta nu sub l is much less than gamma. That was found experimentally and treated theoretically in one of the first publications on a hole burning. All other sources of the nonexponentiality are, in facts additional to this one. So, it's not easy to attain experimentally the BED parameters on such background. The procedure of a numerical fitting of the burning kinetic with BED, developed in, is correct, but it looks unreliable due to many fitting parameters.

DESCRIPTORS: (U) *KINETICS, *SPECTRA, DISPERSIONS, EFFICIENCY, ELECTRONICS, FITTINGS, IMPURITIES, LASERS, MEDIA, PARAMETERS, TRANSITIONS, WIDTH, HOMOGENEITY, FREQUENCY.

IDENTIFIERS: (U) Component Reports, *Hole burning, Broadened, *Nonexponentiality, Amorphous, Disordered systems, BED(Burning Efficiency Dispersion), Line widths, Debye-Waller factor...

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CHARLES UNIV PRAGUE (CZECHOSLOVAKIA) FACULTY OF
MATHEMATICS AND PHYSICSIDENTIFIERS: (U) Component Reports, *Persistent hole
burning, *Langmuir-Blodgett, Ultrathin, Ordered, Non
ordered, Transmission, Broadening, Poly-heptyl,
cyanoacrylate matrix..(U) Persistent Hole Burning Spectroscopy Applications on
Phthalocyanine Langmuir-Blodgett Films.

MAY 92 4p

PERSONAL AUTHORS: Adamec, F.; Ambroz, M.; Brynda, E.;
Dian, J.; Vacha, M.MONITOR: AFOSR, XC
TR-92-0514, AFOSR

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SUPPLEMENTARY NOTE: This article is from 'Organization of
the Optical Society of America Photonic Science Topical
Meeting Series (1991). Volume 18. Conference Edition:
Summaries of papers presented at the Persistent Spectral
Hole-burning: Science and Applications Topical Meeting
Held in Monterey, California on 26-28 September 1991'. AD-
A258 663, p220-223.

ABSTRACT: (U) Phthalocyanine Langmuir Blodgett (LB)
films represent ultra thin monomolecular layers with
molecules in tight contact. Most of the phthalocyanine
molecules in LB films are ordered in domains where they
occupy well defined (parallel) positions. There is also a
minority of non-ordered molecules in off-domain positions
in LB films. This fact is well documented in X-ray
diffraction and transmission electron diffraction.
Moreover, significant inhomogeneous broadening of
absorption spectra of LB film has been observed. In
comparison with absorption spectra of isolated molecules.
On the other hand the observed fluorescence is very weak.
Nevertheless its spectral profile well corresponds to
that of isolated molecules. This phenomenon can be well
explained on the basis of strong aggregation and/or fast
excited energy transfer (EET).

DESCRIPTORS: (U) *FILMS, *PHthalocyanines, *SPECTROSCOPY,
ABSORPTION, ABSORPTION SPECTRA, COMPARISON, DIFFRACTION,
ELECTRON DIFFRACTION, ELECTRONS, ENERGY, ENERGY TRANSFER,
FLUORESCENCE, HANDS, LAYERS, MOLECULES, PROFILES, SPECTRA,
TRANSFER, X RAY DIFFRACTION, X RAYS, MOLECULAR STRUCTURE,
HOMOGENEITY, EXCITATION, PORPHYRINS, MOLECULAR
SPECTROSCOPY.

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IBM RESEARCH DIV SAN JOSE CA

OSAKA UNIV (JAPAN)

(U) Spectral Hole-Burning in the Storage Hierarchy.

(U) The Study of Weak Linear Electron-Phonon Coupling in Iron-Free Hemoproteins.

MAY 92 4P

MAY 92 4P

PERSONAL AUTHORS: Hoyt, Roger F.

PERSONAL AUTHORS: Lin, J. W.; Tada, T.; Saikan, S.; Kushida, T.; Tani, T.

MONITOR: AFOSR, XC
TR-92-0814, AFOSR

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

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ABSTRACT: (U) Rapid storage and retrieval of information is a key factor in the design and performance of present-day computers. For example, nearly all sectors of the business world (banks, airlines, insurance companies, etc.) now critically rely on computer storage subsystems to provide efficient 'on-line' service to their customers. World-wide, computer storage industry revenues are well over \$408 a year and growing. In addition to applications in so called high-end mainframe systems, storage peripherals also play important roles in the mid-range and low end. This last category, which has clearly emerged since 1980, has fostered the growth of new companies who solely develop and manufacture storage devices for workstation, personal computer and lap-top computer applications.

DESCRIPTORS: (U) *DATA STORAGE SYSTEMS, *OPTICAL STORAGE, *HIERARCHIES, INFORMATION PROCESSING, SPECTRA, MEMORY DEVICES, COMPUTERS, INFORMATION RETRIEVAL, ACCESS TIME, COMPUTER ARCHITECTURE, ONLINE SYSTEMS, WORK STATIONS, DATA PROCESSING.

IDENTIFIERS: (U) Component Reports, *Hole burning, Mainframes, Peripherals, Personal computers, RAM(Random Access Memory), DRAM(Dynamic Random Access Memory), DASD(Direct Access Storage Device)..

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ABSTRACT: (U) The present interest in the PHB optical memories has motivated research into finding materials which have weak electron-phonon coupling between the guest impurity and the host system. The magnitude of the linear electron-phonon coupling strength can be obtained from the Debye-Waller factor, the relative strength of the zero-phonon line and phonon sideband of the homogeneous spectrum. The Debye-Waller factor can be determined readily in crystals; in amorphous solids, however, the large inhomogeneous spectral broadening

DESCRIPTORS: (U) *COUPLINGS, *ELECTRONS, *PHONONS, *LINEAR SYSTEMS, *PROTEINS, CRYSTALS, DYES, ECHOES, IMPURITIES, MASKS, MATERIALS, PHASE, PHOTONS, POLYMERS, SIDEBANDS, SOLIDS, IRON, OPTICS, MEMORY DEVICES, HOMOGENEITY, SPECTRA, MOLECULAR SPECTROSCOPY, PHASE MODULATION, BOSONS, FREQUENCY.

IDENTIFIERS: (U) Component Reports, Weak, *Iron-free hemoproteins, PHB(Persistent Hole Burning), Debye-Waller Factor, Zero, Amorphous, Broadening, Femtosecond accumulated photon echo..

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ELECTROTECHNICAL LAB SAKURA (JAPAN)

relation to the local structure of materials.

(U) Iron-Free Cytochrome C and Myoglobin in Buffer Glass as Weakly-Coupling Mesoscopic Molecular System: Hole-Burning, Absorption and Fluorescence Spectra and their Temperature Properties.

DESCRIPTORS: (U) *MOLECULAR STRUCTURE, *HEMOGLOBIN, COUPLINGS, DIFFUSION, DYES, ELECTRONS, GELS, GLASS, INTERACTIONS, MATERIALS, MOLECULES, OBSERVATION, ORGANIC SOLVENTS, PHONONS, POLYMERS, SIDEBANDS, SOLVENTS, STRUCTURES, TOOLS, BUFFERS, ABSORPTION, FLUORESCENCE, SPECTRA, TEMPERATURE, IRON, DETECTION, DOPING, HOMOGENEITY, OPTICS, MEMORY DEVICES, FREQUENCY, MULTIPLEXING, INORGANIC MATERIALS, SPECTRA, MOLECULAR SPECTROSCOPY, CHROMOPROTEINS, PORPHYRINS.

MAY 92 4P

PERSONAL AUTHORS: Tani, Toshiro; Sakakibara, Youichi; Takahashi, Hisao; Yamamoto, Kyonosuke

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

IDENTIFIERS: (U) Component Reports, *Hole burning, *Cytochrome C, Mesoscopic, Free, Iron-free, Persistent spectral hole burning, Zero, Broadening, Debye-Waller factor, Holes, Sharpening, Quinizarin, Sol-gel..

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SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991), Volume 18, Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A258 883, p208-209.

ABSTRACT: (U) Persistent spectral hole burning is a useful tool to detect zero-phonon line and phonon sideband of organic dye molecules doped in glasses and polymers, which are usually covered under inhomogeneous broadening. These observation bring us information in on the electron-phonon interaction such as Debye-Waller factor a these molecular systems. From the viewpoint of the issue of materials designing for wavelength-multiplexed optical memory and also with naive interest to obtain efficient sharp holes, we have paid much attention to the molecular systems in the category of rather weaker inter/intra-molecular coupling. Basically the decrease of linear electron-phonon interaction brings us efficient zero-phonon hole formation and the decrease of the quadratic one does the sharpening of the hole. Using quinizarin derivatives and porphyrin family, we have been investigating various hole-forming dye-doped systems by modifying the molecular structure of dye as well as matrix. Glass matrices are surveyed from organic solvents through modified polymers to inorganic sol-gel glasses. We have been trying to classify and comprehend the properties of holes. Including spectral diffusion, as well as photoreaction processes of hole formation in

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OSAKA UNIV (JAPAN)

transform, Octaethyl porphine..

(U) Linear Electron-Phonon Interaction in Dye-Doped Polymers: Boson Peak Frequencies in Polymers.

MAY 92 4P

PERSONAL AUTHORS: Saikan, Seishiro

MONITOR: AFOSR XC
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SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991), Volume 16, Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A255 863, p202-205.

ABSTRACT: (U) This talk presents a review of our recent experimental results on femtosecond accumulated photon echo in dye-doped polymers. The aim of this research is to clarify the parameter that is most important in affecting seriously the linear electron-phonon coupling in these samples, and to find the materials which have extremely weak linear electron-phonon coupling. The latter research is needed for the improvement of the PHB memory materials. We have so far demonstrated experimentally that Fourier-transform spectroscopy based on the femtosecond accumulated photon echo is most useful for these studies. Furthermore, the detection sensitivity for the accumulated photon echoes has been improved significantly with the use of the phase modulation technique.

DESCRIPTORS: (U) *DYES, *ELECTRONS, *PHONONS, *POLYMERS, *LINEAR SYSTEMS, *DOPING, COUPLINGS, DETECTION, ECHOES, MATERIALS, MODULATION, PARAMETERS, PHASE, PHASE MODULATION, PHOTONS, SENSITIVITY, SPECTROSCOPY, INTERACTIONS, FREQUENCY, MEMORY DEVICES, POLYSTYRENE, ABSORPTION, OPTICS, ELECTROMAGNETIC PROPERTIES, ENERGY, QUANTUM ELECTRONICS, BOSONS.

IDENTIFIERS: (U) Component Reports, Boson peaks, Femtoseconds, PHB(Persistent Hole Burning), Fourier-

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4I17L

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IBM RESEARCH DIV SAN JOSE CA

(U) Persistent Spectral Hole-Burning Induced by Ion-Tunneling in Hydrogenated $\text{CaF}_2\text{:Pr}^{3+}$ and $\text{SrF}_2\text{:Pr}^{3+}$ Crystals.

MAY 92 4P

PERSONAL AUTHORS: Reeves, R. J.; Macfarlane, R. M.

MONITOR: AFOSR, XC
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SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991), Volume 16, Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A258 663, p197-200.

ABSTRACT: (U) The crystal systems of $\text{CaF}_2\text{:Pr}^{3+}$ and $\text{SrF}_2\text{:Pr}^{3+}$ into which H-, D-, or T ions have been diffused exhibit persistent spectral hole-burning when particular Pr^{3+} ion centers are resonantly excited. The H- ions replace lattice and interstitial F- ions. The hole-burning is caused by H- (or D-, T-) ion motion in the lattice following the Pr^{3+} excitation and the holes have lifetimes of at least several hours at low temperatures. The group of centers that undergo this process have rhombic symmetry and are modified from the predominant C_{4v} H- hydrogenic center by the addition of extra hydrogenic ions in the near neighbor coordination cube. A number of centers are produced because there are several different positions where these extra ions can be located. The degenerate E ground state of the C_{4v} parent center is split by the rhombic field resulting in singlet ground states for the Pr^{3+} ion. Of particular interest is the fact that the centers differ greatly from one another in the strength of the rhombic distortion and hence the splitting. A, of the ground state E level. This has dramatic consequences for the magnetic properties of the ground states and for the pseudoquadrupole splittings of 141pr .

DESCRIPTORS: (U) *CRYSTALS, *IONS, *TUNNELING,

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IDENTIFIERS: (U) Component Reports, *Persistent spectral hole burning, *Strontium fluorides, Holes, Lifetimes, Rhombic, Coordination cubes, Singlets, Pseudoquadrupole...

*HYDROGENATION, *CALCIUM FLUORIDES, *PRASEODYMIUM, ADDITION, DISTORTION, EXCITATION, GROUND STATE, INTERSTITIAL, MAGNETIC PROPERTIES, MOTION, NUMBERS, SPLITTING, SYMMETRY, TEMPERATURE, CHEMICAL REACTIONS, STRONTIUM COMPOUNDS, FLUORIDES, DIFFUSION, RESONANCE, CRYSTAL LATTICES, MOLECULAR SPECTROSCOPY, QUADRUPOLE MOMENT, RHOMBUS.

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GEORGIA UNIV ATHENS DEPT OF PHYSICS AND ASTRONOMY

(U) Spectral and Temporal Dynamics of Nonequilibrium
Phonons in YAG:Pr³⁺,

MAY 92 4P

PERSONAL AUTHORS: Wang, Xiao-Jun; Dennis, W. M.

MONITOR: AFOSR, XC
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ABSTRACT: (U) We have investigated the spectral and temporal dynamics associated with phonon decay in the YAG:Pr³⁺ system at a range of temperature between 9 and 25 K. Nonequilibrium phonons were generated using defect induced one phonon absorption (DIOPA) of far infrared (FIR) radiation. Phonon detection was achieved optically using a variation of absorption vibronic sideband phonon spectroscopy. Far infrared radiation in the frequency range 30 - 113 cm⁻¹ was generated using a transversely excited atmospheric pressure CO₂ laser pumped superradiant cell. This configuration produces 50 ns FIR pulses with single pulse energies in the range 1 - 10 mJ. The optical detection pulses were generated using a YAG:Nd³⁺ pumped dye laser. The generation and detection beams were incident on the sample in a counterpropagating geometry with the phonon generated fluorescence collected at 90 deg. The sample was mounted in a two stage cold cycle refrigerator allowing the temperature to be varied between 9 and 300 K. The sample temperature was determined optically.

DESCRIPTORS: (U) *DYNAMICS, *PHONONS, *SPECTRA, *PRASEODYMIUM, *YAG LASERS, ABSORPTION, ATMOSPHERICS, BAROMETRIC PRESSURE, CELLS, CONFIGURATIONS, CYCLES, DECAY, DETECTION, DYE LASERS, DYES, FAR INFRARED RADIATION, FLUORESCENCE, FREQUENCY, GEOMETRY, LASERS, OPTICAL

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IDENTIFIERS: (U) Component Reports, *Temporal dynamics, Vibronic, Superradiant cells, Equilibrium, Defects..

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BAYREUTH UNIV (GERMANY F R)

Picoseconds, Spectral holes, Narrow line widths..

(U) Hydrogen Bonds in a Polymer Investigated by Picosecond Infrared Hole Burning.

MAY 92 4P

PERSONAL AUTHORS: Graener, H.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

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ABSTRACT: (U) In the past spectral hole burning was intensively investigated for dye molecules in solid matrices. The long-lived photochemical holes at low temperature gave valuable and detailed information on the structural properties of the molecular surrounding. e.g. polymer matrices. More recently, persistent photochemical hole burning at low temperatures was extended to the infrared for smaller molecules in rare gas or glass matrices and to hydrogen bonded polymers. Recently we observed transient spectral holes in the infrared absorption spectrum of a polymer at ambient temperature. The analysis of the hole Parameters gives valuable information on the hydrogen bonds in the disorder system. Our experimental technique is a double resonance spectroscopy with intense tunable picosecond pulses. Details of the measuring system have been described recently.

DESCRIPTORS: (U) *HYDROGEN BONDS, *POLYMERS, *INFRARED SPECTRA, ABSORPTION, DYES, GLASS, HYDROGEN, MOLECULES, PARAMETERS, PULSES, SOLIDS, STRUCTURAL PROPERTIES, TEMPERATURE, TRANSIENTS, MOLECULAR SPECTROSCOPY, PHOTOCHEMICAL REACTIONS, RESONANCE, FREQUENCY, IONS, LASER BEAMS, NARROWBAND.

IDENTIFIERS: (U) Component Reports, *Hole burning.

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CORNELL UNIV ITHACA NY LAB OF ATOMIC AND SOLID STATE PHYSICS

SPECTROSCOPY.

IDENTIFIERS: (U) Component Reports, *Hole burning, PIRSHs(Persistent IR Spectral Holes)...

(U) Hole Burning in the Vibrational Spectrum of Crystals and Glasses.

MAY 92 4P

PERSONAL AUTHORS: Sievers, A. J.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

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ABSTRACT: (U) Persistent IR spectral holes can be generated in the vibrational degrees of freedom of small molecules matrix isolated in crystals and glasses even though no electronic excitation is involved, i.e., a non-photochemical process. The union of the IR lead salt diode laser and broad band FT interferometric methods has produced a new high resolution spectroscopic technique for investigating both the statics and dynamics of molecules in solids. These low power single mode diode lasers (approx. 10 to 100 microwatts) provide a near ideal cw source for investigating persistent IR spectral holes (PIRSHs). They can be produced and probed with a single laser, focused to an intensity at the sample typically up to 100 mW/cm². Persistent spectral changes which occur far from the laser line can be monitored with an FTS probe beam at 60 MHz resolution.

DESCRIPTORS: (U) *CRYSTALS, *VIBRATION, *SPECTRA, *GLASS, DEGREES OF FREEDOM, DIODES, DYNAMICS, ELECTRONICS, EXCITATION, HIGH RESOLUTION, INTENSITY, LASERS, LOW POWER, MOLECULES, POWER, PROBES, RESOLUTION, SALTS, SOLIDS, STATICS, INFRARED SPECTRA, LEAD(METAL), BROADBAND, INTERFEROMETERS, FOURIER TRANSFORMATION, SPECTROSCOPY, CONTINUOUS WAVES, GROUND STATE, RELAXATION, ABSORPTION, FREQUENCY, TRANSITIONS, SOLID STATE PHYSICS, MOLECULAR

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BELL COMMUNICATIONS RESEARCH INC RED BANK NJ

(U) Photon-Echo in Er-Doped Fibers: A new Approach to Femtosecond Time-Domain Optical Signal Processing.

MAY 92 4P

PERSONAL AUTHORS: DA Silva, V. L.; Silberberg, Y.; Heritage, J. P.; Chase, E. W.; Saifi, M. A.

MONITOR: AFOSR, XC
TR-92-0814, AFOSR

HARMONICS, IMPURITIES, INORGANIC MATERIALS, IONS, LIGHT, MATERIALS, MEDIA, MIXING, OBSERVATION, OPTICAL PHENOMENA, PULSES, SCALE, SCATTERING, STORES, TEMPERATURE, TIME, TIME DOMAIN, OPTICAL DETECTORS, MEMORY DEVICES, GASES, BULK MATERIALS, ORGANIC MATERIALS, INFORMATION PROCESSING, DATA STORAGE SYSTEMS, NONLINEAR OPTICS, WAVE PROPAGATION, RARE EARTH ELEMENTS, COHERENCE, LASERS, GERMANIUM, CALCIUM, ALUMINUM, SILICATES.

IDENTIFIERS: (U) Component Reports, Femtoseconds, Subpicoseconds, Kerr effect, Raman, Brillouin, Silica, Four wave mixing, Second harmonic generation..

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991), Volume 16, Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A258 663, p180-183.

ABSTRACT: (U) Recently, interest in photon echo has been revived because of its potential application in time-domain optical memories. Several demonstrations have been reported in gases and also bulk organic and inorganic materials at cryogenic temperatures. In this paper, we report the observation of accumulated photon echo in Er doped optical fibers and demonstrate that these fibers can be used to store information on the subpicosecond time scale. Optical fibers have proved to be very attractive for studies of nonlinear optical phenomena such as optical Kerr effect, stimulated Raman and Brillouin scattering, four wave-mixing and even second harmonic generation. The great advantage of optical fibers over bulk media is in the ability to focus the light in a small core area and to propagate it without diffraction over lengths that can be as long as kilometers. By using rare-earth doped fibers, other new, stronger nonlinearities than those originated from the silica base are introduced by the dopant. As a consequence, coherent effects should be important when pulses shorter or comparable to the dephasing time of the impurity ions propagate in the fiber.

DESCRIPTORS: (U) *ECHOES, *FIBERS, *PHOTONS, *ERBIUM, *DOPING, CORES, CRYOGENICS, DEMONSTRATIONS, DIFFRACTION,

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IBM ALMADEN RESEARCH CENTER SAN JOSE CA

(U) Frequency - Domain Measurements of Spectral Hole
Patterns Burned with Phase - Coherent Pulses,

MAY 92 4P

PERSONAL AUTHORS: Jefferson, C. M.; Melixner, Alfred J.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991), Volume 16, Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A258 663, p176-179.

ABSTRACT: (U) Several investigations have shown that in some systems stimulated photon echoes may be obtained over times much longer than the excited state relaxation $T(1)$. It has been claimed that the mechanism for this anomalously long storage time is the formation of a frequency dependent modulation of the ground state population which persists because of spectral hole-burning. Such a population grating produced by coherent multipulse excitation and spectral hole-burning has been measured only in a few cases. We have investigated the frequency dependence of such hole patterns stored in the ground state population with respect to the parameters of both the excitation sequence and those of the guest-host system. We compare our results to a theoretical model obtained using density matrix formalism to describe an inhomogeneously broadened distribution of two level systems with a relaxation path into an additional reservoir state to allow for spectral hole-burning. We chose two pulse stimulation of the inhomogeneously broadened band as a format for studying stored population gratings because the structure of such gratings is especially simple. In our experiments we were able to accurately control the pulse amplitudes, durations, separations and the relative optical phases. We will show that the phase relationship of the stimulating pulses has a profound effect on the structure of the population

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DESCRIPTORS: (U) *FREQUENCY, *PULSES, *COHERENCE, AMPLITUDE, CONTROL, DENSITY, EXCITATION, FORMATS, GROUND STATE, MODELS, MODULATION, PARAMETERS, PATHS, PATTERNS, PHASE, PHOTONS, POPULATION, RELAXATION, RESERVOIRS, SEPARATION, SEQUENCES, STORAGE, STRUCTURES, TIME, MEASUREMENT, ECHOS, GRATINGS(SPECTRA), HOMOGENEITY, OPTICS, SPECTRA, FREQUENCY SHIFT, ATOMIC ENERGY LEVELS, MOLECULAR SPECTROSCOPY.

grating.

IDENTIFIERS: (U) Component Reports, Frequency domain, *Spectral hole, Burned, Hole burning, Matrix...

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

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CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE ORSAY
(FRANCE)

(U) Incoherent Light Read-Out of Spectral Holograms,
MAY 92 3P
RATIOS, REDUCTION, STRUCTURES, TEMPERATURE, TRANSITIONS,
WIDTH, HOMOGENEITY, DETECTION, MEMORY DEVICES, COMPUTERS,
BINARY NOTATION, CODING, INFORMATION PROCESSING,
SPECTROSCOPY, PHOTONS, CROSS CORRELATION, OPTICS, IMAGES,
MOLECULAR SPECTROSCOPY.

IDENTIFIERS: (U) Component Reports, PHB(Persistent Hole

Burning), Monochromatic, Spectral holes, Bits..

PERSONAL AUTHORS: Debarre, A.; Keller, J. C.; Le Gouet,
J. L.; Tchenio, P.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of
the Optical Society of America Photonic Science Topical
Meeting Series (1991). Volume 16. Conference Edition:
Summaries of papers presented at the Persistent Spectral
Hole-Burning: Science and Applications Topical Meeting
Held in Monterey, California on 26-28 September 1991'. AD-
A288 863, p173-175.

ABSTRACT: (U) It is known that one has investigated two
types of approach to Persistent Spectral Hole Burning
(PHB), and to potential application for optical data
storage. In both methods, a structure is stored within
the inhomogeneously broadened optical absorption line of
the guest ions or molecules in a host matrix at low
temperature. In the first method, monochromatic laser
irradiation results in the reduction of the sample
absorption coefficient at a given frequency. The burnt
spectral hole is then detected by monitoring the
transmission of the laser beam when its frequency is
scanned over the absorption band. In view of application
to optical data storage, spectral hole burning can be
regarded as the physical process for addressing a bit of
binary encoded information at a position within the
absorption band. The maximum number of independent
addresses in the absorption band is given by the ratio
between the inhomogeneous width $\Delta\lambda$ and the
homogeneous width $\Delta\lambda_h$ of the optical transition.

DESCRIPTORS: (U) *OPTICAL DATA, *STORAGE, *INCOHERENCE,
*LIGHT, *READ OUT TECHNIQUES, *SPECTRA, *HOLOGRAMS,
ABSORPTION, ABSORPTION COEFFICIENTS, ADDRESSING, APPROACH,
COEFFICIENTS, FREQUENCY, IONS, IRRADIATION, LASER BEAMS,
LASERS, LOW TEMPERATURE, MOLECULES, MONITORING, NUMBERS.

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NIPPON TELEGRAPH AND TELEPHONE CORP TOKYO

(U) Time-Domain Optical Data Storage Using Eu³⁺ Ions in Crystals,

MAY 92 3P

PERSONAL AUTHORS: Mitsunaga, Masaharu

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991), Volume 16, Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A258 653, p170-172.

ABSTRACT: (U) The photon-echo memory, or the time-domain optical data storage, resembles the hole-burning memory in that the inhomogeneous absorption line of a material is employed as a storage medium and the information is stored in it as a frequency-dependent absorption change with the resolution determined by the homogeneous width. Having the common memory capacity N given by the inhomogeneous-to-homogeneous width ratio, both types of memories share common problems like low-temperature operation, spectral diffusion and so on. Although a storage medium is common, storage techniques are definitely different for the two memories. The photon-echo memory utilizes the temporal interference effect between a reference pulse and a data pulse and their interference pattern is stored as a population grating in the frequency domain. In this sense this is a time-domain analog of holography where the spatial interference pattern between a reference beam and a data beam is stored in a medium as a population grating in the real space. Like the spatially diffracted beam from the read beam gives the information stored in the hologram, the temporally diffracted pulse, or the photon echo, after the read pulse can give the information stored in the inhomogeneous distribution.

DESCRIPTORS: (U) *OPTICAL DATA, *STORAGE, *TIME DOMAIN,

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*IONS, *CRYSTALS, *EUROPIUM, ABSORPTION, ANALOGS, COMBUSTION, DIFFUSION, DISTRIBUTION, ECHOES, FREQUENCY, FREQUENCY DOMAIN, HOLOGRAMS, INTERFERENCE, LOW TEMPERATURE, MATERIALS, OPERATION, PATTERNS, PHOTONS, POPULATION, PULSES, RATIOS, RESOLUTION, TEMPERATURE, TIME, WIDTH, MEMORY DEVICES, INFORMATION PROCESSING, INCOHERENCE, READ WRITE MEMORIES, MOLECULAR SPECTROSCOPY.

IDENTIFIERS: (U) Component Reports, *Eu(3+), Hole burning..

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

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OREGON UNIV EUGENE DEPT OF PHYSICS

(U) Temporal Accessing of Frequency-Domain Optical Storage:
Specific Approaches and General Considerations.

MAY 92 6P

PERSONAL AUTHORS: Mossberg, Thomas W.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

possible to subdivide the billions of atoms/molecules within a minimally sized spatial storage volume into separately addressable groups containing only a few hundred atoms each. The atoms/molecules belonging to each spectral group are generally positioned randomly throughout the spatially addressed storage volume with which they are associated.

DESCRIPTORS: (U) *FREQUENCY, *MEMORY DEVICES, *OPTICAL DATA, *OPTICAL STORAGE, *ACCESS TIME, ADDRESSING, APPROACH, ATOMS, CELLS, DENSITY, EDGES, LIGHT, MATERIALS, MOLECULES, SCALE, STORAGE, THREE DIMENSIONAL, VOLUME, WIDTH, ACCESS, SPECTRA, RESONANCE, LASERS, READ WRITE MEMORIES, COMPUTERS, TIME.

IDENTIFIERS: (U) Component Reports, *Domain, *Temporal accessing, Wavelengths, Spatial, Bits..

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 28-28 September 1991', AD-A258 863, p164-169.

ABSTRACT: (U) The ultimate memory device would be one in which a bit of data is stored in every atom or molecule within a storage material. Such a memory would have an incredible storage capacity of somewhere in the range of 10 to the 22nd power bits/cm3. Traditional optical memories, whether two- or three-dimensional, can never hope to achieve atomic-level storage densities for the simple reason that minimally sized storage cells always have edge dimensions on the order of or larger than the wavelength of light employed. In the case of visible light, cubic wavelength scale storage volumes contain billions of atoms. A new class of optical memories has recently been proposed which holds the promise of making near atomic-level data storage a reality. This approach to storage, generically referred to as frequency-selective optical data storage, works by addressing atoms spectrally as well as spatially. It turns out that the constituent atoms/molecules within many materials display spectrally narrow resonances (with a width referred to as δf), and that the resonances of individual atoms/molecules are spread throughout a rather broad frequency range (referred to as Δf). Thus atoms located within a minimally sized spatial volume can be subdivided and hence addressed on the basis of their frequencies. In some materials, up to $\Delta f / \delta f$ approx. 10 to the 7th power frequency subdivisions can be made, making it

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ACADEMIA SINICA CHANGCHUN (CHINA) CHANGCHUN INST OF PHYSICS

IDENTIFIERS: (U) *Hole burning. Spectral holes, Component Reports...

(U) Persistent Photon-Gated Spectral Hole-burning in a New Donor-Acceptor Electron Transfer System.

MAY 92 4P

PERSONAL AUTHORS: Tian, Mingzhen; Luo, Baozhu; Li, Wenlian; Huang, Shihua; Yu, Jiaqi

MONITOR: AFOSR, XC
TR-92-0814, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991), Volume 16, Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 28-28 September 1991', AD-A358 863, p158-161.

ABSTRACT: (U) Due to the interest in the frequency-domain optical storage application, recent researches on spectral hole-burning concentrated on the two-colour photon-gated persistent hole-burning. Some organic systems have been investigated. A representative one is TBT as a donor and CHCl₃ as an acceptor in PMMA film undergoing donor-acceptor electron transfer, which offered a significant mechanism for persistent hole-burning in organic system. But there is an insurmountable problem in the system. AS CHCl₃ is volatile at room temperature, its concentration can not be controlled and the sample is difficult to further study. Here we report the hole-burning system composed of metal-tetrabenzoporphyrin derivatives (MTBP) as the donors and a solid electron acceptor, p-hydroxybenzaldehyde (PHBA), which can easily be made into a stable 'dry' film and in which the concentration of each component can be modified easily.

DESCRIPTORS: (U) *ELECTRON TRANSFER, *OPTICAL STORAGE, *MOLECULAR SPECTROSCOPY, ELECTRON ACCEPTORS, ELECTRONS, FILMS, FREQUENCY, FREQUENCY DOMAIN, METALS, PHOTONS, ROOM TEMPERATURE, SOLIDS, TEMPERATURE, COLORS, LIGHT.

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TOKYO UNIV (JAPAN)

DENSITY, HIGH RESOLUTION, LOW TEMPERATURE,
PHOTODECOMPOSITION, PHOTOIONIZATION, PHOTONS, POLYMERS,
PROPANE, RESOLUTION, SOLIDS, SPECTROSCOPY, TEMPERATURE,
ZINC, AMORPHOUS MATERIALS.

(U) A New Type Photon-Gated Photochemical Hole Burning by
Two-Color-Sensitized Photoreaction.

MAY 92 4P

IDENTIFIERS: (U) *Hole burning, Spectral holes,
PHB(Persistent Spectral Hole Burning), Component Reports...

PERSONAL AUTHORS: Horie, Kazuyuki; Machida, Shinjiro;
Yamashita, Takashi

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

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SUPPLEMENTARY NOTE: This article is from 'Organization of
the Optical Society of America Photonic Science Topical
Meeting Series (1991). Volume 18. Conference Edition:
Summaries of papers presented at the Persistent Spectral
Hole-Burning: Science and Applications Topical Meeting
Held in Monterey, California on 26-28 September 1991', AD-
A258 883, p154-157.

ABSTRACT: (U) Photochemical Hole Burning (PHB) has
attracted considerable interest not only as a tool for
high resolution spectroscopy of amorphous solid at low
temperature but also as a possible means for frequency-
domain high-density optical storage. Many recent
investigations have been devoted to a photon-gated
mechanism because it allows nondestructive readout in
utilizing PHB for a practical optical memory system. The
mechanisms of previously reported photon-gated PHB
systems are two-step photoionization, photodecomposition,
and photoinduced donor-acceptor electron transfer
reactions. In this presentation, we report the first
observation to our knowledge of a new mechanism for
photon-gated PHB: two color photosensitization of the
photoreactive matrix polymer that involves triplet-
triplet energy transfer process from higher excited
triplet state of sensitizer to photoreactive energy
acceptor groups. The present system consists of a zinc 9,
18,27,38-tetra(4-tolyl)-tetrabenzoporphine (ZnTTBP), and
a glycidyl azide polymer (GAP) cross-linked with
trimethylol propane and isophorone diisocyanate.

DESCRIPTORS: (U) *MOLECULAR SPECTROSCOPY, *PHOTOCHEMICAL
REACTIONS, AZIDES, DENSITY, ELECTRON TRANSFER, ELECTRONS,
ENERGY TRANSFER, FREQUENCY, FREQUENCY DOMAIN, HIGH

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TORAY INDUSTRIES INC OTSU (JAPAN) ELECTRONIC AND IMAGING MATERIALS RESEARCH LAB

(U) Suppression of Dephasing by Deuteration of Amorphous Host Materials: The Case of Porphyrin-Doped Polymers.

MAY 92 4P

PERSONAL AUTHORS: Sakoda, Kazuaki; Maeda, Masayuki

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 18. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A256 063, p150-153.

ABSTRACT: (U) As is widely recognized, the dephasing of an optical impurity doped in an amorphous host is mainly brought about by the interaction with two level systems (TLS). Because the microscopic structure of TLS is not clear and statistically distributed in usual cases, it is quite difficult at present to specify the relevant factors which govern the relaxation of TLS's in a given material. However, we know that the relaxation is substantially the tunneling of atoms in the material.

DESCRIPTORS: (U) *ATOMS, *TUNNELING(ELECTRONICS), IMPURITIES, INTERACTIONS, RELAXATION, AMORPHOUS MATERIALS, OPTICAL PROPERTIES, DEUTERIUM, POLYMERS, DOPING, POLYVINYL ALCOHOL, MOLECULAR SPECTROSCOPY.

IDENTIFIERS: (U) *Hole burning, Spectra holes, Deuteration, Component Reports..

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GENEVA UNIV (SWITZERLAND)

(U) Room-Temperature Persistent Spectral Hole Burning in Sm²⁺:SrFClO₅.

MAY 92 4P

PERSONAL AUTHORS: Jaaniso, R.; Bill, H.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 18. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A256 063, p146-149.

ABSTRACT: (U) We report the first observation of spectral hole burning in the spectra of impurity centers at room temperature. The persistent holes are burned in the 5D sub 1 -7F sub 0 (632 nm) and 5D sub 0 -7F sub 0 (890 nm) transitions of Sm(2+) ions in the title compound. The search for the media showing persistent hole burning at liquid nitrogen or at room temperatures is strongly motivated by the potential applications of this phenomenon in the frequency-selective optical data storage and processing, as has been demonstrated in a number of low-temperature experiments. The extension of the temperature range of the hole burning method could also be of interest for scientific applications, especially in probing of disordered materials. In our study, single crystal species with 1 at.% samarium, and having dimensions of 0.2x5x5 mm, were used. From the structural point of view, they can be described as derivatives of PbF₂ type layer crystals with substitutionally disordered double layers of larger X (Cl, Br) halogens and with the Sm (2+) impurities in the cationic sites.

DESCRIPTORS: (U) *IONS, *SAMARIUM, *MOLECULAR SPECTROSCOPY, CRYSTALS, FREQUENCY, HALOGENS, IMPURITIES, LIQUID NITROGEN, LOW TEMPERATURE, MEDIA, NITROGEN, OPTICAL DATA, PROCESSING, ROOM TEMPERATURE, SINGLE

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CRYSTALS, SPECTRA, STORAGE, TEMPERATURE, TRANSITIONS,
ABSORPTION SPECTRA, OPTICAL STORAGE, DATA STORAGE SYSTEMS.

IDENTIFIERS: (U) *Hole burning, Spectral holes,
Component Reports..

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POLYTECHNIC UNIV BROOKLYN NY DEPT OF PHYSICS

(U) Room Temperature Persistent Spectral Hole Burning in
Distributions of Optical Cavities: A Simple Fabry-
Perot Model.

MAY 92 8P

PERSONAL AUTHORS: Pack, Dee W.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of
the Optical Society of America Photonic Science Topical
Meeting Series (1991). Volume 18. Conference Edition:
Summaries of papers presented at the Persistent Spectral
Hole-Burning: Science and Applications Topical Meeting
Held in Monterey, California on 28-28 September 1991'. AD-
A258 663, p138-145.

ABSTRACT: (U) Efforts to create materials in which to
burn holes at higher temperatures face an inherent
contradiction: the need for inhomogeneous line broadening
from host-guest interactions, vs. the desire to limit the
homogeneous line broadening from thermal fluctuations of
host-guest interactions (i.e. phonon broadening). A
different approach to the question of how to burn holes at
high temperatures was recently conceived and
experimentally confirmed. This approach relies on using
distributions of chromophore-doped optical cavities as
the hole burning medium. The effect was recently observed
in dye-doped micro-spheres. As a simple model
illustrating the important effects characteristic to
these Mie theory cavity resonances in spheres, the Fabry-
Perot is treated analytically and numerically in this
work. The dynamic consequences of confining emitting
species in cavities has been an active topic of research
in recent years. Spectroscopic aspects of doped cavities
have received less attention, however. Placing optically
active molecules within cavities imposes periodically
varying structure on the molecular spectrum. The spectrum
of dye molecules in a single cavity will contain sharp
lines at wavelengths satisfying the cavity round trip
equation, with widths that reflect the confinement time
of the light inside the cavity. This may be thought of as

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the homogeneous linewidth imposed by the cavity. Arnold and coworkers demonstrated that a distribution of cavity sizes (the radii of microspheres in Ref. 1) imposes an inhomogeneous spectral distribution, and that this can be taken advantage of to burn spectral holes at room temperature. Interest in this phenomena is sparked by its nature as a new type of hole burning effect, its possible utility for frequency domain optical memory, and its use to size and study the motion of distributions of microspheres.

DESCRIPTORS: (U) *MOLECULAR SPECTROSCOPY, CAVITIES, CHROMOPHORES, DYES, FREQUENCY, FREQUENCY DOMAIN, HIGH TEMPERATURE, INTERACTIONS, LIGHT, MICROSPHERES, MODELS, MOLECULES, MOTION, PHONONS, ROOM TEMPERATURE, SPHERES, TEMPERATURE, TIME, WIDTH, OPTICAL PROPERTIES, RESONANCE, REFLECTIVITY.

IDENTIFIERS: (U) *Hole burning, Spectral holes, Fabry Perot models, Component Reports..

AD-P008 262 20/5

POLYTECHNIC UNIV BROOKLYN NY DEPT OF PHYSICS

(U) Room Temperature Persistent Spectral Hole Burning using Dielectric Particles as Photonic Atoms,

MAY 92 4P

PERSONAL AUTHORS: Arnold, S.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991'. AD-A258 663, p134-137.

ABSTRACT: (U) Persistent spectral hole burning at room temperature has recently been demonstrated using a 2-D collection of fluorescent spherical microparticles having a random distribution of sizes. In this system, known as a Microparticle Hole Burning Medium(MHBM), the differences in the frequencies of Morphology Dependent Resonances(MDR) with size enables one to generate a fluorescence excitation spectrum which is heterogeneous.

DESCRIPTORS: (U) *FLUORESCENCE, *MOLECULAR SPECTROSCOPY, COMBUSTION, EXCITATION, FREQUENCY, MORPHOLOGY, ROOM TEMPERATURE, TEMPERATURE, DIELECTRICS, PARTICLE SIZE, PHOTONS.

IDENTIFIERS: (U) *Hole burning, Spectral holes, Component Reports..

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20/5

IDEMITSU KOSAN CO LTD CHIBA (JAPAN) CENTRAL RESEARCH
LABS

(U) Free Volume Model of Thermally Induced Spectral
Diffusion.

MAY 92 4P

PERSONAL AUTHORS: Tsuchiya, Jun; Takahashi, Jun-ichi;
Tanaka, Hiroshi

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

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scattering process and activation process. The material
parameters, however, that determine the changes are still
unknown. We report TISD results of some dye/polymer
systems and correlation between TISD and polymer
properties.

DESCRIPTORS: (U) *MOLECULAR SPECTROSCOPY, *PHOTOCHEMICAL
REACTIONS, ACTIVATION, DISPERSING, DYES, ENERGY,
EXCITATION, GLASS, LOW ENERGY, MASS, MASS STORAGE, MODELS,
PHONONS, PHTHALOCYANINES, POLYMERS, SCATTERING,
SPECTROSCOPY, STORAGE, TRANSITIONS, TUNNELING, WIDTH,
DIFFUSION.

IDENTIFIERS: (U) *Hole burning, Spectral holes,
Component Reports..

SUPPLEMENTARY NOTE: This article is from 'Organization of
the Optical Society of America Photonic Science Topical
Meeting Series (1991). Volume 18. Conference Edition:
Summaries of papers presented at the Persistent Spectral
Hole-Burning: Science and Applications Topical Meeting
Held in Monterey, California on 26-28 September 1991', AD-
A258 963, p129-131.

ABSTRACT: (U) An organic dye/polymer system, such as
free base phthalocyanine (H2Pc) dispersed in
polymethylmethacrylate (PMMA), has been interested in as
a model material of new mass-storage for photochemical
hole burning (PHB). There are, however, some unsolved
problems in applying it to a practical memory system.
That is, the influence of polymers as a matrix over the
static and dynamic properties of the system, such as,
thermally induced spectral diffusion (TISD), homogeneous
and inhomogeneous line width, burning efficiency and so
on, has not been solved yet. TISD among them has a strong
correlation to micro environment of a polymer dispersing
a dye. The disorders in amorphous polymers are seen in
wide energy range whose upper limit is determined by the
glass transition of polymers. However, the lower limit is
still left unknown, although some phenomena are known
which are affected by low energy excitation. Recently,
hole burning spectroscopy was successfully applied to
investigate in the lower energy region. Thermally induced
conformation changes of polymers are said to have energy
of same size to cause TISD in the lower energy region.
Koehler et al. succeeded in explaining the changes
quantitatively from a combination of three independent
processes, 1- phonon tunneling process, 2-phonon Raman

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IOWA STATE UNIV AMES

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NAVAL AIR DEVELOPMENT CENTER WARMINSTER PA

(U) Hole Burning of the Exciton Coupled Antenna Complex of Rhodobacter Sphaeroides.

MAY 92 4P

PERSONAL AUTHORS: Reddy, N. R.; Small, G. J.

PERSONAL AUTHORS: Bilmers, R.; Davis, J.; Squicciarini, M.

MONITOR: AFOSR, XC
TR-92-0614, AFOSRMONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

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SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991'. AD-A258 863, p125-128.

ABSTRACT: (U) Efficient energy transfer in light harvesting (LH) complexes forms an important part of the photosynthetic process that results in the conversion of light energy into chemical free energy. A number of factors are important for understanding the process that directs the optical excitation to the reaction center. Included are the nature of relevant excited states of chlorophylls (e.g. localized or delocalized), bath induced mechanisms for homogeneous broadening of transitions etc. The Q sub y-absorption (S sub 1) of chlorophyllic molecules in protein complexes appears as inhomogeneously broadened bands with Gamma sub 1 approx. 50 - 200/cm at liquid helium temperatures.

DESCRIPTORS: (U) *PHOTOSYNTHESIS, *MOLECULAR SPECTROSCOPY, ABSORPTION, CHEMICALS, CHLOROPHYLLS, CONVERSION, ENERGY, ENERGY TRANSFER, EXCITATION, FREE ENERGY, HELIUM, LIGHT, LIQUID HELIUM, MOLECULES, PROTEINS, TEMPERATURE, TRANSFER, TRANSITIONS, ANTENNAS.

IDENTIFIERS: (U) *Hole burning, Spectral holes, Rhodobacter sphaeroides, Component Reports..

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SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991'. AD-A258 863, p122-124.

ABSTRACT: (U) Filter operation is achieved by depleting the ground state population of molecules whose local environments are within the bandwidth of the hole-burning pump laser. Hole-burning is achieved in these systems via a mechanism known as triplet-trapping which is shown in Figure 1. The first step in this mechanism is absorption from the ground singlet state, S sub 0, to the first excited singlet state, S sub 1, in the dye molecule. For most laser dyes, most of the population returns to the ground state via prompt fluorescence. Some of the population, however, is transferred to the lowest-lying triplet state, T sub 1, via spin-orbit coupling assisted intersystem crossing. Typical branching ratios for intersystem crossing are approximately 10%. The lifetime of the T, to S sub 0 transition in solid matrices at low temperatures is very long. Tompkin and Boyd reported a 2 S lifetime for fluorescein in boric acid glass at 200 K. This metastable triplet level therefore acts to trap population and prevent it from returning to the ground state.

DESCRIPTORS: (U) *MOLECULAR SPECTROSCOPY, *CRYSTALS, ABSORPTION, ACIDS, BORIC ACID, COMBUSTION, COUPLINGS, CROSSINGS, DYES, ENVIRONMENTS, FILTERS, FLUORESCENCE.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

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GLASS, GROUND STATE, LASERS, MOLECULES, OPERATION, ORBITS,
POPULATION, PUMPS, RATIOS, SOLIDS, TEMPERATURE,
TRANSITIONS, TRAPS, LASER PUMPING, ABSORPTION SPECTRA,
MOLECULAR STRUCTURE, DOPING, MODELS.

EIDGENOESSISCHE TECHNISCHE HOCHSCHULE ZURICH (SWITZERLAND)
(U) Spectral Hole-Burning Between 2 K and Room Temperature
in Sm²⁺ Doped Substitutionally Disordered
Microcrystals.

IDENTIFIERS: (U) *Hole burning, Spectral holes, Dye
molecules, Component Reports...

MAY 92 4P

PERSONAL AUTHORS: Holliday, Keith; Wei, Changjiang;
Croci, Mauro; Wild, Urs P.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of
the Optical Society of America Photonic Science Topical
Meeting Series (1991). Volume 16. Conference Edition:
Summaries of papers presented at the Persistent Spectral
Hole-Burning: Science and Applications Topical Meeting
Held in Monterey, California on 26-28 September 1991', AD-
A258 663, p118-121.

ABSTRACT: (U) Photon gated spectral hole-burning was
first observed in a samarium doped crystal, BaFCl:Sm²⁺.
This material was of interest to the development of
optical memories as the holes were found to be stable to
room temperature thermal cycling. Holes could be burnt at
liquid helium temperatures but as the temperature was
raised the line quickly became homogeneously broadened.
The addition of bromine to the melt succeeded in
broadening the inhomogeneous linewidths to about 2 nm
through substitutional disorder 21 and persistent holes
were observed at 77 K. Subsequently, a study of the
parameters for spectral hole-burning in a BaFClO.5BrO.5:
Sm²⁺ crystalline powder was performed and the highest
temperature for which persistent hole-burning had been
observed was raised to 133 K. Here we report spectral
hole-burning at room temperature (figure 1) in a related
compound, SrO.5MgO.5FClO.5BrO.5:Sm²⁺. The hole-burning
characteristics of this class of materials are dependent
on the method of preparation and, for instance, a
separate study of BaFClO.5BrO.5:Sm²⁺ observed holes at
183 K, decaying with a half-life of a few minutes. The
preparation method for the samples used here has
previously been described.

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AD-PO08 257 20/5 14/1

DESCRIPTORS: (U) *MOLECULAR SPECTROSCOPY, *CRYSTALS, BROWNE, COMBUSTION, CRYSTALS, HALF LIFE, HELIUM, LIQUID HELIUM, MELTS, PHOTONS, POWDERS, ROOM TEMPERATURE, SAMARIUM, TEMPERATURE, DOPING, LINE SPECTRA, RESONANCE.

EIDGENOESSISCHE TECHNISCHE HOCHSCHULE ZURICH (SWITZERLAND)

(U) Subnanosecond Time Resolved Study of Accumulated Photon Echoes in Chlorin Doped Polymer Films at 1.2 K,

IDENTIFIERS: (U) *Hole burning, Spectral holes, Component Reports...

MAY 92 4P

PERSONAL AUTHORS: Gygax, Hansruedi; Goriach, Ekkehard; Rebane, Alexander; Wild, Urs P.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 18. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A258 863, p114-117.

ABSTRACT: (U) Organic impurity systems which exhibit effect of photo-burning of persistent spectral holes have several interesting spectroscopic and prospective practical applications. A CW holographic technique for detecting of narrow hole shapes in thin polymer films doped with organic dye molecules can be used in combination with a variable-strength applied electric field to obtain information about the homogeneous line shapes and symmetry properties of the impurity centres. This method serves also as a demonstration of the possibility of parallel optical computing. An alternative approach to measure homogeneous line shape properties of low temperature impurity systems consists in the application of coherent optical transient techniques such as photon echoes and accumulated photon echoes. A variation of an accumulated photon echo technique in photo-chemical hole burning media - photo-chemically accumulated stimulated photon echo (PASPE) has been shown to be useful in measuring homogeneous dephasing times as well as in writing ultrafast time domain holograms. In the present work we describe an experiment where we have combined the principles of PASPE and time- and space domain holography with a sensitive subnanosecond time resolution detection using time-correlated single photon counting (TCSPC) apparatus. We also discuss the relation

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AD-PO08 256 20/5 20/2

between the present time domain experiment and CW holographic hole burning.

DESCRIPTORS: (U) *HOLOGRAPHY, DETECTION, DYES, ECHOES, ELECTRIC FIELDS, FILMS, HOLOGRAMS, IMPURITIES, LOW TEMPERATURE, MEDIA, MOLECULES, PHOTONS, POLYMERS, RESOLUTION, SHAPE, SYMMETRY, TEMPERATURE, TIME, TIME DOMAIN, TRANSIENTS, VARIABLES, VARIATIONS, DOPING, COHERENT OPTICAL RADIATION, LASER BEAMS, HOLOGRAPHY, MOLECULAR SPECTROSCOPY.

IDENTIFIERS: (U) *Hole burning, Spectral holes, Component Reports..

MAINZ UNIV (GERMANY F R)

(U) Antihole Formation in Intramolecular Rotational Tunnel Systems,

MAY 92 4P

PERSONAL AUTHORS: Gradl, G.; Fels, A.; Friedrich, J.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991), Volume 16, Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A258 883, p110-113.

ABSTRACT: (U) Hole burning in mixed crystals containing methyl groups can be used to determine the difference of the rotational tunnel splitting of the methyl groups in the ground and excited electronic state of the guest probe. Two mechanisms were suggested: If the photo-transformation of the probe is photochemical in nature, the difference in tunnel splitting shows up in the side hole pattern which appears upon thermal relaxation of the bleached ground state levels through spin conversion processes. On the other hand, if the photo-transformation is purely photophysical in nature, the nuclear spin conversion occurs most probably in the excited triplet state and the tunnel splitting is reflected in the appearance of antiholes. In this paper, we show that for dimethyl-s-tetrazine as a diluted guest in a n-octane host, the difference in the methyl tunnel splitting leads to the formation of two very sharp, perfectly Lorentzian antiholes. 'Mis splitting is 20 times as large as that for dimethyl-s-tetrazine in durene measured by Borezyskowski et al. /1/. The absolute magnitude of the tunnel splitting in the ground state is comparable to kT leading to an intensity difference of the two antiholes from which the absolute magnitude of the tunnel splitting in the ground as well as in the electronically excited state can be determined.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

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DESCRIPTORS: (U) *MOLECULAR SPECTROSCOPY, CONVERSION, CRYSTALS, ELECTRONIC STATES, ELECTRONICS, GROUND STATE, INTENSITY, NUCLEAR SPINS, PROBES, RELAXATION, SPLITTING, TUNNELS, FREQUENCY, OPTICAL PROPERTIES.

IDENTIFIERS: (U) Tunnel splitting, Antiholes, *Holes burning, Spectral holes, Component Reports...

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MITSUBISHI ELECTRIC CORP AMAGASAKI (JAPAN) CENTRAL RESEARCH LAB

(U) Hole Multiplexing in Quinone Derivative Photochemical Hole Burning Systems,

MAY 92 4P

PERSONAL AUTHORS: Yoshimura, Motomu; Nishimura, Tetsuya; Yagyu, Ei-ji; Tsukada, Noriaki; Takeyama, Tetsu

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991), Volume 18, Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A258 883, p106-109.

ABSTRACT: (U) We have been interested in PHB mechanism in the quinone derivatives. The substituent effects of the guest molecules are examined on the hole multiplexing 3, hole formation wavelength range and electric field effect 4. We especially intend to know how densely multiple holes can be formed by wavelength tuning and Stark tuning. First, the substituent effect on hole density and hole formation range in the wavelength dimension has been investigated. It has been proved to be important to select the proper substituents. Second, the Stark effect on the PHB reaction characteristics in the amorphous hosts has been investigated. Also in the quinone derivative systems, the Stark effect has been successfully observed. Five multiple holes in the electric field dimension have been produced at 4.2 K. The dipole moment difference Δu between in the ground state and in the excited state of the guest molecule has been estimated by the spectral hole shift due to the applied electric field.

DESCRIPTORS: (U) *MOLECULAR SPECTROSCOPY, DELTAS, DENSITY, DIPOLE MOMENTS, DIPOLES, ELECTRIC FIELDS, GROUND STATE, MOLECULES, MOMENTS, MULTIPLEXING, QUINONES, STARK EFFECT, TUNING, POLYMERS, THIN FILMS, ABSORPTION SPECTRA.

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HITACHI LTD TOKYO (JAPAN) CENTRAL RESEARCH LAB

IDENTIFIERS: (U) PHB(Persistent Spectral Hole Burning),
*Hole burning, Spectral holes, Component Reports..

(U) Optimized Read/Write Conditions of PHB Memory.

MAY 92 4P

PERSONAL AUTHORS: Murase, Norio; Horie, Kazuyuki

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 18. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A258 883, p102-105.

ABSTRACT: (U) PHB memory has been a good candidate for a future ultra-high density memory for these ten years. This PHB memory is considered to realize the recording density of 1000 times higher than conventional optical memories because it can store wavelength-multiplicatively 1000 bits in a 1-microns diameter recording spot. But not so many researchers are working on PHB memory compared to the number of researchers wrestling with realization of higher recording density of other types of memory such as magnetic or optical ones. One of the reasons is based on the doubt whether high speed readout is possible in such a high density recording in 1-microns diameter spot. Therefore one of the most important research on PHB memory is the estimation of degree of coexistence between high recording density and high speed readout. With respect to this point, two fundamental estimations have been proposed by Moerner et al. According to their results, even a memory of 10 times higher recording density than conventional optical memories can not be realized in case of 30 nsec/bit readout time for already-known single photon type PHB materials. But the above estimation was done under the conditions of 10 microns for fixed laser spot diameter and 100 MHz for hole width.

DESCRIPTORS: (U) *MOLECULAR SPECTROSCOPY, DENSITY, DIAMETERS, HIGH DENSITY, LASER SPOTS, LASERS, PHOTONS,

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TIME, VELOCITY, WIDTH, MEMORY DEVICES, OPTICAL STORAGE, FREQUENCY.

IDENTIFIERS: (U) PHB(Persistent Spectral Hole Burning),
*Hole burning, Spectral holes, Component Reports..

AD-PO08 253 20/12 20/5

TOKYO UNIV (JAPAN)

(U) Preparation and Properties of Sol-Gel Thin Films with Porphins,

MAY 92 4P

PERSONAL AUTHORS: Inoue, Hiroyuki; Iwamoto, Takashi; Makishima, Akio; Ikemoto, Makoto; Horie, Kazuyuki

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 18. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 28-28 September 1991', AD-A258 683, p88-101.

ABSTRACT: (U) Recently the sol-gel process for preparing amorphous materials has been studied. The low processing temperatures enable us to dope the gel with functional organic molecules. Such molecules have poor thermal stability and cannot be included in traditional oxide glasses. Avnir et al. have been reported the preparation and optical properties of amorphous silica doped with rhodamine 8G and pyrene. Makishima and Tani have doped one with 1,4-dihydroxy-9,10-anthraquinone (DAQ) and showed photochemical hole burning (PHB) at 4.8 K. They have also demonstrated that other organic molecules can be successfully incorporated into sol-gel matrices. The number of potential applications of such materials is expected to be substantial. Although materials have been synthesized, little is known about the structure of sol-gel matrix and the interaction between the molecule and the matrix. PHB has attracted considerable interest as a tool for high-resolution solid state spectroscopy. The sol-gel thin film is expected to possess several advantages over gel bulks. Several studies suggest the differences of the structure and properties between bulks and thin films. However, due to the thickness, there have been rather few investigations attempting to obtain structural information directly. Recently the use of organic molecule appears to be one approach for supplying

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new insights regarding the chemistry of sol-gel materials. In this point of view PHB is expected to be high potential. We report here the preparation of sol-gel thin films doped with the porphine derivative and its application to PHB.

DESCRIPTORS: (U) *THIN FILMS, *MOLECULAR SPECTROSCOPY, *MOLECULAR STRUCTURE, AMORPHOUS MATERIALS, ANTHRAQUINONES, CHEMISTRY, GELS, HIGH RESOLUTION, INTERACTIONS, MOLECULES, OPTICAL PROPERTIES, OXIDES, PROCESSING, RESOLUTION, SOLIDS, SPECTROSCOPY, TEMPERATURE, THERMAL STABILITY, THICKNESS, DOPING, GLASS, ABSORPTION SPECTRA.

IDENTIFIERS: (U) *Sol-gel, *Hole burning, Spectral holes, Component Reports..

ACADEMIA SINICA BEIJING (CHINA)

(U) Photon-Gated Photochemical Hole Burning in Zinc-Tetrabenzoporphyrin/Aromatic Cyanide System,

MAY 92 4P

PERSONAL AUTHORS: Lizeng, Zhao; Zhengzhong, Lu; Xiulang, Zhang; Dongxiang, Zhang

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991), Volume 16, Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A298 863, p94-97.

ABSTRACT: (U) The group of Moerner, et al., first reported two-color hole-burning by donor-acceptor electron transfer for a derivative of zinc as a donor with halomethane acceptors in a poly(methyl methacrylate) (PMMA) thin film. Their results have opened up a new class of materials for photon-gating. We report a new example of photon-gated photochemical hole burning (PHB) in which donor-acceptor electron transfer is responsible for hole formation. The donor molecules are also derivatives of tetrabenzoporphyrin, one of which is meso-tetra(p-tolyl)-zinc (TZT). The host matrix is PMMA. The acceptor can be one of several aromatic cyanide (AC) for example, cyanoanthracene, cyanonaphthalene, and cyanobenzene etc.. The TZT donor molecule was synthesized by a modified procedure and purified by extraction and liquid chromatography. The PMMA host used Mp-105, Mw/Mn=2.0. Aromatic cyanide are obtained from Aldrich Chemicals. Optical samples were prepared by mixing the chloroform solution of TZT, AC and PMMA in appropriate ratio and evaporating the solvent on the optical glass.

DESCRIPTORS: (U) *MOLECULAR SPECTROSCOPY, CHLOROFORM, CHROMATOGRAPHY, COLORS, CYANIDES, ELECTRON TRANSFER, ELECTRONS, EXTRACTION, GLASS, LIQUID CHROMATOGRAPHY, METHACRYLATES, MIXING, MOLECULES, OPTICAL GLASS, PHOTONS,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4I17L

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SOLVENTS, THIN FILMS, ZINC, PHOTOCHEMICAL REACTIONS,
OPTICAL PROPERTIES.

IDENTIFIERS: (U) *Hole burning, Spectral holes,
Component Reports..

AD-PO08 251 20/5 20/6

STANFORD UNIV CA DEPT OF APPLIED PHYSICS

(U) Holeburning Optical Magnetic Resonance Imaging.

MAY 92 4P

PERSONAL AUTHORS: Schiller, Stephan; Byer, R. L.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991), Volume 16, Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 28-28 September 1991', AD-A258 663, p90-92.

ABSTRACT: (U) Scanning probe microscopy and gradient imaging are two techniques for imaging at sub-wavelength spatial resolution. Gradient imaging in the form of magnetic resonance imaging (MRI) has so far been demonstrated only in the radio- and microwave frequency domains. An extension of MRI to optical frequencies for imaging (semi-) transparent objects is of interest because an optical photon detection process is inherently more sensitive than magnetic induction detection, potentially leading to increased spatial resolution. Rare-earth ions incorporated into a crystalline host are promising as a prototype system for demonstration of high spatial resolution OMRI. In resonance imaging spatial resolution is obtained by focussing in the frequency rather than space domain and thus spatial resolution is not directly dependent on the wavelength of the exciting waves. A simple estimate for the minimum resolvable detail size can be given by considering magnetic resonance imaging of centers containing a Zeeman doublet (lower level 0 and upper level 1).

DESCRIPTORS: (U) *MOLECULAR SPECTROSCOPY, *OPTICAL IMAGES, DETECTION, FREQUENCY, GRADIENTS, IONS, MAGNETIC INDUCTION, MAGNETIC RESONANCE, MICROSCOPY, MICROWAVE FREQUENCY, MICROWAVES, PHOTONS, PROBES, PROTOTYPES, RADIO EQUIPMENT, RESOLUTION, RESONANCE, SCANNING.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4I17L

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AD-PO08 250 20/5

IDENTIFIERS: (U) *Hole burning, Spectral holes,
Component Reports..

STATE PEDAGOGICAL UNIV MOSCOW (USSR)

(U) Spectral Hole Burning: Dynamical Approach to Spectral
Diffusion Problem.

MAY 92 4P

PERSONAL AUTHORS: Osad'ko, I. S.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of
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Summaries of papers presented at the Persistent Spectral
Hole-Burning: Science and Applications Topical Meeting
Held in Monterey, California on 26-28 September 1991', AD-
A258 663, p86-88.

ABSTRACT: (U) Herzog and Hahn and Portis while studying
magnetic resonance in 1956 found hole broadening with
time. Discussed is the difference between photon and
resonance frequencies and the intensity of the
electromagnetic field. Klauder and Anderson offered a
stochastic theory for the dipolar correlation function of
resonant spins which interact with an array of
nonresonant ones. The interaction leads to the temporal
dependence of the dephasing time T sub 2 of the resonant
spins.

DESCRIPTORS: (U) *MOLECULAR SPECTROSCOPY, *DIFFUSION,
*SPIN RESONANCE, ELECTROMAGNETIC FIELDS, GLASS, FREQUENCY,
TIME, ECHOES, MAGNETIC RESONANCE.

IDENTIFIERS: (U) *Hole burning, Spectral holes,
Component Reports..

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AUSTRALIAN NATIONAL UNIV CANBERRA

(U) Hole Burning in the Organic Triplet State: Side Holes
in an Amorphous Glass.

MAY 92 4P

broader than the resonant feature. If this variation is
large enough, no distinct side features can be observed.

DESCRIPTORS: (U) *MOLECULAR SPECTROSCOPY, *GLASS, ATOMS,
CHROMOPHORES, LIGANDS, METAL COMPLEXES, METALS, MOLECULES,
OSCILLATORS, SPECTROSCOPY, TRANSITION METALS, AMORPHOUS
MATERIALS.

PERSONAL AUTHORS: Riesen, Hans; Krausz, Elmars

IDENTIFIERS: (U) *Hole burning, Spectral holes,
Component Reports..

MONITOR: AFOSR, XC

TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of
the Optical Society of America Photonic Science Topical
Meeting Series (1991): Volume 16, Conference Edition:
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Hole-Burning: Science and Applications Topical Meeting
Held in Monterey, California on 26-28 September 1991', AD-
A258 863, p82-85.

ABSTRACT: (U) Hole-burning spectroscopy has been widely
applied to the S sub 0 -S sub 1, transition of organic
molecules in amorphous hosts. However, only very few
reports on the hole-burning spectroscopy of the triplet
state have appeared. The low oscillator strength of the S
sub 0 -T sub 1 transition is the obvious handicap in
performing such experiments. The oscillator strength of
the S sub 0 -T sub 1, transition can be dramatically
increased by the heavy atom effect making hole-burning
experiments in the S sub 0 -T sub 1, transition more
feasible. A very pronounced heavy atom effect can be
expected in ligand-centered singlet-triplet transitions
of second and especially third row transition metal
complexes leading to lifetimes in the fs range. In the
hole-burning spectrum of the S sub 0 -T sub 1, transition
it is in principle possible to observe side-holes that
are separated from the resonant feature by +/-D for a
chromophore with D not = 0 and E not = 0 and by +/-D+E),
+/-D-E) an +/-2E for a molecule with D not = 0 and E not
= 0. However, the first excited singlet state S sub 1 and
the phosphorescent triplet state T sub 1 are well known
to be poorly correlated in glasses, i.e. the S sub 1-T
sub 1 separation is not constant within the inhomogeneous
distribution. The spin sublevels of the triplet state may
also not be correlated. In the case of a varying ZFS
within the inhomogeneous distribution, side-holes will be

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CHARLES UNIV PRAGUE (CZECHOSLOVAKIA) FACULTY OF
MATHEMATICS AND PHYSICS

(U) Persistent Hole Burning Study of Core Antenna of
Photosystem,

MAY 92 4P

PERSONAL AUTHORS: Vacha, M.; Adamec, F.; Ambroz, M.;
Dian, J.; Nedbal, L.

MONITOR: AFOSR, XC
TR-92-0614, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of
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Meeting Series (1991). Volume 16. Conference Edition:
Summaries of papers presented at the Persistent Spectral
Hole-Burning: Science and Applications Topical Meeting
Held in Monterey, California on 20-28 September 1991', AD-
A258 663, p78-81.

ABSTRACT: (U) The application of hole burning
spectroscopy (HB) in the study of photosynthetic systems
offers an independent method for determining excited
state lifetimes of particular chromophores. The rate
constants of excitation energy transfer (EET) in
photosynthetic antennae can be directly determined by
time resolved fluorescence spectroscopy. For most
bacterial and higher plants antennae is of the order of
10 to the -12 power/s. Efficient EET in pigment-protein
complexes causes significant shortening (three orders of
magnitude) of the excited state lifetimes T sub 1 in
comparison with isolated pigments. The hole widths
obtained in hole burning spectroscopy are proportional to
the total relaxation time T sub 2: 1/T sub 2 = 1/2T sub 1
+ 1/T sub 2*. In the presence of fast EET the T sub 1
contribution is dominant. The aim of this report is to
compare the role of protein environment and efficiency of
EET in photosystem II (PS II) core antenna chlorophyll
protein complex (CPa2) in polyacrylamid gel with that of
the core antenna in native PS II particles in buffer/
glycerol glass (PS II part.).

DESCRIPTORS: (U) *MOLECULAR SPECTROSCOPY,
*PHOTOSYNTHESIS, ANTENNAS, BUFFERS, CHLOROPHYLLS,

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CHROMOPHORES, CORES, ENERGY TRANSFER, EXCITATION,
FLUORESCENCE, GELS, GLASS, GLYCEROLS, PARTICLES, PIGMENTS,
POLYACRYLAMIDES, PROTEINS, RELAXATION TIME, SPECTROSCOPY,
TRANSFER, GLASS, POLYMERS.

IDENTIFIERS: (U) *Hole burning, Spectral holes,
Component Reports..

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

AD-P008 247 20/3

AKADEMIYA NAUK ESTONSKOI SSR TARTU

(U) Correlation Between the Relative Zero-Phonon Electronic Transition Probabilities (DEBYE-WALLER Factors) and the Matrix-Induced Spectral Shifts of Molecular Impurity Centers Doped into Amorphous Hosts,

MAY 92 4P

PERSONAL AUTHORS: Range, Indrek

MONITOR: AFOSR, XC
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UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991), Volume 16, Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 28-28 September 1991', AD-A286 863, p74-77.

ABSTRACT: (U) The attainable contrast in spectrally highly selective photochromic materials critically depends on the Debye-Waller factors (DWF). The search for better hole-burning systems requires simple criteria for the selection of suitable dopants and hosts on the basis of molecular structure and, preferably, of room-temperature spectroscopy. The accumulated experimental data allow to establish reasonable relationships between the DWF and the differences of intermolecular interaction parameters in the ground and excited state (dipole moments, polarizabilities). According to the Franck-Condon principle, the probability of exciting low-frequency intermolecular vibrations in the course of an electronic transition is higher when the minima of the intermolecular interaction potentials are displaced. Small DWF values are expected in the case of large differences between the van der Waals forces in the ground and excited state and vice versa.

DESCRIPTORS: (U) *PHOTOCHROMIC MATERIALS, *MOLECULAR SPECTROSCOPY, CONTRAST, DIPOLE MOMENTS, DIPOLES, ELECTRONICS, EXPERIMENTAL DATA, FREQUENCY, INTERACTIONS, LOW FREQUENCY, MATERIALS, MOLECULAR STRUCTURE, MOMENTS, PARAMETERS, PROBABILITY, ROOM TEMPERATURE, SELECTION,

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SPECTROSCOPY, STRUCTURES, TEMPERATURE, TRANSITIONS, VALUE, VANS, VIBRATION, PHONONS, DOPING, AMORPHOUS MATERIALS, MOLECULE MOLECULE INTERACTIONS.

IDENTIFIERS: (U) *Hole burning, Spectral holes, Component Reports...

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4I17L

AD-P008 246 20/5

AD-P008 245 20/5 20/8

MAINZ UNIV (GERMANY F R)

BAYREUTH UNIV (GERMANY F R)

(U) Spectral Holes Under Pressure: Proteins and Glasses,

(U) Electric-Field Effects on Hole Spectra in Doped Polymers: A Step towards Two-Dimensional Optical Spectroscopy,

MAY 92 4P

PERSONAL AUTHORS: Zollfrank, J.; Friedrich, J.

MAY 92 3P

MONITOR: AFOSR, XC

PERSONAL AUTHORS: Kador, L.

TR-92-0514, AFOSR

MONITOR: AFOSR, XC

TR-92-0514, AFOSR

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SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 28-28 September 1991', AD-A258 863, p68-71.

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 28-28 September 1991', AD-A258 863, p65-67.

ABSTRACT: (U) Pressure tuning of spectral holes provides, in a way, a link between gas phase and solid state spectroscopy. Generally speaking, the shift of a spectral hole under isotropic pressure conditions, allows for a determination of three system parameters. These are: the vacuum frequency $\nu_{\text{sub vac}}$ of the molecular probe, the solvent shift $\nu_{\text{sub s}}$ with the probe experiences when embedded into a lattice and the compressibility k of the base material.

DESCRIPTORS: (U) *MOLECULAR SPECTROSCOPY, GLASS, PROTEINS, SPECTRA, FREQUENCY.

IDENTIFIERS: (U) *Hole burning, Spectral holes, Component Reports..

ABSTRACT: (U) Optical absorption bands of organic dye molecules or inorganic ions in condensed matter are affected by inhomogeneous broadening and are thus usually much broader than the corresponding homogeneous lines. In disordered systems, the difference can amount to several orders of magnitude at low temperatures. In order to detect the effects of external perturbations such as hydrostatic pressure or electric fields on all inhomogeneous band, the perturbations must therefore have very large magnitudes. The sensitivity can be greatly enhanced by investigating the changes of hole-burning spectra caused by the external fields. In amorphous matrices, an external electric field gives rise to a symmetrical broadening of spectral holes due to the linear Stark effect. This was shown to be true even in the case of centrosymmetric dopant molecules where the first-order Stark effect is ascribed to matrix-induced dipole moments. The magnitude of the broadening yields thus information on the electrostatic dye-matrix interaction.

DESCRIPTORS: (U) *MOLECULAR SPECTROSCOPY, *OPTICAL PROPERTIES, ABSORPTION, DIPOLE MOMENTS, DIPOLES, DYES, ELECTRIC FIELDS, ELECTROSTATICS, EXTERNAL, HYDROSTATIC PRESSURE, HYDROSTATICS, INTERACTIONS, IONS, MOLECULES.

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PERTURBATIONS, PRESSURE, SENSITIVITY, SPECTRA, STARK EFFECT, TEMPERATURE, POLYMERS, TWO DIMENSIONAL, FREQUENCY, DOPING.

IDENTIFIERS: (U) Dye molecules, *Hole burning, Spectral holes, Component Reports..

AD-PO08 244 20/5

CALIFORNIA UNIV RIVERSIDE DEPT OF CHEMISTRY

(U) Photochemical Hole Burning Stark Effect Studies on Octatetrane n-Alkane Mixed Crystals,

MAY 92 3P

PERSONAL AUTHORS: Gradl, Gerhard; Kohler, Bryan E.; Westerfield, Curtis

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 18. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 28-28 September 1991', AD-A258 663, p62-64.

ABSTRACT: (U) Given the enormous increase in resolution that can be realized in hole burning studies, the application of these techniques to determine the spectroscopic consequences of applied electric fields was a natural extension. Much of the work in this area has focused on organic dye molecules in disordered glasses. For most of these systems, the application of an electric field most often just broadens the persistent hole although it has been shown that, in certain cases the orientation averaged effect of a randomly oriented solvent field plus a fixed applied field can lead to a partial splitting of the hole profile.

DESCRIPTORS: (U) *MOLECULES, *MOLECULAR SPECTROSCOPY, *CRYSTALS, COMBUSTION, DYES, ELECTRIC FIELDS, PROFILES, RESOLUTION, SOLVENTS, SPLITTING, WORK, GLASS, FREQUENCY, STARK EFFECT.

IDENTIFIERS: (U) *Hole burning, Spectral holes, Component Reports..

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AD-PO08 242 20/5 20/6

AKADEMIYA NAUK SSSR MOSCOW

REGENSBURG UNIV (GERMANY F R)

(U) Hole-Burning and External Field Effects: Principles, Recent Results and New Systems (Superfine Films),

(U) Applications of Electric Field Effects on Persistent Spectral Holes,

MAY 92 2P

MAY 92 4P

PERSONAL AUTHORS: Personov, R. I.

PERSONAL AUTHORS: Mater, Max

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

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UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A258 683, p60-61.

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A258 683, p58-59.

ABSTRACT: (U) The possibility to investigate the influence of external electric and magnetic fields on complex molecules in amorphous solids is essentially limited by a large width of their spectral bands. Hole-burning opens up new excellent opportunities for using the Stark and Zeeman effects in spectroscopy of molecules and solids and their different applications. Owing to the small hole width the sensitivity of measurements increase by several orders of magnitude.

ABSTRACT: (U) We studied the effects of an external electric field on persistent spectral holes in an inhomogeneously broadened optical transition of dye molecules embedded in crystalline or disordered solids. The results are applied to optical data storage in the electric field dimension, modulation and pulse forming of laser beams, and hybrid optical bistability.

DESCRIPTORS: (U) *THIN FILMS, *LINE SPECTRA, MOLECULAR SPECTROSCOPY, FREQUENCY, ELECTRIC FIELDS, MAGNETIC FIELDS, AMORPHOUS MATERIALS, SOLIDS, GLASS, POLYMERS.

DESCRIPTORS: (U) *ELECTRIC FIELDS, *LINE SPECTRA, DYES, EXTERNAL, LASER BEAMS, LASERS, MODULATION, MOLECULES, OPTICAL DATA, PULSES, SOLIDS, STORAGE, TRANSMISSIONS, OPTICAL STORAGE, DATA STORAGE SYSTEMS, LASER BEAMS, OPTICAL IMAGES, MOLECULAR SPECTROSCOPY.

IDENTIFIERS: (U) *Hole burning, Dye molecules, Spectral holes, Component Reports..

IDENTIFIERS: (U) Dye molecules, Spectral holes, Component Reports..

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EIDGENOESSISCHE TECHNISCHE HOCHSCHULE ZURICH (SWITZERLAND)

holograms stored at different frequencies should have similar spatial structure and contrast.

(U) Holography in Frequency Selective Media: Hologram
, Phase and Causality.

DESCRIPTORS: (U) *HOLOGRAPHY, *OPTICAL STORAGE,
*MOLECULAR SPECTROSCOPY, ABSORPTION, ABSORPTION
COEFFICIENTS, DENSITY, DIFFRACTION, ELECTRIC FIELDS,
FREQUENCY, FREQUENCY DOMAIN, HIGH DENSITY, HOLOGRAMS,
IMAGES, INTERACTIONS, INTERFERENCE, LASER BEAMS, LASERS,
PATTERNS, PHASE, PROCESSING, REFRACTIVE INDEX, SIGNALS,
TIME, OPTICAL IMAGES, REFRACTIVE INDEX, THIN FILMS,
CRYOSTATS.

MAY 92 4P

PERSONAL AUTHORS: Bernet, Stefan; Kohler, Bern; Rebane,
Alexander; Renn, Alois; Wild, Urs P.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

IDENTIFIERS: (U) *Hole burning, Spectral holes,
Component Reports..

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of
the Optical Society of America Photonic Science Topical
Meeting Series (1991). Volume 18. Conference Edition:
Summaries of papers presented at the Persistent Spectral
Hole-Burning: Science and Applications Topical Meeting
Held in Monterey, California on 28-28 September 1991', AD-
A288 683, p50-53.

ABSTRACT: (U) Persistent spectral hole burning in
conjunction with holography (PSHB) opens new prospects
for high density optical information storage and
processing. In the holographic approach, hole burning is
carried out with two-crossed coherent laser beams which
bleach out a narrow frequency domain hole in an
inhomogeneously broadened absorption band recording, at
the same time, a spatial holographic fringe pattern.
During read out of the hologram diffraction from this
spatial fringe pattern occurs, and a holographic image is
reconstructed, reflecting the changes of the absorption
coefficient and the refractive index introduced by the
spectral hole. The variation of the refractive index as a
function of the frequency extends further than the
corresponding absorption coefficient change. If many
holograms are recorded at adjacent frequencies, the
refractive index gratings cause interference between the
holographic signals recorded at different frequencies. A
possible way to avoid interaction, and to suppress the
buildup of a spectrally non-selective background signal,
is to control the relative phase changes of pi between
been shown, that relative phase changes of pi between
adjacent holograms in the frequency domain as well as in
the electric field dimension result in a considerable
reduction of this background. In this case, however, the

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EIDGENOESSISCHE TECHNISCHE HOCHSCHULE ZURICH (SWITZERLAND)

FREQUENCY, LASER BEAMS, CROSSTALK.

(U) Holographic Optical Data Storage of 2000 Images by Photochemical Hole Burning.

IDENTIFIERS: (U) Hole burning, Spectral holes, Component Reports...

MAY 92 4P

PERSONAL AUTHORS: Kohler, Bern; Bernet, Stefan; Renn, Alois; Wild, Urs P.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 18. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 28-28 September 1991', AD-A258 663, p46-48.

ABSTRACT: (U) In addition to its importance for the optical spectroscopy of solids, photochemical spectral hole burning (PSHB) has attracted great interest due to its potential use in high density optical data storage. By encoding information as a function of frequency an enormous increase in storage is possible compared to conventional optical storage materials. The most optimistic estimates predict an increase given by the ratio of the inhomogeneous linewidth to the homogeneous linewidth of the optical transition responsible for hole burning. Until now, however, there have been relatively few investigations of the practical limitations to storing a large number of spectral holes. We describe here a recent experiment in which 2000 grayscale images were successfully recorded as holograms in the PSHB material chlorin in polyvinylbutyral. In holographic spectral hole burning the relative phase of the interfering light waves used to prepare the hologram has a strong influence on diffraction properties and, hence, on crosstalk between adjacent holograms. By controlling the phase and frequency during burning in a novel manner, we have minimized crosstalk between the stored images.

DESCRIPTORS: (U) *HOLOGRAPHY, *OPTICAL STORAGE, *DATA STORAGE SYSTEMS, MOLECULAR SPECTROSCOPY, OPTICAL IMAGES.

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UNIVERSITY OF SOUTHERN CALIFORNIA LOS ANGELES DEPT OF PHYSICS

IDENTIFIERS: (U) Space, Component Reports...

(U) Holograms in Time and Space: Imaging Through a Scattering Medium.

MAY 92 4P

PERSONAL AUTHORS: Rebane, Alexander; Feinberg, Jack

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 28-28 September 1991', AD-A256 663, p42-45.

ABSTRACT: (U) As an image-bearing wave traverses a scattering medium, the phase of the wave becomes severely distorted. Although most of the light is multiply scattered, a small fraction of the light will be scattered much less than average, and so may still contain information about the original incident wave front. Because this barely-scattered light is extremely weak, it is usually overwhelmed by the multiply-scattered light, so that no image can be observed by eye. Note, however, that the wave that is barely scattered (or not scattered at all) travels a shorter path to the observer's eyes than does the multiply-scattered part of the wave. If the original image-bearing beam is an ultrashort pulse, then in principle, by replacing the eye with a fast, time-resolving detector, one could discriminate between the unscattered, image-containing part of the transmitted light and the multiply-scattered background light. One might use this technique to observe objects embedded in a strongly scattering medium, such as living tissue, if only a fast enough 'shutter' could be developed to cut off the strong background of scattered light.

DESCRIPTORS: (U) *HOLOGRAMS, *LIGHT SCATTERING, *ELECTROMAGNETIC WAVE PROPAGATION, OPTICAL IMAGES, CAMERAS, RESONATORS, FOUR DIMENSIONAL, TIME.

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AD-PO08 237 14/1 12/5 20/5

EIDGENOESSISCHE TECHNISCHE HOCHSCHULE ZURICH (SWITZERLAND)

SPARTA INC LEXINGTON MA

(U) Molecular Computing.

(U) New Developments in Time-and-Space-Domain Holography and Shaping of Light Pulses by Spectral Hole-Burning Filters.

MAY 92 4P

PERSONAL AUTHORS: Wild, Urs P.; Renn, Alois

MAY 92 4P

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

PERSONAL AUTHORS: Kaarli, Rein; Saari, Peeter; Sonajalg, Heiki

UNCLASSIFIED REPORT

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A258 663, p38-41.

UNCLASSIFIED REPORT

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ABSTRACT: (U) Each dye molecule embedded in an amorphous material such as a polymer host experiences a specific molecular environment which strongly influences its electronic transition energies. At low temperatures the different microenvironments result in an inhomogeneously broadened absorption band. The invention of the laser brought new spectroscopic techniques based on energy selection, such as fluorescence line narrowing and spectral hole-burning. These techniques enable convenient addressing of thousands of molecular subsets selected by their transition energy.

DESCRIPTORS: (U) *HOLOGRAPHY, *MOLECULAR SPECTROSCOPY, *OPTICAL STORAGE, ABSORPTION, ADDRESSING, AMORPHOUS MATERIALS, COMBUSTION, DYES, ELECTRONICS, ENERGY, ENVIRONMENTS, FLUORESCENCE, INVENTIONS, LASERS, MATERIALS, MOLECULES, POLYMERS, SELECTION, TEMPERATURE, TRANSITIONS, OPTICAL IMAGES.

IDENTIFIERS: (U) Dye molecules, Hole burning, Spectral holes, Component Reports..

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IDENTIFIERS: (U) Hole burning, Dye molecules, Spectral

DESCRIPTORS: (U) *HOLOGRAPHY, *OPTICAL STORAGE, *MOLECULAR SPECTROSCOPY, COMPOSITE MATERIALS, POLYMERS, RESONANT FREQUENCY, LIGHT MODULATORS, FOUR DIMENSIONAL, TIME, OPTICAL FILTERS, ECHOES.

ABSTRACT: (U) Photochemically instable dye molecules in low-temperature polymers are distributed not only spatially in the medium but also spectrally along the axis of resonant optical transition frequencies and orientationally with reference to the polarization of the transition. Consequently, such composite organic materials--spectral hole burning media--can be considered as novel optical materials possessing not only three-dimensional photosensitivity but also sensitivity to the wavelength and polarization of the incident light. The distribution function of the resonance frequencies of dye molecules determines the dielectric permittivity of the material and hence the amplitude and phase transmittance of the sample after exposure to light non-monochromatic polarized light gives rise to a four-dimensional anisotropic hole, or grating pattern, in the distribution function.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

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holes, Space, Component Reports..

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SPARTA INC LEXINGTON MA

(U) Persistent Spectral Hole Burning Applications for
Massive Optical Neural Network Computers,

MAY 92 4P

PERSONAL AUTHORS: Henshaw, Philip D.; Lis, Steven A.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 18. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A258 583, p28-31.

ABSTRACT: (U) Neural networks require two types of operations: interconnections, which define how the output of one state affects the input of the next, and non-linear operations, which relate the inputs of a state to its output. Interconnections, which require many signals passing through the same space, are best performed with photons, which do not interact with one another. Non-linear operations require interaction (i.e., cross products) between the various inputs to a state, and are best performed with electrons, which interact strongly through their electrical charge. In a typical neural network architecture, almost all of the computation required is associated with the interconnections, and only a tiny fraction is associated with the non-linear operations (sigmoidal response or thresholding) performed at each state. In this paper we will present an architecture which uses both photons and electrons in a natural manner to perform all the functions required for a complete neural network architecture. A schematic of this architecture is shown in Figure 1. Almost all of the computations are performed optically in parallel, providing the capability to implement extremely large neural networks.

DESCRIPTORS: (U) *NEURAL NETS, *COMPUTER ARCHITECTURE, *HOLOGRAMS, *OPTICAL CIRCUITS, *OPTICAL STORAGE.

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*MOLECULAR SPECTROSCOPY, ELECTRONS, INPUT, INTERACTIONS, NETWORKS, OUTPUT, PHOTONS, RESPONSE, SIGNALS, SIGNAL PROCESSING, THREE DIMENSIONAL, FREQUENCY, FOUR DIMENSIONAL, CHIPS(ELECTRONICS).

IDENTIFIERS: (U) Hole burning, Spectral holes, Component Reports..

AD-PO08 235 20/8 12/9 20/5

EIDGENOESSISCHE TECHNISCHE HOCHSCHULE ZURICH (SWITZERLAND)

(U) Error-Corrective Recall of Digital Optical Images in Neural Networks Models by Photo-Burning of Spectral Holes.

MAY 92 4P

PERSONAL AUTHORS: Rebane, Karl K.; Ollikainen, Olavi; Rebane, Alexander

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

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SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 28-28 September 1991', AD-A258 883, p24-27.

ABSTRACT: (U) The neural-network-like scheme of data storage and processing of N-bit sequences of information needs a memory of about N(2) elements (interconnections). In digital auto-associative memories the useful data is presented usually as a set of S different words, $v(s)$ ($s=1, \dots, S$), each word being a sequence of N bits. Simple mathematical rule, given originally by Hopfield, can serve as an algorithm to calculate the values of the N(2) elements of the memory matrix, T. Recall of the memory gives an output word, $v(out)$, which results from a thresholded inner product between the interrogating input word, $v(in)$, and the memory matrix. The readout procedure can be expressed mathematically, where $TRH(\dots)$ stands for the thresholding procedure.

DESCRIPTORS: (U) *NEURAL NETS, *OPTICAL IMAGES, *MOLECULAR SPECTROSCOPY, ALGORITHMS, INPUT, NETWORKS, OUTPUT, RECALL, DATA STORAGE SYSTEMS, OPTICAL STORAGE, FREQUENCY, PARALLEL PROCESSING, MEMORY DEVICES, ERROR CORRECTION CODES.

IDENTIFIERS: (U) *Hole burning, Spectral holes, Component Reports..

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AKADEMIYA NALIK SSSR MOSCOW AD-PO08 234 CONTINUED
LASER BEAMS, FREQUENCY.

(U) Ultrafast Dephasing of Resorufin in D-Ethanol Glass IDENTIFIERS: (U) *Hole burning, Spectral holes,
from 1.8 - 35 K Studied by Incoherent Photon-Echo, Component Reports...

MAY 82 4P

PERSONAL AUTHORS: Gruzdev, N. V.; Vainer, Yu. G.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 18. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A258 683, p18-21.

ABSTRACT: (U) Optical dephasing studies of organic glasses and polymers provide the valuable information about an amorphous system's dynamics. In the recent years hole-burning and two-pulse picosecond photon-echo were widely used for these purposes. These methods have different characteristic times: minutes and more - for hole-burning, picoseconds - for two-pulse picosecond photon-echo. As a result, in the case of amorphous systems, data obtained by using of these methods correspond to different time scales and are not equivalent. The comparison between the results obtained by these different methods can provide additional information about a dynamical processes in amorphous systems (for example, about spectral diffusion). Up to now the most experimental investigations of optical dephasing in organic glasses and polymers were made at small temperature region and only in two time scales: picosecond and minutes and more. It was interesting to investigate organic amorphous systems in nanosecond and microsecond time regions and at more wide temperature region.

DESCRIPTORS: (U) *POLYMERS, *GLASS, *OPTICAL PROPERTIES, *MOLECULAR SPECTROSCOPY, COMBUSTION, COMPARISON, DIFFUSION, DYNAMICS, ECHOES, MICROSECOND TIME, PHOTONS, PULSES, REGIONS, TEMPERATURE, TIME, OPTICAL MATERIALS,

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CALIFORNIA UNIV RIVERSIDE DEPT OF CHEMISTRY

(U) Photon Echo and Time-Resolved Fluorescence Anisotropy Measurements of Organically Doped Sol-Gel Glasses.

MAY 82 3P

PERSONAL AUTHORS: L'Esperance, Drew M.; Crowell, Robert A.; Chronister, Eric L.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

DESCRIPTORS: (U) *ECHOES, *PHOTONS, *GLASS, ABSORPTION SPECTRA, ANISOTROPY, AZULENES, CHROMOPHORES, DYES, FLUORESCENCE, GELS, LOW TEMPERATURE, MEASUREMENT, NAPHTHALENES, RELAXATION, SILANES, SPECTRA, STILBENES, TEMPERATURE, DOPING, VISIBLE SPECTRA, MATRIX MATERIALS, MOLECULAR SPECTROSCOPY.

IDENTIFIERS: (U) *Sol gel, *Hole burning, Spectral holes, Component Reports..

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991), Volume 16, Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A258 663, p15-17

ABSTRACT: (U) We present time resolved measurements of homogeneous dephasing of organic dopants in inorganic sol-gel glasses. A variety of organically doped sol-gel glasses have been synthesized and their dynamics investigated by time-resolved photon echo and fluorescence anisotropy measurements. The homogeneous dephasing rate of the chromophore is determined from photon echo measurements at low temperature ($T = 1.4$ K), while thermally activated homogeneous dephasing mechanisms are investigated by temperature dependent photon echo measurements. Our results are contrasted with recent hole-burning experiments on doped sol-gel glasses. Aluminum silicate (ASE) and tetraethoxy silane (TEOS) glasses have been doped with rhodamine dyes, polyaromatics, cresylviolet, resorufin and a wide range of chromophores with different nonradiative electronic relaxation rates. A small list includes naphthalene (170ns), rhodamine 6G (2ns), Rose Bengal (500ps), stilbene (70ps), azulene (2ps), as well as quinizarin and chlorin. The visible absorption spectra of some organically doped sol-gel glasses is shown. The low temperature homogeneous dephasing rate for chromophores doped into TEOS and in ASE sol-gel glasses has been measured utilizing photon echo measurements.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4I17L

AD-PO08 232 CONTINUED

GEORGIA UNIV ATHENS DEPT OF PHYSICS AND ASTRONOMY

(U) Time-Resolved Hole-Burning in YLiF₄:Er³⁺ With Zeeman Scanning.

MAY 92 3P

PERSONAL AUTHORS: Wang, Y. P.; Meltzer, R. S.; Wannemacher, R.; Macfarlane, R. M.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 18. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 28-28 September 1991', AD-A258 883, p12-14.

ABSTRACT: (U) We report the results of time-resolved optical holeburning of Er(3+) ions in YLiF₄ (0.02%). In earlier work for H/c we described the time evolution of holes burned at 33kHz using laser scanning over a frequency of 40MHz and we reported, using larger scans, the occurrence of optical side holes. We now describe results for H/c with scans > 400 MHz using a new Zeeman technique for frequency scanning the optical transition frequencies which allow one to study the time evolution of the holes and their associated side-holes. The hole lineshapes evolve with time reaching a linewidth of approx. 10 MHz after 800 micros. We identify the source of the time evolution of the hole shape as spectral diffusion resulting from mutual spin flips of the surrounding fluorine nuclei whose flip rates are strongly modified from the bulk rates by the presence of the large magnetic moment of the Er(3+) ion which produces a 'frozen core'. A computer simulation which takes into account the details of the dynamics of the frozen core successfully describes the time evolution of the holes, confirming the dominant role of F nuclear spin flips.

DESCRIPTORS: (U) *NUCLEAR SPINS, *MOLECULAR SPECTROSCOPY, *ZEEMAN EFFECT, *YTTRIUM ALLOYS, COMPUTERS, CORES, DIFFUSION, DYNAMICS, FLUORINE, FREQUENCY, IONS, LASERS.

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MAGNETIC MOMENTS, NUCLEI, SCANNING, SHAPE, SIMULATION, TRANSITIONS, OPTICAL PROPERTIES, LINE SPECTRA, SPIN RESONANCE, COMPUTERIZED SIMULATION, RESONANCE.

IDENTIFIERS: (U) *Hole burning, Zeeman scanning, Spectral holes, Component Reports..

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4117L

AD-PO08 231 11/9 20/5

AD-PO08 230 11/2 20/6 20/5

BAYREUTH UNIV (GERMANY F R)

STANFORD UNIV CA DEPT OF CHEMISTRY

(U) Frequency Dependence of IR Radiation-Induced Spectral Diffusion in Hole-Burning Systems.

(U) Time Dependent Hole Burning and Optical Coherence Experiments as Probes of Spectral Diffusion in Low Temperature Glasses.

MAY 92 2P

MAY 92 4P

PERSONAL AUTHORS: Richter, W.; Lieberth, M.; Haarer, D.

PERSONAL AUTHORS: Fayer, Michael D.

MONITOR: AFOSR, XC
TR-92-0514, AFOSRMONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A258 663, p10-11.

SUPPLEMENTARY NOTE: This article is from 'Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 16. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991', AD-A258 663, p6-9.

ABSTRACT: (U) Persistent spectral holes burnt in polymeric matrices such as polyethylene and polymethylmethacrylate, doped with metal-free phthalocyanine show infrared light-induced spectral diffusion. With respect to the energy dose of the IR irradiation, the hole broadening exhibits no saturation, whereas the hole filling saturates at a level of 70-80% of the initial hollow area, the exact value being dependent on the frequency of the infrared light.

DESCRIPTORS: (U) *POLYMERS, *INFRARED SPECTRA, *IRRADIATION, *MOLECULAR SPECTROSCOPY, MATRIX MATERIALS, POLYETHYLENE, POLYMETHYL METHACRYLATE, PHTHALOCYANINES, DIFFUSION, FREQUENCY.

IDENTIFIERS: (U) Hole burning, Spectral holes, Component Reports..

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DESCRIPTORS: (U) *GLASS, *OPTICAL PROPERTIES, *LINE SPECTRA, ANALOGS, ATOMS, CHROMOPHORES, DYNAMICS, ECHOES, FLUORESCENCE, HEAT, INTERACTIONS, LOW TEMPERATURE, MAGNETIC RESONANCE, MODELS, MOLECULES, PHOTONS, RESONANCE, STIMULATED SPIN ECHO.

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

AD-P008 230 CONTINUED

SURFACES, TEMPERATURE, OPTICAL MATERIALS, FREQUENCY,
MOLECULAR SPECTROSCOPY.

IDENTIFIERS: (U) *Hole burning, Line narrowing, Spectral
holes, Component Reports...

AD-P008 229 20/8 20/5 11/2

STANFORD UNIV CA DEPT OF CHEMISTRY

(U) Spectral Diffusion of Optical Transitions in Doped
Polymer Glasses below 1 deg K,

MAY 92 2P

PERSONAL AUTHORS: Haarer, D.; Muller, K. P.

MONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: This article is from 'Organization of
the Optical Society of America Photonic Science Topical
Meeting Series (1991). Volume 16. Conference Edition:
Summaries of papers presented at the Persistent Spectral
Hole-Burning: Science and Applications Topical Meeting
Held in Monterey, California on 26-28 September 1991', AD-
A258 683, p2-3.

ABSTRACT: (U) Photochemical and photophysical hole
burning is a well established technique for eliminating
the large inhomogeneous broadening of electronic
transitions, which dominates the optical spectroscopy of
amorphous solids. With the possibility of measuring the
quasi-homogeneous width Gamma sub qh of electronic
transitions, dye molecules can be used as probes for
dynamical processes in amorphous solids. The temperature
dependence of the electronic linewidth of a given dye
molecule in a crystalline lattice as compared to its
linewidth in an amorphous solid shows large differences
in both, its absolute value and its broadening behavior.
This is due to the different origin of the dominant line
broadening mechanisms: Interaction with phonons in a
crystalline host and with two level systems (TLS) in an
amorphous solid.

DESCRIPTORS: (U) *LINE SPECTRA, *OPTICAL MATERIALS,
*GLASS, *OPTICAL PROPERTIES, BEHAVIOR, COMBUSTION, DYES,
ELECTRONICS, INTERACTIONS, MOLECULES, PHONONS, PROBES,
SOLIDS, SPECTROSCOPY, TRANSITIONS, VALUE, WIDTH,
MOLECULAR SPECTROSCOPY, AMORPHOUS MATERIALS, CRYSTAL
LATTICES, POLYMERS, DOPING, DIFFUSION, FREQUENCY.

IDENTIFIERS: (U) Dye molecules, *Hole burning, Spectral
holes, Component Reports...

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4I17L

AD-8171 407L 20/11

AD-8171 398L 9/3

CALIFORNIA INST OF TECH PASADENA

PHYSICAL SCIENCES INC ALEXANDRIA VA

(U) Dynamic Failure of Rock.

(U) Compact Active Hydrogen Maser.

DESCRIPTIVE NOTE: Technical rept. 15 Sep 89-14 Sep 92.

DESCRIPTIVE NOTE: Final technical rept..

NOV 92 52P

JAN 93 29P

PERSONAL AUTHORS: Ahrens, Thomas J.; Rubin, Allan M.

PERSONAL AUTHORS: Opie, David B.; Read, Michael E.

CONTRACT NO. AFOSR-89-0547

REPORT NO. PSI/TR-2211-811

PROJECT NO. 2302

CONTRACT NO. F49620-92-C-0034

TASK NO. CS

PROJECT NO. 3005

MONITOR: AFOSR, XC
TR-93-0109, AFOSR

TASK NO. SS

MONITOR: AFOSR, XC
TR-93-0095, AFOSR

UNCLASSIFIED REPORT

Distribution: Further dissemination only as directed by Air Force Office of Scientific Research, Bolling AFB, D.C. 20332-8448; 15 Mar 93 or higher DoD authority.

DESCRIPTORS: (U) *DYNAMICS, *LIMESTONE, *TENSILE STRESS, ALUMINUM, CRATERS, DAMAGE, EXPERIMENTAL DATA, FAILURE, FLYER PLATES, IMPACT, ONE DIMENSIONAL, PARAMETERS, PLATES, ROCK, STRESSES, THREE DIMENSIONAL, ULTRASONICS, VELOCITY.

IDENTIFIERS: (U) PE61102F, Dynamic tensile failure.

UNCLASSIFIED REPORT

Distribution: Further dissemination only as directed by USAF, AF Office of Scientific Research, Bldg. 410, Bolling AFB, DC 20332-8448.

DESCRIPTORS: (U) *HIGH TEMPERATURE SUPERCONDUCTORS, *MASERS, CLOCKS, COOLING, GLOBAL POSITIONING SYSTEM, TELEMETRY SYSTEMS, NAVIGATION, CRYOGENICS, RESONATORS, CRYOSTATS, THERMAL STABILITY, THERMISTORS, FABRICATION, HYDROGEN, PROTOTYPES, STABILITY, TEMPERATURE CONTROL, TETRAFLUOROETHYLENE RESINS.

IDENTIFIERS: (U) SBIR(Small Business Innovative Research) Program, *Compact active masers.

AD-8171 407L

AD-8171 398L

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

AD-B171 271L 15/8

AD-A261 815 20/4

AIR FORCE MATERIEL COMMAND WRIGHT-PATTERSON AFB OH

MICHIGAN UNIV ANN ARBOR DEPT OF ELECTRICAL ENGINEERING
AND COMPUTER SCIENCE

(U) FY 93 Research Technology Area Plan.

(U) Massively-Parallel Computational Fluid Dynamics.

DESCRIPTIVE NOTE: Final rept.,

DESCRIPTIVE NOTE: Final rept. 15 Oct 89-14 Oct 92,

93 68P

OCT 92 SP

PERSONAL AUTHORS: Hellwing, Helmut

PERSONAL AUTHORS: Calahan, Donald

MONITOR: AFOSR, XC
TR-93-0053, AFOSR

CONTRACT NO. AFOSR-90-0020

UNCLASSIFIED REPORT
EXPORT CONTROL

PROJECT NO. 2304

TASK NO. A3

MONITOR: AFOSR, XC
TR-93-0139, AFOSR

Distribution: Further dissemination only as directed by
AFOSR/XPP, Bolling AFB, Washington, DC 20332-0001 1 Oct
91 or higher DoD authority. This document contains export-
controlled technical data.

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *AIR FORCE RESEARCH, AIR FORCE PLANNING,
RESEARCH MANAGEMENT, MATERIEL, COSTS.

IDENTIFIERS: (U) EXPORT CONTROL.

ABSTRACT: (U) The effort has had several components
since it was initiated in Oct of 1989; all of these had
as their objective the assistance of Dr. Joseph Shang at
WRDC in the redirection of his effort toward use of
massively-parallel architectures. The major objective was
to gain algorithm experience in conversion of two Air
Force production CFD codes to a general format applicable
to a variety of commercial message-passing architectures.
Earlier, an explicit N-S 3D code from WRDC had been
converted to the NCUBE. This was used as a model for
parallelized production code developed at WRDC under
DARPA sponsorship. This effort was completed with the
conversion of a serial full 3D Navier-Stokes Beam-Warming
CFD code to a 1024-node scalar NCUBE hypercube at SANDIA
(Albuquerque).

DESCRIPTORS: (U) *COMPUTATIONAL FLUID DYNAMICS, AIR, AIR
FORCE, ALGORITHMS, CONVERSION, FORMATS, GAIN, MODELS,
NODES, PRODUCTION, COMPUTER ARCHITECTURE, MESSAGE
PROCESSING, PARALLEL PROCESSING.

IDENTIFIERS: (U) WJAFOSR2304A3.

AD-B171 271L

AD-A261 815

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T41J7L

AD-A261 813 21/2 20/13 20/4

AD-A261 813 CONTINUED

CFD RESEARCH CORP HUNTSVILLE AL

(U) Influence of Supercritical Conditions on Pre-Combustion Chemistry and Transport Behavior of Jet Fuels.

DESCRIPTIVE NOTE: Final rept. 9 Jul 92-9 Jan 93,

FEB 93 60P

PERSONAL AUTHORS: Krishnan, Anantha

REPORT NO. CFDR-4240/2

CONTRACT NO. F49620-92-C-0030

PROJECT NO. 3005

TASK NO. SS

MONITOR: AFOSR, XC
TR-93-0137, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of the Phase I study was to investigate heat transfer characteristics in supercritical flows. Detailed models were formulated to compute transport properties (such as density, conductivity, viscosity, and specific heat) in the supercritical regime. The models were incorporated into a general purpose Computational Fluid Dynamics (CFD) code capable of modeling flow, heat transfer, and reactions in complex geometries. Two and three-dimensional simulations were performed for supercritical flow and heat transfer in a test cell. Parallel experimental work was done by Professor L.D. Chen at the University of Iowa. The results of the Phase I work show that there is considerable augmentation of heat transfer near the critical point. Also, the large variation in density across the critical point has a significant effect on the near wall profiles of velocity and temperature. Ideal gas approximations of supercritical flows can result in gross errors in predicting heat transfer rates. The development of this supercritical transport model provides a basis for incorporating complex models for pre-combustion chemistry in jet fuels.... Thermal stability. Supercritical flows, Transport properties, Heat transfer.

AD-A261 813

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T41J7L

DESCRIPTORS: (U) *COMBUSTION, *COMPUTATIONAL FLUID DYNAMICS, *JET ENGINE FUELS, *SUPERCRITICAL FLOW, *THERMAL STABILITY, *CONVECTION(HEAT TRANSFER), CONDUCTIVITY, DENSITY, ERRORS, FLUID DYNAMICS, FUELS, HEAT TRANSFER, MODELS, PROFILES, SIMULATION, SPECIFIC HEAT, STABILITY, TEMPERATURE, TEST AND EVALUATION, THREE DIMENSIONAL, TRANSPORT PROPERTIES, VELOCITY, VISCOSITY, ENTHALPY, HEAT FLUX, JET AIRCRAFT, CRITICAL TEMPERATURE.

IDENTIFIERS: (U) PE65502F, WJAFOSR3005SS.

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4117L

AD-A261 734 6/11 7/3 6/13
 NEW MEXICO STATE UNIV LAS CRUCES DEPT OF CIVIL
 ENGINEERING

AD-A261 713 11/6.1 20/2 20/3 20/6
 NORTH CAROLINA AGRICULTURAL AND TECHNICAL STATE UNIV
 GREENSBORO DEPT OF ELECT RICAL ENGINEERING

(U) Modeling Joint Effects of Mixtures of Chemicals on
 Microorganisms Using Quantitative Structure Activity
 Relationships.

DESCRIPTIVE NOTE: Annual rept. 20 Aug 91-19 Aug 92.

92 33P

PERSONAL AUTHORS: Nirmalakhandan, N.; Mohsin, M.;
 Arunignanendran, V.; Bangxin, S.; Cadena, F.

CONTRACT NO. AFOSR-91-0394

PROJECT NO. 2312

TASK NO. AS

MONITOR: AFOSR, XC
 TR-93-0047, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Toxicity of 50 organic chemicals to
 microorganisms was determined using the respirometric
 approach. Using this experimental database, models for
 predicting toxicity (IC50 values) were developed using
 QSAR techniques. Toxicity measurements were also made for
 ten binary mixtures, and sixteen multi-component mixtures.
 The joint effects of organic chemicals in mixtures were
 analyzed by three different approaches. Using the QSAR
 model developed from single chemical studies, an approach
 was developed to analyze and predict joint effects of
 chemicals in mixtures. The results of this study indicate
 that the joint effects could be considered simply
 additive for the different classes of chemicals tested.

DESCRIPTORS: (U) *CHEMICALS, *MICROORGANISMS, *MIXTURES,
 *ORGANIC COMPOUNDS, *TOXICITY, ADDITIVES, DATA BASES,
 MEASUREMENT, MODELS, STRUCTURES, BINARY COMPOUNDS,
 MICROBIOLOGY.

IDENTIFIERS: (U) PE61102F, Joint effects, Quantitative,
 Activity, Relationships, Respirometric.

AD-A261 734

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(U) Optical Characterization of Ga(1-x)IN(x)AS(y)SB(1-y)/
 GASB Alloy and Device Application.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-30 Oct 92.

DEC 92 80P

PERSONAL AUTHORS: Iyer, S.; Abul-Fadi, A.

REPORT NO. TR-3

CONTRACT NO. F46920-89-C-0004

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR, XC
 TR-93-0098, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) GaSb and GaInAsSb layers of excellent
 optical quality with compositions corresponding to the
 room temperature photoluminescence peak wavelength of 1.7
 um to 2.32 um have been grown by liquid phase
 electroepitaxial ((LPEE) technique. These layers were
 characterized using X-ray diffraction, energy dispersive
 X-ray analysis and low temperature Fourier transform
 photoluminescence (PL) with emphasis on the latter. The
 variation in the low temperature photoluminescence
 spectra of these alloys as a function of the alloy
 compositions has been the subject of detailed
 investigation. The nature of the recombination processes
 has been identified from the temperature and intensity
 dependence of the PL spectra. N-type doping of the layers
 has been achieved using tellurium. The PL spectra become
 increasingly complicated and considerable change in the
 PL spectra with the excitation intensity is also observed.
 A systematic and quantitative evaluation of the effects
 of compensation in GaSb has been examined as a function
 of Te concentration in the layers under both low and high
 excitation conditions. Photoreflectance spectroscopy has
 been assembled for the characterization of semiconductor
 band structure and surface, PIN photodiode device has

AD-A261 713

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

AD-A281 713 CONTINUED

been fabricated using the doped layers and characterized using I-V and C-V measurements.... LPE, LPE, GainAsSb, GaSb, Photoluminescence.

DESCRIPTORS: (U) *ALLOYS, *OPTICAL PROPERTIES, *GALLIUM, *ANTIMONIDES, *INDIUM, *ARSENIDES, *SEMICONDUCTORS, *DOPING, ENERGY, EXCITATION, INTENSITY, LAYERS, LIQUID PHASES, EPITAXIAL GROWTH, DISPERSIONS, PIN DIODES, FOURIER TRANSFORMATION, BAND SPECTRA, LOW TEMPERATURE, MEASUREMENT, PHOTODIODES, PHOTOLUMINESCENCE, ROOM TEMPERATURE, SPECTRA, SPECTROSCOPY, STRUCTURES, SURFACES, TELLURIUM, TEMPERATURE, VARIATIONS, X RAY DIFFRACTION.

IDENTIFIERS: (U) WJAFOSR2306B1, PE81102F, LPEE(Liquid Phase Electroepitaxial) technique, Photoreflectance, Band structure.

AD-A281 703 7/6 20/2 20/11 11/4

WASHINGTON STATE UNIV PULLMAN DEPT OF PHYSICS

(U) Defect Initiation/Growth and Energy Dissipation Induced by Deformation and Fracture.

DESCRIPTIVE NOTE: Annual technical rept. 15 Jun 91-14 Dec 92,

JAN 93 313P

PERSONAL AUTHORS: Dickinson, J. T.

REPORT NO. FRACTO-1992

CONTRACT NO. F49620-91-C-0093

PROJECT NO. 2302

TASK NO. DS

MONITOR: AFOSR, XC
TR-93-0078, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Based on our capabilities to (1) detect and characterize particle release from surfaces on fast time scales, (2) to measure rapid electrical transients, and (3) to obtain high resolution topographical information utilizing scanning tunneling and atomic force microscopy, we present new results on the time sequence of events leading up to defect initiation and growth which ultimately leads to fracture. We employ dynamic methods as well as post-fracture examination in polymers, ceramics, metals, and interfaces. We emphasize mechanisms, with interpretation and connections between these results and the creation and evolution of defects in materials under mechanical stress. In many cases, the information we are acquiring has important implications concerning dissipation of energy (e.g., plastic deformation, microcracking, crack branching, and crack deflection) which play critical roles in controlling the strength and toughness of materials.... Deformation, Crack propagation, Fracture, Particle emission, Fracture-emission interfacial failure, Creeping, Electrical transients, Microcracking, Surface charge, Fractography, Crystal defects, Scanning tunneling microscopy, Photoluminescence.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

AD-A261 703 CONTINUED

AD-A261 698 11/5 20/11 11/4 20/13

DESCRIPTORS: (U) *CRYSTAL DEFECTS, *DEFORMATION, *DISSIPATION, *FRACTURE(MECHANICS), *ENERGY, CRACK PROPAGATION, CRAZING, DEFLECTION, DYNAMICS, ELECTRICAL PROPERTIES, TOPOGRAPHY, ELECTRON MICROSCOPY, CERAMIC MATERIALS, STRESSES, STRENGTH(MECHANICS), EMISSION, FAILURE, FRACTOGRAPHY, HIGH RESOLUTION, INTERFACES, MATERIALS, METALS, MICROCRACKING, PARTICLES, PHOTOLUMINESCENCE, PLASTIC DEFORMATION, POLYMERS, PROPAGATION, RESOLUTION, SCANNING, SEQUENCES, STATIC ELECTRICITY, SURFACES, TIME, TOUGHNESS, TRANSIENTS, TUNNELING.

UTAH UNIV SALT LAKE CITY DEPT OF MATHEMATICS

(U) Failure Considerations in Composite Systems Based on 3D Micromechanical Stress Fields: Part A.

DESCRIPTIVE NOTE: Final technical rept..

DEC 92 326P

PERSONAL AUTHORS: Folias, E. S.

CONTRACT NO. AFOSR-90-0351

IDENTIFIERS: (U) PE61102F, Atomic force microscopy, Initiation.

MONITOR: AFOSR, XC

TR-93-0076, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In this investigation, a systematic 3D micromechanics approach is used to model a composite. The fibers are assumed to be cylindrical inclusions which are periodically embedded into a matrix plate. A three dimensional analysis is used in order to capture any edge effects which may be present. A set of fundamental key problems has been identified and their respective solutions for the displacement and stress fields are then used in order to provide us with some answers to the following fundamental questions: transverse strength, longitudinal strength, residual stresses due to thermal expansion mismatch, modeling of fiber matrix interface, edge effects. The 3D results are then used to first identify critical locations where failure, due to fracture, is most likely to initiate and second to derive fracture criteria for crack initiation at the local level. The criteria reveal the dependence of the composite strength on the material properties, the local cell geometry, the ratio of the fiber volume fraction, the ratio of fiber radius to fiber length and finally the applied mechanical and or thermal loads... 3D Stress fields, Composites, Micromechanics, Residual stresses, Transverse strength, Longitudinal strength, Thermal expansion mismatch, Fiber/matrix interface.

DESCRIPTORS: (U) *FAILURE, *MICROMECHANICS, *STRESSES, *COMPOSITE MATERIALS, *THREE DIMENSIONAL, CELLS, CRACKS, DISPLACEMENT, EDGES, EXPANSION, FIBERS, GEOMETRY, INCLUSIONS, INTERFACES, LENGTH, MATERIALS, MODELS, PLATES, RATIOS, RESIDUALS, THERMAL EXPANSION, TRANSVERSE, VOLUME,

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AD-A261 697 5/2

STRENGTH(MECHANICS), FRACTURE(MECHANICS), LOADS(FORCES).

SAN DIEGO STATE UNIV CA CENTER FOR RESEARCH IN
MATHEMATICS AND SCIENCE EDUCAT ION

IDENTIFIERS: (U) Cylindrical, Matrix, Longitudinal,
Mismatch, Initiation.

(U) A Schema-Based Theory of Transfer.

93 16P

PERSONAL AUTHORS: Reed, Stephen K.

CONTRACT NO. AFOSR-88-O107

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XC
TR-93-0057, AFOSR

UNCLASSIFIED REPORT

Availability: Publ in Transfer on Trial: Intelligence,
Cognition, and Instruction, p39-67, 1993. Available to
DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) This chapter summarizes my research on
transfer from 1985-1991, using schema theory to organize
the results. The first section presents the major
assumptions of schema theory and shows how they apply to
word problems. The second section discusses transfer to
similar problems that have the same story content, but
slightly different solutions. Research indicates how
analogous examples, examples with procedures, and
multiple examples can mediate transfer. The third section
discusses transfer to isomorphic problems that have
identical solutions, but different story content.
Analogous examples, schema abstraction, and direct
instruction provide alternative instructional approaches.
The concluding section contrasts the schema- and search-
based approaches.... Schema, Examples, Procedures,
Analog, Categorization, Word problems.

DESCRIPTORS: (U) *INFORMATION TRANSFER, *INFORMATION
THEORY, ANALOGS, CONTRAST, INSTRUCTIONS.

IDENTIFIERS: (U) WJAFOSR2313A4, PE61102F, *Schema theory

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AD-A261 697

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4I17L

AD-A261 696 20/5

AD-A261 696 CONTINUED

YALE UNIV NEW HAVEN CT DEPT OF APPLIED PHYSICS

(U) Frequency Splitting and Precession of Cavity Modes of
a Droplet Deformed by Inertial Forces.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308CS, SRS(Stimulated
Raman Scattering).

DESCRIPTIVE NOTE: Rept. for 1 Feb 92-31 Jan 93.

92 9P

PERSONAL AUTHORS: Chen, Gang; Swindal, J. C.; Chang,
Richard K.

CONTRACT NO. AFOSR-91-0150

PROJECT NO. 2308

TASK NO. CS

MONITOR: AFOSR, XC
TR-93-0129, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in SPIE, v1726 Shanghai International
Symposium on Quantum Optics, p292-298, 1992. Available to
DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Spectrally and temporally resolved
measurements of stimulated Raman scattering (SRS) from
flowing ethanol droplets are presented. The equal
frequency spacings of the SRS peaks are an order of
magnitude smaller than the spacings from morphology-
dependent resonances (MDR's) of a perfect sphere. The
observed temporal oscillations of the SRS from two
segments of the droplet rim are 180 deg out-of phase and
dependent on the azimuthal mode number, m , of the MDR. The
observed frequency splitting and precision of the MDR
about the symmetry axis of an oblate droplet is
consistent with perturbation predictions of the frequency
splitting of a $(2n+1)$ -degenerate MDR of a perfect sphere.
... Shape deformation, Inertial force, Droplet flow,
Stimulated Raman scattering, Cavity resonance modes.

DESCRIPTORS: (U) *ETHANOLS, *LIGHT SCATTERING, *DROPS,
CAVITIES, DEFORMATION, FLOW, MEASUREMENT, MORPHOLOGY,
OSCILLATION, PERTURBATIONS, PRECISION, PREDICTIONS,
RESONANCE, SHAPE, SPLITTING, SYMMETRY, REPRINTS, RAMAN
SPECTRA.

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AD-A261 692 5/8 6/4 12/9 AD-A261 692 CONTINUED

SAM TECHNOLOGY INC SAN FRANCISCO CA

(U) Physiological Indices of Mental Workload.
SENSES(PHYSIOLOGY), STIMULATION(PHYSIOLOGY), RECEPTOR
SITES(PHYSIOLOGY), ELECTRICAL PROPERTIES, COMPUTER
APPLICATIONS, MICROCOMPUTERS, MUSCLES, RESPONSE, STIMULI,
TEST AND EVALUATION, WORKLOAD.DESCRIPTIVE NOTE: Interim technical rept. 15 Dec 91-14
Dec 92,

DEC 92 7P

PERSONAL AUTHORS: Gavins, Alan; Leong, H. M.

CONTRACT NO. F49620-92-C-0013

PROJECT NO. 3005

TASK NO. 55

MONITOR: AFOSR, XC
TR-93-0086, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We are working on an enabling technology to facilitate the development of physiological indices of mental workload that could be used in high performance aircraft. To date, we have designed and implemented the core components of a neural-network based algorithm for deriving continuous mental workload indices from continuous recordings of brain, scalp muscle, eye and heart electrical activity. We have also designed an experiment to test the adequacy of this algorithm, and have developed technologies to perform the experiment including: (1) designing a task battery to initially test the ability of the network algorithm to generalize across cognitive functions relevant to piloting aircraft; and (2) implementing a software library that could be used to efficiently present the task stimuli using the same personal computer which also collects 32 channels of electrophysiological data. We have tested the integrated system and have found it capable of providing accurate timing of task stimuli, subject responses, and electrophysiological data.... Mental workload, Neural networks, Physiological indices.

DESCRIPTORS: (U) *INTEGRATED SYSTEMS, *PILOTS, *MAN MACHINE SYSTEMS, *ELECTROENCEPHALOGRAPHY, *NEURAL NETS, AIRCRAFT, ALGORITHMS, BRAIN COGNITION, EYE, FUNCTIONS, HEART, LIBRARIES, AIR FORCE RESEARCH, STRESS(PHYSIOLOGY),

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AD-A261 689 5/7 12/5

AD-A261 688 12/5

TEXAS UNIV AT EL PASO

FLORIDA UNIV GAINESVILLE QUANTUM THEORY PROJECT

(U) Towards a Formalism for Program Generation 1992 - Final Report.

(U) Molecular Interactions and Properties with Many-Body Methods.

DESCRIPTIVE NOTE: Final rept. 15 Jun 89-29 Dec 92,

DESCRIPTIVE NOTE: Final rept. 1 Dec 91-30 Nov 92.

DEC 92 31P

NOV 92 7P

PERSONAL AUTHORS: Cooke, Daniel E.

PERSONAL AUTHORS: Bartlett, Rodney J.

CONTRACT NO. F49620-89-C-0074

CONTRACT NO. AFOSR-90-0079

PROJECT NO. 2304

PROJECT NO. 2301

TASK NO. FS

TASK NO. DS

MONITOR: AFOSR, XC
TR-93-0083, AFOSRMONITOR: AFOSR, XC
TR-93-0104, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The following was accomplished over the period of the contract: (1) Studied the interaction between iterative and data structures; (2) Completed Denotational Semantics of BagL; (3) Initiated work on a logic semantic for BagL; (4) Initiated work on a Visual Interface for BagL; (5) Initiated work on semantic extensions to support software maintenance in BagL; (6) Initiated a revision of BagL semantics; and (7) Initiated work on a BagL interpreter. In the coming years the researchers hope to complete the BagL interpreter, the logical semantic, and establish the expressiveness of BagL. In the long term it is hoped to apply results of nonmonotonic logic research to BagL for the purpose of software evolution automation. They also hope to develop a visual interface based upon the formal language.

ABSTRACT: (U) A variety of Air Force applications require highly detailed information about atoms, molecules, and their interactions. This information is necessary in problems ranging from chemical laser development, to the detection and identification of rocket plumes, to non-linear optics electron beam technology, and high density and energy fuels. The crucial component needed to understand molecular reactions is the potential energy surfaces (PES) that serve to describe the attractions among the atoms and molecules. However, such information is not easy to obtain. In many cases, the most direct approach to obtaining accurate potential surfaces for molecules, and detailed information about their excited states, vibrational spectra, and a wealth of other quantities, is high level ab initio solutions of the Schrodinger equation.

DESCRIPTORS: (U) *SEMANTICS, *SOFTWARE ENGINEERING, *PROGRAMMING LANGUAGES, INTERFACES, EVOLUTION(GENERAL), AUTOMATION.

DESCRIPTORS: (U) *MOLECULAR PROPERTIES, *QUANTUM THEORY, *COMPUTER PROGRAMS, ATOMS, CHEMICAL LASERS, DETECTION, ELECTRON BEAMS, ELECTRONS, ENERGY, EQUATIONS, INTERACTIONS, MOLECULES, OPTICS, PLUMES, POTENTIAL ENERGY, SCHRODINGER EQUATION, SURFACES, VIBRATIONAL SPECTRA, EXCITATION, MOMENTUM, POLARIZATION, AIR FORCE RESEARCH.

IDENTIFIERS: (U) WUAFOSR2304FS, *Third generation languages.

IDENTIFIERS: (U) WUAFOSR2301DS, Coupled cluster methods,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4I17L

AD-A261 688 CONTINUED

Dissociation energy, Potential energy surfaces, Many body perturbation theory.

AD-A261 687 7/2 7/4

TENNESSEE UNIV KNOXVILLE DEPT OF CHEMISTRY

(U) Electrochemical and Spectroscopic Studies of Molten Halides.

DESCRIPTIVE NOTE: Final rept. 15 Sep 88-14 Nov 92.

JAN 93 78P

PERSONAL AUTHORS: Mamantov, Gleb

CONTRACT NO. AFOSR-88-0307

PROJECT NO. 2303

TASK NO. AS

MONITOR: AFOSR, XC
TR-93-0101, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This program deals with chemistry and electrochemistry in molten halides, media which are used in the production of several important elements, such as aluminum, magnesium and fluorine, in some high energy battery systems, as well as in other applications. The emphasis was placed on simple and complex chlorides and fluorides, for example the LiCl-KCl eutectic, the LiF-NaF-KF eutectic (FLINAK), alkali metal and organic tetrachloroaluminates, and cryolite. Pure fluorides usually have high melting points, for example cryolite, Na₃AlF₆, melts at 1000 deg C compared to NaAlCl₄ which melts at 156 deg C. The use of molten mixtures of fluorides and chlorides can result in solute chemistry which is quite different from that observed in pure chloride. One complication which cannot be entirely avoided is caused by atmospheric contaminants. Even the parent alkali chloroaluminates contain millimolar quantities of complexed oxide which may result from the interaction of some melts with Pyrex glass. Therefore, studies of solute species at typical electrochemical or spectroscopic concentrations should take into account the presence of oxide species wherever possible.

DESCRIPTORS: (U) *HALIDES, *ELECTROCHEMISTRY, *SPECTROSCOPY, MELTING POINT, CHLORIDES, PHYSICAL PROPERTIES, FLUORIDES, METALLURGY, SYNTHESIS(CHEMISTRY).

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CHEMICAL PROPERTIES.

IDENTIFIERS: (U) PE81102F, WJAFOSR2303AS, Molten halides,
Tetrachloroaluminates, Cryolites.

AD-A261 685 13/8 9/1

STANFORD UNIV CA DEPT OF ELECTRICAL ENGINEERING

(U) Multivariable Control for Flexible IC Processing.

DESCRIPTIVE NOTE: Final annual rept. 1 Oct 91-30 Sep 92,

NOV 92 21P

PERSONAL AUTHORS: Kailath, Thomas

CONTRACT NO. F49620-90-C-0014, DARPA Order-7149

PROJECT NO. 7149

TASK NO. 01

MONITOR: AFOSR, XC
TR-93-0108, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this DARPA research project was to develop real-time control systems using in-situ sensors for semiconductor manufacturing. Our initial application was the development of a temperature control system for Rapid Thermal Processing (RTP) equipment. We developed mathematical models of RTP, analyzed them, identified and validated these models, deduced several control algorithms and finally applied them to real systems at Stanford University and at Texas Instruments. Also, based on our analysis, we modified the design of the system hardware (lamp array) and also proposed an optimal lamp array design technique.

DESCRIPTORS: (U) *CONTROL SYSTEMS, *SEMICONDUCTORS, *INTEGRATED CIRCUITS, *PRODUCTION ENGINEERING, *SYSTEMS ENGINEERING, ALGORITHMS, ARRAYS, MANUFACTURING, MATHEMATICAL MODELS, REAL TIME, TEMPERATURE, TEMPERATURE CONTROL, TEXAS.

IDENTIFIERS: (U) WJAFOSR714901.

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SEARCH CONTROL NO. T4117L

AD-A281 876 9/1 23/2

AD-A281 671 20/4 22/2

INTEGRATED SYSTEMS INC SANTA CLARA CA

IOWA STATE UNIV AMES DEPT OF MECHANICAL ENGINEERING

(U) Adaptive Control of Nonlinear Flexible Systems.

(U) Investigation of Liquid Sloshing in Spin-Stabilized Satellites.

DESCRIPTIVE NOTE: Final rept. 1 Aug 80-31 Jul 82,

DESCRIPTIVE NOTE: Final rept. 1 Jul 89-30 Nov 92,

JAN 83 55P

JAN 83 212P

PERSONAL AUTHORS: Kosut, Robert L.; Kabuli, M. G.

PERSONAL AUTHORS: Baumgarten, Joseph R.; Flugrad, Donald R.; Pletcher, Richard H.

REPORT NO. ISI-5878-2

CONTRACT NO. F49620-80-C-0084

REPORT NO. ISU-ERI-AMES-93113

PROJECT NO. 2302

CONTRACT NO. AFOSR-89-0403

TASK NO. B1

PROJECT NO. 2302

MONITOR: AFOSR, XC

TASK NO. A5

TR-93-0081, AFOSR

MONITOR: AFOSR, XC

TR-93-0077, AFOSR

UNCLASSIFIED REPORT

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ABSTRACT: (U) The objective is the development of adaptive control methods which can significantly improve closed-loop performance for a broad class of nonlinear flexible systems. Towards this end, a nonlinear controller, applicable to a broad class of nonlinear systems, was devised. The controller consists of a feedforward signal generator which incorporates a model estimate together with a global feedback linearizer. There is an inner feedback controller which modifies control action in accordance with output errors between the feedforward ideal output and the actual sensed output. The adaptive scheme studied uses measured data to update the model in the feedforward signal generator. It was discovered in many simulations that this two-level approach to adaptive feedback linearization can perform significantly better than feedback linearizers using an observer network.

DESCRIPTORS: (U) *FEEDBACK, *NONLINEAR SYSTEMS, *SIGNAL GENERATORS, *ADAPTIVE CONTROL SYSTEMS, ERRORS, GLOBAL, LOOPS, MODELS, NETWORKS, OUTPUT, SIGNALS, SIMULATION.

IDENTIFIERS: (U) PEG1102F.

AD-A281 876

AD-A281 671

DESCRIPTORS: (U) *ARTIFICIAL SATELLITES, *COMMUNICATION

ABSTRACT: (U) Several spin-stabilized communication satellites with liquid stores on board have exhibited unstable nutational motion. Liquid sloshing is suspected as the cause of this undesirable behavior. During an initial three year grant period, a test rig was built and instrumented, a rigid body computer model was developed using a pendulum analogy to simulate the sloshing liquid, and computational fluid dynamic (CFD) methods were used to develop a primitive variable numerical algorithm to describe two and three dimensional liquid sloshing. During the current three year grant period, the test rig and rigid body computer model have been used to study the effect of various physical parameter values on the motion, and stability conditions have been determined. The structural mathematical model has been improved by introduction of finite element techniques to account for elastic deformation of the test rig, and an implicit-explicit numerical approach has been implemented to solve the coupled, nonlinear equations of motion.... Coning, Nutation and structural deflection of satellites due to sloshing fluid, Fluid-structure interaction.

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SATELLITES, *COMPUTATIONAL FLUID DYNAMICS, *SPIN STABILIZATION, ALGORITHMS, ANALOGIES, APPROACH, BEHAVIOR, BODIES, COMPUTERS, DEFLECTION, DEFORMATION, DYNAMICS, EQUATIONS OF MOTION, FLUID DYNAMICS, GRANTS, INTERACTIONS, LIQUIDS, MATHEMATICAL MODELS, MODELS, PARAMETERS, PENDULUMS, SLOSHING, STABILITY, STORES, STRUCTURES, TEST AND EVALUATION, THREE DIMENSIONAL, VALUE, VARIABLES.

CALIFORNIA UNIV LOS ANGELES DEPT OF MECHANICAL AEROSPACE AND NUCLEAR ENGINEER ING

(U) Real-Time Adaptive Control of Mixing in a Plane Shear Layer.

DESCRIPTIVE NOTE: Final rept. 1 Apr 89-31 May 91.

IDENTIFIERS: (U) PE81102F, WUAFOSR2302A5.

MAY 91 18P

PERSONAL AUTHORS: Gibson, J. S.

CONTRACT NO. AFOSR-89-0343

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR, XC
TR-93-0075, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This project has focused on two classes problems in active control of fluid flows. In the first class of problem, active control is used to enhance and stabilize mixing of two fluids. This portion of the research was based on experiment at the University of Arizona. The experiment is funded under a separate grant from AFOSR. The second research problem is to use active control to regulate the wake produced by flow past a cylinder and to regulate the lift and drag on the cylinder.

DESCRIPTORS: (U) *DRAG, *LIFT, *FLUID FLOW, *CYLINDRICAL BODIES, *VORTICES, MIXING, WAKE, FLOW RATE, ADAPTIVE CONTROL SYSTEMS, VELOCITY, TEMPERATURE, FLOW FIELDS, COMPUTATIONAL FLUID DYNAMICS.

IDENTIFIERS: (U) Cylinders.

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AD-A261 659 20/1

AD-A261 659 CONTINUED

CONNECTICUT UNIV HEALTH CENTER FARMINGTON

(U) Monaural and Binaural Processing of Complex Waveforms.

DESCRIPTIVE NOTE: Annual technical rept. 1 Nov 91-31 Oct 92.

JAN 93 12P

PERSONAL AUTHORS: Trahiotis, Constantine; Bernstein, Leslie R.

CONTRACT NO. F49620-92-J-0062

PROJECT NO. 2313

TASK NO. A6

MONITOR: AFOSR, XC
TR-93-0094, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Data were collected concerning the amount of comodulation masking release (CMR) obtained when coherent envelope information is presented successively rather than simultaneously. It was determined that off-frequency information, which produces a CMR, can provide only a small release from masking when presented prior and subsequent to the temporal interval containing the signal. Three papers were published and a fourth is undergoing revision. One assessed sensitivity to interaural correlation of the envelope of high-frequency waveforms and whether such sensitivity might account for detectability in an MLD paradigm. Another showed sensitivity to antiphasic sinusoids added only to the envelopes of high-frequency bands of noise as a function of the frequency of the sinusoid and the bandwidth of the masker. A third, with Dr. R. M. Stem, depicts how straightness weighting can be accomplished by a second, physiologically demonstrated, stage of neural processing. The complex, cross-correlation-based model was extended to account for how interaural insensitive disparities in combination with interaural temporal disparities affects lateralization. Software was written for experiments concerning effects of forward masking fringes on the high-frequency MLD and to perform the theoretical analyses of stimuli used in the successive CMR paradigm.... CMR.

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Cross-correlation, Generation of complex digital stimuli, Interference, Masking, M.L.D., Off-frequency cuing.

DESCRIPTORS: (U) *MASKING, *WAVEFORMS, *SOUND WAVES, *MODULATION, BANDWIDTH, CORRELATION, CROSS CORRELATION, FREQUENCY, FREQUENCY BANDS, HIGH FREQUENCY, INTERFERENCE, INTERVALS, MODELS, NOISE, SENSITIVITY, SIGNALS, STIMULI, DATA ACQUISITION, INFORMATION PROCESSING, ACOUSTIC MEASUREMENT.

IDENTIFIERS: (U) PE61102F, Comodulation masking release.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4I17L

AD-A261 658 5/8

AD-A261 658 CONTINUED

STANFORD UNIV CA DEPT OF PSYCHOLOGY

VARIABLES.

(U) Spontaneous Discovery and Use of Categorical Structure.

IDENTIFIERS: (U) PEB1102F. Unsupervised learning.
Category Invention, Attribute, Feature, Default, Value,
Autocorrelation, Variable.

DESCRIPTIVE NOTE: Annual technical rept. 15 Jan 92-14 Jan 93.

FEB 93 31P

PERSONAL AUTHORS: Clapper, John P.; Bower, Gordon H.

CONTRACT NO. AFOSR-91-0144

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XC
TR-93-0093, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) These experiments investigated unsupervised category learning using tasks in which subjects attempted to memorize the features of training instances from two contrasting categories. On each trial, subjects studied a verbal feature list (training instance) for 24 seconds, after which they were given multiple choice recognition tests to evaluate their memory for each list item. The amount of time spent looking at each feature during the study phase, and the accuracy of recognition during the test phase, provided two separate indices of unsupervised learning on each trial. The main independent variable in these experiments was the specific sequence in which instances from the two categories were presented. The effects of these sequence manipulations on learning provided strong evidence for the use of an explicit, non-incremental, category invention process to capture the consistent structure of the stimulus domain. The present experiments also showed the selective encoding process and enhanced memory for instances predicted by standard, schema-based, theories of learning.... Unsupervised learning. Category Invention, Attribute, Feature, Default.

DESCRIPTORS: (U) *CODING, *LEARNING, *MEMORY(PSYCHOLOGY), *SEQUENCES, AUTOCORRELATION, PSYCHOLOGICAL TESTS, PATTERN RECOGNITION, RECOGNITION, TEST AND EVALUATION, TRAINING.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

AD-A281 652 20/12 20/6 20/3 9/1 AD-A281 652 CONTINUED

POLYTECHNIC UNIV BROOKLYN NY DEPT OF PHYSICS

(U) Experimental and Theoretical Studies of Proximity Effect and Coulomb Blockade Phenomena in Josephson Junctions.

Tunneling Microscopes), PIJE (Proximity Induced Josephson Effect).

DESCRIPTIVE NOTE: Final rept. 15 May 89-29 Mar 92,

JAN 93 35P

PERSONAL AUTHORS: Wolf, E. L.; Laikhtman, B.

CONTRACT NO. AFOSR-88-0338

PROJECT NO. 2305

TASK NO. C3

MONITOR: AFOSR, XC
TR-93-0105, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The topics of theoretical and experimental interest in this research have been: Behavior of ultrasmall low capacitance (Coulomb-blockaded) Josephson and normal metal tunnel junction microstructures. Experimentally the microstructures (STM) A particular interest is in the fundamentally new mechanisms of interaction with radiation believed to operate in these systems. The Proximity Induced Josephson Effect (PIJE), an effect occurring at a Normal Metal/Superconductor (N/S) interface which displays many of the features of the Josephson effect, and whose device potential has not been at all explored. Related topics in our research in this project have been methods to form Josephson junctions using cuprate superconductors, and methods to prepare and modify the surface of cuprate superconductors to make Josephson junctions and other electronic devices.

DESCRIPTORS: (U) *JOSEPHSON JUNCTIONS, CAPACITANCE, ELECTRONICS, INTERACTIONS, INTERFACES, METALS, RADIATION, SUPERCONDUCTORS, SURFACES, THEORY, LOW RATE, MICROSTRUCTURE, ELECTRONIC EQUIPMENT, SCANNING ELECTRON MICROSCOPES, TUNNELING, COPPER, SOLID STATE PHYSICS.

IDENTIFIERS: (U) *Proximity effect, *Coulomb blockade phenomena, Experimental studies, Cuprate, STM (Scanning

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AD-A261 651 9/1 20/6 20/3 7/4 AD-A261 651 CONTINUED

COLORADO STATE UNIV FORT COLLINS DEPT OF ELECTRICAL
ENGINEERINGETCHING, PHOTOELECTRIC EMISSION, N TYPE SEMICONDUCTORS.
IDENTIFIERS: (U) *Heterostructures, Opto electronic
devices, Stracking faults, Mismatch, Dislocations.

(U) Optoelectronic III-V Heterostructures on Si Substrates.

DESCRIPTIVE NOTE: Final rept. 15 Sep-89-14 Sep 92.

SEP 92 26P

PERSONAL AUTHORS: Robinson, Gary Y.

CONTRACT NO. AFOSR-89-0153

PROJECT NO. 2306

TASK NO. B1

MONITOR: AFOSR, XC
TR-93-0106, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The results of a three-year program to investigate the epitaxial growth of the III-V semiconductors, particularly the InGaAsP/InP materials system, on Si substrates is presented. The heterostructures were grown by gas-source molecular beam epitaxy (GSMBE) and were designed for applications in optoelectronics. With regard to growth of InP and InGaAsP alloys on Si, the research program was successful in reducing misfit dislocations and stacking faults resulting from the 8% lattice mismatch between InP and Si. A strained layer superlattice of In(x)Ga(1-x)P/In(y)Ga(1-y)P (X not equal Y) was used as a buffer layer. The use of InGaP as buffer layers led to extensive development, in parallel with the InP-on-Si work, of InGaP layers by GSMBE. The Schottky barrier energies for both n-type and p-type materials were measured for the first time for the wide bandgap alloys InGaP and InGaAlP when lattice matched to GaAs.

DESCRIPTORS: (U) *SEMICONDUCTORS, *SILICON, *OPTICAL PROPERTIES, *ELECTRONIC EQUIPMENT, *INDIUM PHOSPHIDES, *GALLIUM ARSENIDES, SUBSTRATES, STRUCTURES, EPITAXIAL GROWTH, MOLECULAR BEAMS, GASES, ALLOYS, CRYSTAL LATTICES, LAYERS, STRAIN(MECHANICS), BUFFERS, X RAY DIFFRACTION, PHOTOLUMINESCENCE, HALL EFFECT, ANNEALING, THERMAL PROPERTIES, SCHOTTKY BARRIER DEVICES, ENERGY, SURFACES.

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AD-A261 636 20/7 20/9 20/1 9/1 AD-A261 636 CONTINUED

POLYTECHNIC UNIV FARMINGDALE NY WEBER RESEARCH INST

(U) Investigations of the Transient Behavior of the Cathode Fall Region in Planar and Hollow Cathodes.

DESCRIPTIVE NOTE: Final rept. 1 Jul 89-1 Jul 92.

DEC 92 61P

PERSONAL AUTHORS: Cheo, B.; Bruno, D.

CONTRACT NO. AFOSR-89-0433

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR, XC
TR-93-0107, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Recently there has arisen a strong interest in producing negatively charged ion beams such as H⁻ for space based accelerators. The negative ions are generated in the plasma of an arc or glow discharge. The electrons are separated from the negative ions by a magnetic field. In such an environment various plasma and discharge instabilities can occur resulting in undesirable Megahertz noise of broad spectrum in the beam. It has been experimentally shown that the noise could be reduced by using a large ballast resistor in the discharge circuit. However to effectively suppress the noise, the value of the resistance would be prohibitively high. This report describes the design of a possible noise suppression circuit utilizing power transistors in a pulsed discharge. Using power transistors it is possible to obtain high dynamic impedance; but still with sufficiently low D.C. resistance to stabilize the instabilities. The noise is present within a Negative Ion Source obtained from Los Alamos National Laboratory (AT division). This report describes the design of a Gate Turnoff Thyristor (GTO) pulsing circuit for the Negative Ion Source which includes the modification of an existing gate drive unit for a low power GTO. The Negative Ion Source had been pulsed by a capacitive bank discharge circuit. This GTO pulsing circuit has been successfully tested on a Hollow Cathode discharge.

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DESCRIPTORS: (U) *CATHODES, *NOISE, *SUPPRESSION, *ANIONS, BALLAST, CIRCUITS, DRIVES, DYNAMICS, ELECTRONS, GLOW DISCHARGES, IMPEDANCE, ION BEAMS, ION SOURCES, LOW POWER, MAGNETIC FIELDS, MODIFICATION, RESISTANCE, RESISTORS, SPACE BASED, THYRISTORS, TRANSISTORS, HYDROGEN, HELIUM, ACCELERATION, PLASMA DEVICES, SPECTRA, PULSES, ACOUSTICS.

IDENTIFIERS: (U) PEB1102F, WUAFOSR2301A7, *Fall region, Planar cathodes, Hollow cathodes, Negative ion source, Gate turnoff thyristor, Arc discharge.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4I17L

AD-A281 817 12/7 12/4

AD-A281 817 CONTINUED

JOHNS HOPKINS UNIV BALTIMORE MD

IDENTIFIERS: (U) WJAFOSR2304CS, *Relaxation Networks.

(U) Complexity of Connectionist and Constraint-Satisfaction Networks.

DESCRIPTIVE NOTE: Final rept. 1 Dec 88-30 Apr 92.

APR 92 10P

PERSONAL AUTHORS: Kasif, Simon

CONTRACT NO. AFOSR-89-0181

PROJECT NO. 2304

TASK NO. CS

MONITOR: AFOSR, XC
TR-83-0074, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Since the beginning of the funding of the grant, we established a substantial effort in the area of connectionist optimization algorithms, relaxation networks, and geometrical learning algorithms. All of the above are highly interconnected research projects. We have achieved several significant results that have increased our understanding of the computational capabilities and limitations of connectionist and constraint network. Our most significant contributions thus far are in the area of parallel complexity of constraint networks, comparative experimentation with learning algorithms and geometric concept learning. Our results in the area of parallel constraint networks are the subject of several publications in first rate journal and conferences. Our experimental research achieves the best results on several well established benchmarks. Most notably our group achieved the best results (in terms of predictions accuracy) in the area of protein folding. The technical result of research investigations are summarized in the following sections.

DESCRIPTORS: (U) *OPTIMIZATION, *RELAXATION, *COMPUTER NETWORKS, ACCURACY, ALGORITHMS, DOCUMENTS, FOLDING, GRANTS, LEARNING, LIMITATIONS, PREDICTIONS, PROTEINS, RATES, GEOMETRY, RESEARCH MANAGEMENT.

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CALIFORNIA INST OF TECH PASADENA GRADUATE AERONAUTICAL
LABS

DIMENSIONAL, LAGRANGIAN FUNCTIONS, TAYLORS SERIES,
VELOCITY, MIXING, TURBULENT FLOW, VELOCIMETERS, VORTICES,
TRANSFORMATIONS(MATHEMATICS).

(U) Image Correlation Velocimetry.

IDENTIFIERS: (U) PE81102F, WUAFOSR2308BS, Image
correlation velocimetry.

DESCRIPTIVE NOTE: Technical rept. 1 Jun-1 Nov 92.

FEB 93 32P

PERSONAL AUTHORS: Tokumaru, P. T.; Dimotakis, P. E.

REPORT NO. GALTIT-FW92-1

CONTRACT NO. F49620-92-J-0290

PROJECT NO. 2308

TASK NO. BS

MONITOR: AFOSR, XC
TR-93-0133, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This paper focuses on the correlation of two successive scalar images for the purpose of measuring imaged fluid motions. A method is presented for deforming, or transforming, one image to another. Taylor series expansions of the Lagrangian displacement field are used, in conjunction with an integral form of the equations of motion, to approximate this transformation. The proposed method locally correlates images for displacements, rotations, deformations, and higher order displacement gradient fields, and applies a global minimization procedure to insure a global consistency in the results. An integral form of the equations of motion is employed and, as a consequence, no spatial or temporal differentiation of the image data is required in estimating the displacement field. Successive two-dimensional digital CCD images of fluid motion marked with dye, are used to verify the capabilities of the method. The utility of the method is also illustrated using a pair of Voyager 2 images of Jupiter.... Turbulent mixing imaging diagnostics.

DESCRIPTORS: (U) *EQUATIONS OF MOTION, *FLUID FLOW,
*OPTICAL IMAGES, DEFORMATION, DISPLACEMENT, DYES, GLOBAL,
GRADIENTS, IMAGES, MIXING, SERIES(MATHEMATICS), TWO

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AD-A261 597 12/7

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF BRAIN AND
COGNITIVE SCIENCES

(U) Using Modular Neural Networks With Local
Representations to Control Dynamic Systems.

DESCRIPTIVE NOTE: Final rept. 1 Sep 89-31 Aug 92.

DEC 92 11P

PERSONAL AUTHORS: Atkeson, Christopher G.

CONTRACT NO. AFOSR-89-0500

PROJECT NO. 2305

TASK NO. B3

MONITOR: AFOSR, XC
TR-93-0082, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of the research was to
develop an artificial neural network with very fast
learning. Many areas of activity and approaches have
convinced us that we can perform training and access
sufficiently quickly to allow real-time learning....
Neural networks, Memory-based learning, Motor control.

DESCRIPTORS: (U) *LEARNING, *NEURAL NETS, *REAL TIME,
*SYSTEMS APPROACH, ACCESS, MOTORS, TIME, TRAINING,
COMPUTER ARCHITECTURE, ARTIFICIAL INTELLIGENCE, SERIAL
PROCESSORS, PARALLEL PROCESSORS.

IDENTIFIERS: (U) PEG1102F.

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AD-A261 596 9/1 20/5

JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF CHEMISTRY

(U) Theoretical Treatment of Spin-Forbidden and
Electronically Nonadiabatic Processes. Methods and
Applications.

DESCRIPTIVE NOTE: Final rept. 1 Nov 89-31 Oct 92.

JAN 93 23P

PERSONAL AUTHORS: Yarkony, David R.

CONTRACT NO. AFOSR-90-0051

PROJECT NO. 2303

TASK NO. B3

MONITOR: AFOSR, XC
TR-93-0081, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research program focusses on the
electronic structure aspects of radiationless decay
processes related to the stability and formation of high
energy density materials. We have also begun theoretical
studies on electronic nonadiabaticity in ion-molecule
reactions. These studies are enabled by a unique system
of electronic structure algorithms, the BROOKLYN programs,
which we have developed over the last decade. These
programs provide advanced capabilities for the study of
the electronic structure aspects of spin-forbidden and
spin-allowed electronically nonadiabatic processes. The
methodology we have developed is based exclusively on
large scale configuration state function expansions (10(5)
-10(6) terms). These methods, which we believe define the
state of the art in these areas, have permitted us to
make significant contributions to the understanding of
electronically nonadiabatic processes. Problems of
particular relevance to the high energy density materials
program include studies of the stability of the potential
energetic species a-N2O2, tetrahedral N4 and the dication
HS2+. We have also initiated a research program in ion-
molecule chemistry reporting for the first time a seam of
crossings of two states of the same symmetry for the
prototypical charge transfer reaction H+ + NO yields H +
NO+. Finally a new phase of program development has been

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Initiated with the goal of extending our capabilities for the direct determination of actual/allowed/avoided crossing hyperlines and hyperplanes. The algorithm under development will permit systematic determination of (1) actual/allowed crossing seams passing through a minimum energy crossing point and (2) avoided crossing seams as a function of an arbitrary set of internal coordinates.

DESCRIPTORS: (U) *DECAY, *ELECTRONIC STATES, *ION MOLECULE INTERACTIONS, ALGORITHMS, CHARGE TRANSFER, CHEMISTRY, CONFIGURATIONS, COORDINATES, CROSSINGS, DENSITY, DETERMINATION, ELECTRONICS, ENERGY, EXPANSION, HIGH ENERGY, INTERNAL, IONS, MATERIALS, METHODOLOGY, MOLECULES, PHASE, SCALE, STABILITY, STATE OF THE ART, SYMMETRY, TOOLS, TRANSFER, YIELD.

IDENTIFIERS: (U) PEG1102F, *Nonadiabatic Conditions, *Electronic structure.

STANFORD UNIV CA EDWARD L GINZTON LAB OF PHYSICS
(U) Laser Physics and Laser Techniques.

DESCRIPTIVE NOTE: Final rept. 15 Mar 89-14 Mar 92,

JAN 93 19P

PERSONAL AUTHORS: Siegman, A. E.

CONTRACT NO. F49620-89-K-0004

PROJECT NO. 2301

TASK NO. AS

MONITOR: AFOSR, XC
TR-93-0059, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The Final Report summarizes accomplishments over the 3-year period in several different areas of Laser Physics and Laser Techniques, including ultrafast optical measurements using tunable laser-induced gratings; development of a new subpicosecond photodetector technique; generation of tunable picosecond pulses in the IR using parametric mode locking; new developments in laser resonators and laser mode computations, experimental progress toward measuring an important and fundamental excess spontaneous emission or excess quantum noise mechanism in laser oscillators; and the development of new techniques for laser beam characterization and laser beam measurement.... Subpicosecond optical measurements, Photodetector spontaneous emission, Excess spontaneous emission, Excess quantum noise, Laser oscillator, Beam quality.

DESCRIPTORS: (U) *LASER BEAMS, EMISSION, LASERS, MEASUREMENT, NOISE, OSCILLATORS, PHOTODETECTORS, PULSES, RESONATORS, TUNABLE LASERS, NONLINEAR OPTICS, MODE LOCKED LASERS, INFRARED LASERS, PULSED LASERS, INFRARED PULSES.

IDENTIFIERS: (U) *Optical measurement, Quantum noise.

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NEW YORK UNIV NY

NEW YORK UNIV NY

(U) Imaging Regional Changes in the Spontaneous Activity of the Brain: An Extension of the Minimum-Norm Least-Squares Estimate.

(U) Duration of Alpha Suppression Increases With Angle in a Mental Rotation Task.

DESCRIPTIVE NOTE: Manuscript rept. 1 Feb 92-14 Feb 93,

DESCRIPTIVE NOTE: Rept. for 1 Feb 92-14 Feb 93.

JAN 93 18P

FEB 93 27P

PERSONAL AUTHORS: Wang, Jia Z.; Kaufman, Lloyd; Williamson, Samuel J.

PERSONAL AUTHORS: Michel, C. M.; Kaufman, L.; Williamson, S. J.

REPORT NO. 92-5

REPORT NO. 92-8

CONTRACT NO. AFOSR-90-0221, SAFOSR-91-0401

CONTRACT NO. AFOSR-90-0221

PROJECT NO. 2313

PROJECT NO. 2313

TASK NO. BS

TASK NO. BS

MONITOR: AFOSR, XC

MONITOR: AFOSR, XC

TR-93-0054, AFOSR

TR-93-0055, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) A method has been developed to determine the distribution of average spontaneous neuronal activity across the cerebral cortex from measurements of the field pattern across the human scalp. Computations of the mean short-term power, as well as the covariance between pairs of sensors, provide sufficient information to obtain a best estimate for the distribution of mean short-term image current power, as well as the covariance of image current between different locations on cerebral cortex. This method has applications for determining the spatial locations of alpha power suppression as regions of cortex participate in sensory or cognitive functions.... Magnetic source imaging, MSI, Alpha rhythm, Magnetic inverse problem, Spontaneous brain activity.

DESCRIPTORS: (U) *BRAIN, *CEREBRAL CORTEX, *MAGNETIC FIELDS, COGNITION, COMPUTATIONS, COVARIANCE, ESTIMATES, HUMANS, IMAGES, MEAN, MEASUREMENT, PATTERNS, REGIONS, SUPPRESSION, INCOHERENCE, LEAST SQUARES METHOD.

IDENTIFIERS: (U) PEG1102F, Magnetic source imaging, *Extracranium.

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ABSTRACT: (U) Magnetic and electric recordings of average power within the restricted alpha band (10-12 Hz) were made over the parietal and occipital areas of the human scalp while subjects were engaged in the mental imagery task of comparing an object with one previously seen but rotated and perhaps also mirror reflected. Alpha power was found to be suppressed while the subjects were engaged in the comparison, and the duration of suppression increased with the minimum rotation angle to achieve a match. This is additional evidence that visual cortex is engaged in the process of mental imagery. Moreover, for large rotation angles, where the task is markedly more difficult, a shift in the spatial pattern of suppression indicates that the left parietal area of the cortex becomes involved.... Brain waves, Alpha waves.

DESCRIPTORS: (U) *COGNITION, *ELECTROENCEPHALOGRAPHY, *INFORMATION PROCESSING, *VISUAL CORTEX, ANGLES, COMPARISON, HUMANS, MIRRORS, PATTERNS, POWER, ROTATION, SUPPRESSION.

IDENTIFIERS: (U) PEG1102F.

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TEXAS A AND M UNIV COLLEGE STATION DEPT OF AEROSPACE
ENGINEERING

CONDUCTUS INC SUNNYVALE CA

(U) Mechanics and Control of Multibody Structural Systems.

(U) Advanced HTS S-N-S Devices.

DESCRIPTIVE NOTE: Final rept. 31 Jul 90-31 Oct 92,

DESCRIPTIVE NOTE: Final rept. 1 Jul-24 Dec 92.

JAN 93 282P

DEC 92 20P

PERSONAL AUTHORS: Junkins, John L.; Kurdila, Andrew J.

PERSONAL AUTHORS: Simon, Randy W.; Char, Kookrin

CONTRACT NO. F49620-89-C-0084

REPORT NO. SB92-A-02

MONITOR: AFOSR, XC

TR-93-0080, AFOSR

CONTRACT NO. F49620-92-C-0044

PROJECT NO. 1802

UNCLASSIFIED REPORT

TASK NO. 01

ABSTRACT: (U) This report summarizes research into novel methods for structural dynamical simulations control of large nonlinear notions of multi-body systems. A new Order N method is introduced which is shown to be a significant advancement for computing motions of nonlinear multi-body systems. A method is introduced for establishing globally stable maneuvers of flexible structures; both analytical and experimental results are presented. A new integration process is established which used the work/energy equation to stabilize the numerical integration of structural system differential equations... . Structural dynamics, Computational mechanics, Vibration suppression, Nonlinear mechanics, Spacecraft control, Space structures, Multi-Body dynamics.

MONITOR: AFOSR, XC

TR-93-0058, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Superconductor-normal-superconductor

Josephson junctions are a prime candidate for the active devices in electronic circuits based on high-temperature superconductors. In this program, CaRuO₃ was used as a normal metal layer and yttrium barium copper oxide as the superconducting layers to produce Josephson junctions in edge-junction geometry. These superconductor-normal-superconductor junctions have been studied to determine their suitability for use in integrated circuits. The devices worked as Josephson junctions at temperatures up to at least 77 K with characteristic voltages in the range of 100-750 microvolts over most of their operating temperature range. The resistance of the junctions was dominated by the interface region rather than by the barrier layer itself. The properties of dc SQUIDs made from the junctions were excellent at 77 K. The variation in junction parameters over multiple devices was on the order of plus-or-minus thirty percent, which is encouraging but not yet sufficient for integrated circuit applications. Further process refinements may lead to more desirable device uniformity... SNS Junctions, Josephson, HTS.

DESCRIPTORS: (U) *FLEXIBLE STRUCTURES, *SPACECRAFT, *MANIPULATORS, *MANEUVERABILITY, *SPACE STATIONS, CONTROL, DIFFERENTIAL EQUATIONS, DYNAMICS, MANEUVERS, MECHANICS, MOTION, NUMERICAL INTEGRATION, SIMULATION, SUPPRESSION, VIBRATION, DEGREES OF FREEDOM, TRAJECTORIES, SPACECRAFT TRAJECTORIES, FEEDBACK, ROBOTS, EQUATIONS OF MOTION, LYAPUNOV FUNCTIONS, MECHANICAL ENGINEERING, EIGENVALUES, STRUCTURAL ANALYSIS, STRUCTURAL RESPONSE, LAGRANGIAN FUNCTIONS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2302B1, Multibody systems, *Large space structure.

DESCRIPTORS: (U) *HIGH TEMPERATURE SUPERCONDUCTORS, *INTEGRATED CIRCUITS, *JOSEPHSON JUNCTIONS, BARIUM,

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BARRIERS, CIRCUITS, COPPER, ELECTRONICS, HIGH TEMPERATURE, INTERFACES, LAYERS, METALS, OXIDES, RESISTANCE, SUPERCONDUCTORS, VARIATIONS, VOLTAGE, YTTRIUM.

IDENTIFIERS: (U) Calcium ruthenium oxide, Yttrium barium copper oxide.

AD-A261 542 20/4 21/5

CALIFORNIA INST OF TECH PASADENA GRADUATE AERONAUTICAL LABS

(U) Measurements of Scalar Power Spectra in High Schmidt Number Turbulent Jets.

DESCRIPTIVE NOTE: Technical rept. 1 Jun-1 Nov 92.

NOV 92 25P

PERSONAL AUTHORS: Miller, Paul L.; Dimotakis, Paul E.

CONTRACT NO. F49620-92-J-0290

PROJECT NO. 2308

TASK NO. 8S

MONITOR: AFOSR, XC
TR-93-0132, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Single-point, jet-fluid concentration measurements obtained from high Schmidt number ($Sc \approx 1.9 \times 10$ to the 3rd power) turbulent jets permit an investigation of temporal scalar power spectra, for jet Reynolds numbers in the range of 1.25 less than or equal to $Re \times 10^{-4}$ less than or equal to 7.2. At intermediate scales, we find a spectrum with a logarithmic derivative (slope) that is increasing with Reynolds number, in absolute value, but less than $5/3$ at the highest Reynolds number in our experiments. At the smallest scales, our spectra exhibit no 1-k power-law behavior, possessing a log-normal region over a range of scales exceeding a factor of 40, in some cases.... Turbulent mixing.

DESCRIPTORS: (U) *JET FLOW, *TURBULENT FLOW, *JET PROPULSION, MEASUREMENT, MIXING, JET MIXING FLOW, TURBULENCE, NOZZLES, OPTICAL DETECTION, SIGNAL PROCESSING, ARGON LASERS, VISCOSITY, NOZZLE GAS FLOW, POWER SPECTRA, REYNOLDS NUMBER, SLOPE, SPECTRA.

IDENTIFIERS: (U) WJAFOSR2308BS, PEO1102F, *Schmidt number, Shear flow, Discharge rate.

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MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF BRAIN AND
COGNITIVE SCIENCES

WISCONSIN UNIV-MADISON DEPT OF PSYCHOLOGY

(U) Integration of Pictures and Discourse.

(U) Top-Down Influences on Bottom-Up Processing.

DESCRIPTIVE NOTE: Annual rept. Jan-Dec 92.

DESCRIPTIVE NOTE: Final technical rept. 1 Jul 89-30 Nov 92.

JAN 93 17P

JAN 93 21P

PERSONAL AUTHORS: Richards, Whitman

PERSONAL AUTHORS: Glenberg, Arthur M.

CONTRACT NO. AFOSR-89-0504

CONTRACT NO. AFOSR-89-0367

PROJECT NO. 2313

PROJECT NO. 2313

TASK NO. A8

TASK NO. A4

MONITOR: AFOSR, XC
TR-93-0048, AFOSR

MONITOR: AFOSR, XC
TR-93-0037, AFOSR

UNCLASSIFIED REPORT

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ABSTRACT: (U) Although perception is the subject of extensive study, there has been no formal definition of this state. We offer one, and show how even a rather simple formal conceptualization of a percept entails a considerable amount of machinery. Over the past year or two, several components of the machinery required have been studied. These include (1) the role of especially powerful features, called 'Key Features', and (2) how perceptual categories incorporate world knowledge. There also has been progress in understanding preferences for certain structures, as well as in the dynamics of altering preferences (Chaos in Percepts).... Vision, AI, Cognition, Neurophysiology, Visual psychophysics, Dynamical systems.

DESCRIPTORS: (U) *COGNITION, *PERCEPTION, *VISION, CHAOS, DYNAMICS, NEUROPHYSIOLOGY, PSYCHOPHYSICS, BRAIN, AIR FORCE RESEARCH.

IDENTIFIERS: (U) PB81102F, Key features, World knowledge, Visual psychophysics, Preferences, Configuration Stereopsis, Texture curvature.

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ABSTRACT: (U) Pictures help people to comprehend and remember texts. The goal of this project is to begin to understand how this occurs. This Final Technical Report describes progress in three areas. First, we have demonstrated that pictures are used to modify the mental representation derived from texts. When reading with pictures, people tend to form mental models, even when reading in relatively unfamiliar domains. These mental models are representations of what the text is about (in contrast to representations of the text itself), they have an analogical character, and they are constructed using the visual/spatial sketchpad of working memory. Second, we have documented some comprehension processes that are affected by pictures and some that are not. In particular, ease of anaphor resolution is independent of the presence or absence of pictures. On the other hand, pictures enhance the reader's ability to compute a particular kind of elaborative inference that we call noticing. These inferences are derived from spatial relations within the mental model, but need not represent spatial information. Third, we describe a computer simulation that demonstrates how the various processes and representations identified experimentally can be coordinated using a limited-capacity system. Reading, Comprehension, Pictures, Mental models.

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DESCRIPTORS: (U) *COMPREHENSION, *PICTURES, *READING,
*COGNITION, MODELS, RESOLUTION, COMPUTERIZED SIMULATION,
ANALOGS.

YALE UNIV NEW HAVEN CT SCHOOL OF MEDICINE

(U) Stress-Induced Enhancement of the Startle Reflex.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4, Anaphor
resolution, Noticing.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 91-30 Sep 92.

SEP 92 9P

PERSONAL AUTHORS: Davis, Michael

CONTRACT NO. AFOSR-91-0035

PROJECT NO. 2312

TASK NO. A2

MONITOR: AFOSR, XC
TR-93-0087, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The role of the amygdala in the acquisition of conditioned fear. Conditioned fear-potentiated startle involves both learning (e.g., learning the association between the light and the shock), memory (e.g., retrieval of the association that the light predicts shock which then leads to a state of fear), and performance (e.g., the state of fear elevating the startle reflex). Work prior to that supported by the Air Force had purposely focused on performance, because we felt this was probably the simplest aspect of this paradigm and hence the one most amenable to experimental analysis. Hence, we chose drugs (e.g., diazepam, buspirone) or lesions (e.g., of the central nucleus of the amygdala) which should reduce fear and thereby prevent fear-enhancement of startle. This work showed that the central nucleus of the amygdala, and its direct projection to a particular part of the acoustic startle pathway, were critically involved in the performance or expression of fear-potentiated startle.

DESCRIPTORS: (U) *DRUGS, *FEAR, *LESIONS, *REFLEXES,
*CONDITIONED RESPONSE, ACOUSTICS, ACQUISITION, DIAZEPAM,
LEARNING, LIGHT, SHOCK, BRAIN, AIR FORCE RESEARCH.

IDENTIFIERS: (U) PE61102F, WUAFOSR2312A2, Startle reflex,
Acoustic Startle pathway, Buspirone, Amygdala,
*Conditioning.

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FLORIDA UNIV GAINESVILLE DEPT OF PSYCHOLOGY

RICE UNIV HOUSTON TX DEPT OF MATHEMATICAL SCIENCES

(U) Complex Auditory Signals.

(U) Integrated Approaches to Parallelism in Optimization and the Solution of Inverse Problems.

DESCRIPTIVE NOTE: Annual rept. 1 Jan-31 Dec 92,

DESCRIPTIVE NOTE: Final rept. 1 Apr-30 Sep 92,

DEC 92 8P

SEP 92 8P

PERSONAL AUTHORS: Green, David M.

PERSONAL AUTHORS: Dennis, John E.; Tapia, Richard A.

CONTRACT NO. F49620-92-J-0139

CONTRACT NO. F49620-92-J-0203

PROJECT NO. 2313

PROJECT NO. 2304

TASK NO. AS

TASK NO. DS

MONITOR: AFOSR, XC

MONITOR: AFOSR, XC
TR-93-0079, AFOSR

UNCLASSIFIED REPORT

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ABSTRACT: (U) The main area of research continues to be spectral shape discrimination, what I have called profile analysis. Three areas continue to receive considerable attention. They are: (1) the cues available for detecting spectral changes as a function of the bandwidth of the stimulus, (2) how the number of components or density of the spectrum affects the ability to hear spectral changes, and (3) temporal effects--how duration of the stimulus appears to interact with other variables to influence the listener's ability to hear spectral changes. In the first two areas, we have used Berg's CQSS analysis to great advantage, and we anticipate that we shall continue to utilize that procedure in our research.

ABSTRACT: (U) New primal-dual interior point methods for linear programming have been developed. Convergence properties have been determined.

DESCRIPTORS: (U) *LINEAR PROGRAMMING, *SYSTEMS APPROACH, *OPTIMIZATION, CONVERGENCE, POINTS(MATHEMATICS), INVERSION, PROBLEM SOLVING.

IDENTIFIERS: (U) PE61102F, WJAFOSR2304DS.

DESCRIPTORS: (U) *BAND SPECTRA, *AUDITORY SIGNALS, BANDWIDTH, DENSITY, DISCRIMINATION, REPORTS, PROFILES, SHAPE, SPECTRAL ENERGY DISTRIBUTION, AUDITORY PERCEPTION.

IDENTIFIERS: (U) Spectral discrimination, Spectral shape discrimination.

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BROWN UNIV PROVIDENCE RI DIV OF ENGINEERING

(U) Research Support for the Laboratory for Lightwave Technology.

DESCRIPTIVE NOTE: Final rept. 1 Jan 90-31 Dec 92.

DEC 92 101P

PERSONAL AUTHORS: Morse, T. F.

CONTRACT NO. AFOSR-90-0062

PROJECT NO. 2301

TASK NO. AS

MONITOR: AFOSR. XC
TR-93-0102, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The Laboratory for Lightwave Technology within the Division of Engineering at Brown University is one of the few university laboratories at which it is possible to design, fabricate, and characterize optical fibers of not only traditional, but of unusual design. These fibers have an increasingly important role in a host of applications of significance to the defense requirements of the United States. Among these are fiber lasers for the measurement of clear air turbulence (in an important eye-safe region of the spectrum), fiber sensors for the measurement of temperature, strain, not only in high temperature composite materials, but in structural concrete, important for roads, runways, and buildings. We are also engaged in research, an outgrowth of our work in optical fibers, on novel techniques for the formation of nano-phase oxide particles, both ceramic and amorphous. The work on amorphous oxides is associated with our MCVI and DVD laboratories. In these, to be discussed below, we have proposed and studied a new technique for the formation of multi-component oxides to be used in the doping of optical fiber preforms. In this synthesis, an aerosol of organometallic precursors is convectively transported into a reaction zone where it is pyrolyzed. The liquid aerosol is homogeneous at the molecular level, so that subsequent reactions produce glasses that are not phase separated. This has also been used to study the

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synthesis of high temperature ceramic nanophase single crystal oxides that may be produced at a high rate. The synthesis of both glasses and ceramics using novel techniques has meshed with our research in novel optical fibers and fiber sensors. In this report, we discuss the general activities of our laboratory.

DESCRIPTORS: (U) *FIBER OPTICS, *RESEARCH MANAGEMENT, AEROSOLS, AIR, BUILDINGS, CLEAR AIR TURBULENCE, COMPOSITE MATERIALS, CONCRETE, CRYSTALS, DOPING, ENGINEERING, EYE, EYEGLASSES, HIGH RATE, HIGH TEMPERATURE, LABORATORIES, LASERS, LIQUIDS, MATERIALS, MEASUREMENT, OXIDES, PARTICLES, PHASE, PRECURSORS, RATES, REQUIREMENTS, ROADS, RUNWAYS, SINGLE CRYSTALS, SYNTHESIS, TEMPERATURE, TURBULENCE, UNITED STATES, UNIVERSITIES, FABRICATION, MILITARY APPLICATIONS.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2301AS, *Lightwaves.

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4I17L

AD-A261 487 12/4 5/1

WASHINGTON UNIV SEATTLE DEPT OF MATHEMATICS

(U) Methods of Optimization Under Uncertainty.

DESCRIPTIVE NOTE: Final rept..

DEC 92 14P

PERSONAL AUTHORS: Rockafellar, R. T.

CONTRACT NO. AFOSR-89-0081

PROJECT NO. 2304

MONITOR: AFOSR, XC
TR-93-0089, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Research under this grant has focused on large-scale optimization methodology connected with the solution of problems in which decisions must be made in the face of uncertainty: stochastic programming problems. The principal techniques developed for modeling such problem have been used various new kinds of decomposition into small-scale optimization problems in extended linear-quadratic programming. Extended linear-quadratic programming goes beyond ordinary linear and quadratic programming in allowing for objective functions to incorporate penalty terms and other features which create piecewise linear or quadratic formulas. The new decomposition techniques include primal-dual Lagrangian decomposition and forward-backward splitting. In total, four-year grant supported the writing of 16 technical papers (12 already in print or about to be the development and documentation of 2 computer codes, and the completion of 3 doctoral dissertations.... Large-scale optimization, Stochastic programming, Decision-making under uncertainty.

DESCRIPTORS: (U) *DECISION MAKING, *OPTIMIZATION, *QUADRATIC PROGRAMMING, *LINEAR PROGRAMMING, COMPUTER PROGRAMMING, COMPUTERS, DECOMPOSITION, GRANTS, METHODOLOGY, PENALTIES, SCALE, SPLITTING, THESES, UNCERTAINTY, PROBLEM SOLVING.

IDENTIFIERS: (U) PEG1102F.

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AD-A261 486 20/14 19/8

NORTH CAROLINA CENTRAL UNIV DURHAM DEPT OF PHYSICS

(U) An Electron Beam Source for Novel Generators of Electromagnetic Radiation.

DESCRIPTIVE NOTE: Final rept. 15 May 89-30 Sep 92.

FEB 93 12P

PERSONAL AUTHORS: Jones, Charles R.; Dutta, J. M.

CONTRACT NO. FO48920-89-C-0062

PROJECT NO. 2301

TASK NO. AS

MONITOR: AFOSR, XC
TR-93-0097, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The microwave electron gun which is the focus of this project has been successfully operated, producing beam current of 0.5 A in a five microsecond pulse at pulse repetition rates up to 30 Hz. Studies of the performance characteristics of the gun are proceeding. Initially it has been determined that the new deflection magnet design produces a factor of two improvement over earlier designs. Coherent transition radiation produced when the electron bunches impact a metal screen has been observed in the microwave spectral region. Harmonics of the driving frequency have been detected to frequencies above 50 GHz. Installation of more efficient interaction devices to extend both spectral range and power generated is in progress.

DESCRIPTORS: (U) *ELECTRON GUNS, *ELECTROMAGNETIC RADIATION, DEFLECTION, ELECTRONS, FREQUENCY, GUNS, HARMONICS, IMPACT, INSTALLATION, INTERACTIONS, MAGNETS, METALS, MICROWAVES, POWER, PULSES, RADIATION, RATES, REGIONS, REPETITION RATE, TRANSITIONS, ELECTRON BEAMS.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2301AS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4I17L

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GORDON RESEARCH CONFERENCES INC KINGSTON RI

IMPURITIES, RARE EARTH ELEMENTS, ERBIUM, MICROSCOPY, STRUCTURAL ANALYSIS, LIGHT, DISLOCATIONS.

(U) Gordon Conference on Point Defects, Line Defects and Interfaces in Semiconductors Held in Plymouth, New Hampshire on 20-24 July 1982.

IDENTIFIERS: (U) Mismatched heterostructures, Wid band gap.

DESCRIPTIVE NOTE: Final rept. 15 Jul-3 Dec 92.

DEC 92 10P

PERSONAL AUTHORS: Cruickshank, Alexander

CONTRACT NO. F49620-92-J-0409

MONITOR: AFOSR, XC
TR-93-0099, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) By any number of measures the 1992 Gordon Research Conference on Point Defects, Line Defects and Interfaces in Semiconductors was very successful. The Gordon conference organization evaluates all of its conferences by means of a questionnaire to all participants. Our conference was ranked 20 out of 134 conferences held during the summer of 1992. This is especially good for a field that is so mature. Good choices of discussion leaders and speakers were key to this success. Speakers from related fields where new and important defect problems are emerging generated a lot of excitement. The 23 invited talks were presented in sessions run by 11 different discussion leaders. In addition 59 posters were presented. The total number of participants was about 125. In this year of reduced travel budgets, many key people would not have been able to participate without financial support. Having so many younger scientists among the participants was also important. The conference finances are summarized on the attached sheet. Since no conference proceedings or abstract book was printed, I submit the final program along with a complete list of the poster presentations as the final report.

DESCRIPTORS: (U) *INTERFACES, *POINT DEFECTS, *SEMICONDUCTORS, ABSTRACTS, ORGANIZATIONS, QUESTIONNAIRES, SCIENTISTS, SELECTION, SYMPOSIA, DEFECT ANALYSIS, DIFFUSION, GALLIUM ARSENIDES, ALUMINUM ARSENIDES, SUPERLATTICES, STRAIN(MECHANICS), SILICON, GERMANIUM,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4I17L

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NEW YORK UNIV NY

RECOGNITION.

(U) Facilitation and Interference in Identification of Pictures and Words.

IDENTIFIERS: (U) PEB1102F, WUAFOSR23138S, Fragmented stimuli, Perceptual closure.

DESCRIPTIVE NOTE: Annual rept. 1 Dec 91-30 Nov 92.

JAN 93 16P

PERSONAL AUTHORS: Snodgrass, Joan G.

CONTRACT NO. F48620-92-U-0119

PROJECT NO. 2313

TASK NO. BS

MONITOR: AFOSR. XC
TR-93-0085, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research is concerned with facilitation and interference in the identification of pictures and words. We study facilitation by presenting subjects with fragmented stimuli to identify during study, and then test the ability of various types of study stimuli to prime or improve performance on the same stimuli presented again. An important finding from our previous research is that subjects show more priming when they study a picture which is moderately fragmented during study than one which is either very fragmented or almost intact. We accounted for this phenomenon by the perceptual closure hypothesis, which says that experiencing perceptual closure, or completion of an incomplete figure during a study episode, has the most facilitative effect on subsequent identification. We study interference by presenting more degraded versions of a picture or word just prior to the identification test. Perceptual interference is generally observed if a picture or word is preceded by more fragmented versions of itself just prior to identification. Much of our work on this aspect of the research concerns discovering the reason for the perceptual interference.

DESCRIPTORS: (U) *CLOSURES, *IDENTIFICATION, *INTERFERENCE, *PICTURES, *PERCEPTION(PSYCHOLOGY), *VISUAL PERCEPTION, STIMULI, TEST AND EVALUATION, WORD

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MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MECHANICAL ENGINEERING

fibers) to maximize toughness....Fracture mechanics. Fiber-reinforced composites. Ceramic composite materials. Surface-integral methods.

(U) 3-D Analysis and Verification of Fracture Growth Mechanisms in Fiber-Reinforced Ceramic Composites.

DESCRIPTORS: (U) *FIBER REINFORCED COMPOSITES, *CERAMIC MATERIALS, *FRACTURE(MECHANICS), CEMENTS, COEFFICIENTS, COMPOSITE MATERIALS, CRACKS, FAILURE, FAR FIELD, FRICTION, GLASS, INCLUSIONS, INTEGRALS, INTERFACES, LABORATORIES, MECHANICS, MEDIA, MODELS, OBSERVATION, OPERATION, PARAMETERS, PLATFORMS, RESIDUALS, RODS, SCALE, SIMULATION, STRESSES, STRUCTURES, SURFACES, THREE DIMENSIONAL, TOUGHNESS, BRITTLENESS, COHESION, COMPUTATIONS, VERIFICATION.

DESCRIPTIVE NOTE: Final rept. 1 Apr-31 Dec 92.

DEC 92 33P

PERSONAL AUTHORS: Cleary, M. P.; Keat, W. D.; Larson, M. C.; Patterson, F. T.

CONTRACT NO. F49620-92-J-0220

IDENTIFIERS: (U) Superposition, SIFEH(Surface Integral and Finite Element Hybrid).

MONITOR: AFOSR, XC
TR-93-0082, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report documents a 3-D computational and experimental investigation into the mechanics of roughening a brittle matrix by incorporating long brittle fibers. Computationally, small scale failure mechanisms ahead of a crack are explicitly modeled and merged with a continuum representation of the far field outside the process zone. Particular attention is given to the interfacial decohesion and frictional slipping near the tip of a matrix crack which is impinging upon an inclusion. The surface integral and finite element (SIFEH) method, which employs the principle of superposition to combine the best features of two powerful numerical techniques, provides an extremely flexible and efficient computational platform for modeling linear elastic fractures near material inhomogeneities. Applications to general 3-D fracture growth in multimaterial media demonstrate the capabilities of the computational technique and are also described. The computational simulation is being guided by laboratory experiments. Crack growth observations made on a model (micro-) structure comprising a glass rod embedded in a cement matrix show the toughening mechanisms of crack pinning and crack bridging in operation. In a second experiment, interfacial slip evolution was modeled experimentally for planar bimaterial interfaces. This combined experimental and numerical program has provided insight into optimal combinations of the key parameters (e.g. residual stresses at interface, friction coefficient, strength of

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UNIVERSITY OF NORTH TEXAS DENTON

(U) Development of a Fish Stress Protein Antibody/Antigen-Based Approach for Biomonitoring of Water Quality.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 81-30 Nov 92,

JAN 83 28P

PERSONAL AUTHORS: Zimmerman, Earl G.

CONTRACT NO. AFOSR-91-0358

PROJECT NO. 2312

TASK NO. A4

MONITOR: AFOSR, XC
TR-93-0049, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Early detection of changes in the quality of water resources, especially those impacted by anthropogenic contaminants, is of primary concern to individuals involved with managing these resources. The associated fisheries, both commercial and recreational, represent a valuable resource which can be irreparably impacted, as well. Those charged with managing water resources rely heavily on chemical, physical and biomonitoring techniques. A need exists for a rapid means of assessing the 'health' of rivers, reservoirs, and estuaries in the nation. A reliable, field applicable method which determines stress levels in fish could provide resource managers with a valuable tool to determine if chemicals from point and non point source pollution are adversely impacting aquatic systems. For example, if the levels of stress in fish were determined upstream and downstream from an industrial and/or municipal discharge, it would be possible to determine the relative health of the two fish populations. Likewise, with proper validation it may be possible to determine if fish are approaching a level of stress nearing a threshold above which adverse impacts on growth and reproduction will occur. This report describes the results of the first year of a research project designed to further evaluate the potential of a stress protein.

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DESCRIPTORS: (U) *PROTEINS, *ANTIGEN ANTIBODY REACTIONS, CHEMICALS, CONTAMINANTS, DETECTION, ESTUARIES, FISHERIES, FISHES, HEALTH, IMPACT, NATIONS, POLLUTION, POPULATION, QUALITY, REPRODUCTION, RESERVOIRS, RIVERS, TOOLS, VALIDATION, WATER RESOURCES, STRESSES.

IDENTIFIERS: (U) WUAFOSR2312A4, PE81102F.

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UNIVERSITY OF MANCHESTER INST OF SCIENCE AND TECHNOLOGY
(UNITED KINGDOM) DEPT OF PURE AND APPLIED PHYSICS

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF
METEOROLOGY

(U) The Initiation of Lightning and the Growth of Electric
Fields in Thunderstorms.

(U) Development and Testing of Improved Techniques for
Modeling the Hydrologic Cycle in a Mesoscale Weather
Prediction System.

DESCRIPTIVE NOTE: Annual rept. 10 Jul 91-9 Jul 92.

DESCRIPTIVE NOTE: Annual technical rept. 15 Dec 91-14 Dec
92.

DEC 92 SOP

PERSONAL AUTHORS: Latham, John

JAN 93 11P

CONTRACT NO. F49620-92-J-0020

PERSONAL AUTHORS: Warner, Thomas; Carlson, Toby M.;
Fritsch, J. M.

PROJECT NO. 2310

CONTRACT NO. F49620-92-J-0118

TASK NO. CS

PROJECT NO. 2310

MONITOR: AFOSR, XC

TR-93-0046, AFOSR

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MONITOR: AFOSR, XC

TR-93-0045, AFOSR

ABSTRACT: (U) As specified in the original proposal,
there exists mounting evidence that the growth of strong
electric fields - culminating in lightning - in the great
majority of thunderstorms is intimately linked with - and
probably contingent upon - the concomitant development of
the ice-phase. Thus, significant progress in the
elucidation of electrification mechanisms requires an
improved understanding of the complex set of processes
involved in cloud glaciation. Accordingly, primary
emphasis has been devoted in this first year of a
proposed 3-year study, to the analysis and interpretation
of data emanating from major airborne experiments in
which a primary objective was to seek a superior
understanding of the initiation and development in
cumulus clouds of the type which often become strongly
electrified.

DESCRIPTORS: (U) *CLOUDS, *THUNDERSTORMS, AIRBORNE,
CUMULUS CLOUDS, ELECTRIC FIELDS, ICE FORMATION, CHARGE
TRANSFER, COLLISIONS, ATMOSPHERIC PRECIPITATION, ICE,
LIGHTNING.

IDENTIFIERS: (U) PEB1102F, Glaciation, Graupel.

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ABSTRACT: (U) Soil-water content is the single most
important land-surface variable in atmospheric prediction
models. Sophisticated surface physics-soil hydrology
parameterization schemes are beginning to be used in
mesoscale weather prediction models; however, soil-water
content is not measured over large enough areas on a
regular basis where it could provide suitable initial
conditions for those models. Therefore, the
initialization of the soil-water content profile has to
depend on a knowledge of the hydrological balance of the
soil in the area represented by each mesoscale-model grid
point. In turn, this information must be obtained from a
knowledge of the precipitation, evaporation, and
substrate recharge from the water table. We have
undertaken the task to develop a systematic means for
providing initial values of the soil-water-content
profile for the Penn State/NCAR Mesoscale Model (Anthes
and Warner, 1978). This task is composed of three phases.
The first phase is to develop an off line, one-
dimensional hydrological model that is driven by
conventional meteorological, soil and vegetation data.
The second phase is to develop the database to drive the

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hydrological model in a form that is compatible with the surface physics-soil hydrology parameterization scheme utilized in the mesoscale model (i.e., the Biosphere-Atmosphere Transfer Scheme (BATS), described by Dickinson et al. (1986)). The last phase consists of generating an automated update of the soil-water content profile at each of the mesoscale-model grid points.

DESCRIPTORS: (U) *MOISTURE CONTENT, *WEATHER FORECASTING, DATA BASES, ATMOSPHERE MODELS, ATMOSPHERIC PRECIPITATION, TIME DOMAIN, TERRAIN, EVAPORATION, GRIDS, HYDROLOGY, MODELS, ONE DIMENSIONAL, PRECIPITATION, PROFILES, SOILS, SUBSTRATES, SURFACES, VEGETATION, WATER, WATER TABLE, WEATHER.

IDENTIFIERS: (U) PB1102F, Water content.

AD-A281 452 6/4 5/8

CALIFORNIA UNIV SAN DIEGO LA JOLLA

(U) Neural Basis of Motion Perception.

DESCRIPTIVE NOTE: Annual rept. 1 Apr 91-31 May 92.

MAY 92 5P

PERSONAL AUTHORS: Ramachandran, V. S.

CONTRACT NO. AFOSR-89-0414

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR, XC
TR-83-0050, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Our research is concerned with 'high level' vision with a strong biological slant. The last two or three decades have seen breathtaking progress in the three disciplines--cognitive psychology, AI and visual neurophysiology--but they have been pursued more or less independently. We believe that the time is now ripe for forging links between these disciplines for an integrated approach to vision. We have had two goals in mind: (1) To develop conceptual links between neurophysiology and perception; (2) To develop specific tests for computational models of human vision. Our research has called into question several widely accepted dogmas concerning the mechanisms of early vision. Also, we have been able to discover several novel visual phenomena (e.g., motion capture, stereo-capture, etc.) and have identified a wide range of new 'natural constraints' that govern the perception of shape-from-shading structure from motion and motion correspondence. Also, we have discovered striking perceptual correlates of several well-known physiological observations (e.g., 'phantom contours'--stimuli which selectively activate the magnocellular pathway).

DESCRIPTORS: (U) *SPACE PERCEPTION, *VISUAL PERCEPTION, *NEUROPHYSIOLOGY, *PSYCHOLOGY, COGNITION, FORGING, HUMANS, MODELS, MOTION, OBSERVATION, SHAPE, STIMULI, STRUCTURES, TEST AND EVALUATION, TIME, VISION.

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IDENTIFIERS: (U) PEG1102F, *Motion perception.

CLARKSON UNIV POTSDAM NY DEPT OF MATHEMATICS AND
COMPUTER SCIENCE

(U) Nonlinear Wave Phenomena Related to Interactions in
the Ionosphere.

DESCRIPTIVE NOTE: Final rept. 1 Sep 89-31 Aug 92.

JAN 93 8P

PERSONAL AUTHORS: Kaup, D. J.; Fokas, A. S.

CONTRACT NO. AFOSR-89-0510

PROJECT NO. 3484

ASK NO. D7

MONITOR: AFOSR, XC
TR-93-0084, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Investigated was a very important mechanism for the decay of upper hybrid waves into electron Bernstein waves. This mechanism operates only in a very narrow resonance region around the harmonics of the electron cyclotron frequency. The researchers calculated the width of these resonances and compared the analytical results with experimental observations. They found very good agreement with all available data. They found a simple mechanism for the generation of upper hybrid waves from the pump made by direct conversion. Simple estimates indicate how extremely large amplitude waves can be generated.

DESCRIPTORS: (U) *CYCLOTRON WAVES, *IONOSPHERE, AMPLITUDE, CONVERSION, CYCLOTRONS, DECAY, ELECTRONS, FREQUENCY, HARMONICS, RESONANCE, MAGNETRONS, ACOUSTIC WAVES, COLLISIONS, PLASMAS(PHYSICS), ELECTROMAGNETIC PULSES.

IDENTIFIERS: (U) Bernstein waves.

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AD-A281 449 8/8 8/4

HARVARD UNIV CAMBRIDGE MA

(U) Neuropsychological Components of Object Identification.

DESCRIPTIVE NOTE: Final technical rept. Dec 90-Nov 92.

JAN 93 18P

PERSONAL AUTHORS: Kosslyn, Stephen M.

CONTRACT NO. AFOSR-91-0100

PROJECT NO. 2313

TASK NO. BS

MONITOR: AFOSR, XC
TR-93-0070, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The research supported by this grant focused on the structure of high-level visual processing. Five types of research were conducted: (1) We performed case studies of individual brain-damaged patients. We found evidence that curved edges are processed separately from straight edges and that location information sometimes can be used to encode some characteristics of shape. (2) We tested groups of brain-damaged patients with specific types of lesions. We found evidence that metric information may be used to encode spatial categories (such as above/below), and that imagery may involve some structures that are intact even when the visual field is disrupted. (3) We developed a computerized visual/spatial test battery, and administered it to a group of 19 brain-damaged patients. The results indicate that most of the visual/spatial abilities we examined can be impaired independently, suggesting that at least some distinct subsystems carry out each ability. (4) We implemented computer models and found support for the distinction between subsystems that compute two distinct kinds of spatial relations (metric and category). (5) Some of the tasks we developed to study deficits in brain-damaged patients were used to study the visual-spatial abilities of air force pilots; we found that pilots are particularly good at mental rotation and encoding metric distance information.... Neuropsychology, vision, computational models.

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DESCRIPTORS: (U) *BRAIN DAMAGE, *SENSES(PHYSIOLOGY), *NEUROPHYSIOLOGY, *VISION, AIR FORCE, CASE STUDIES, CODING, COMPUTER AIDED DESIGN, JET AIRCRAFT, NEUROLOGY, EDGES, LESIONS, MODELS, PATIENTS, PILOTS, PROCESSING, ROTATION, SHAPE, STRUCTURES, TEST AND EVALUATION.

IDENTIFIERS: (U) PE81102F, Computational models.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 74117L

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*Perning detachment.

CHICAGO UNIV IL DEPT OF CHEMISTRY

(U) Perning Detachment: A New Frontier.

DESCRIPTIVE NOTE: Final rept. 1 Feb 89-31 Jul 92.

JUN 93 8P

PERSONAL AUTHORS: Berry, R. S.

CONTRACT NO. AFOSR-88-0286

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XC
TR-83-0038, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The main objective of this project is a first exploration of a process not heretofore studied systematically, the detachment of electrons from negative ions when the ions collide with electronically excited neutral atoms or molecules. A steppingstone experiment, the two-color, two-photon photodetachment of the electrons from negative ions, is a part of the project as it is now being done. This report describes the completion of the apparatus for the steppingstone experiment and the first photodetachment results, and outlines precisely what the goals for the next few months will be, based on the success of the ion source and the laser. The steppingstone experiment is being conducted with Cl⁻ ions to determine the dependence of the detachment probability on the total energy and the difference in energies of the two photons; when this is complete, the ion optics and target cell for the collisional detachment experiment will be completed while the photodetachment work is extended to the study of the CN⁻ ion.

DESCRIPTORS: (U) *ELECTRONS, *PHOTONS, *ANIONS, ATOMS, CELLS, COLORS, ENERGY, ION SOURCES, LASERS, MOLECULES, NEUTRAL, OPTICS, PROBABILITY, TARGETS, EXCITATION, CHLORIDES, COLLISIONS, CYANIDES, IONIZATION.

IDENTIFIERS: (U) PEG1102F, Donor, Negative ions.

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NEW YORK UNIV NY

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF
MATERIALS SCIENCE AND ENGINEERING(U) Neuromagnetic Investigation of Cortical Regions
Underlying Short-Term Memory.(U) Development of Predictive Reaction Models of Soot
Formation.

DESCRIPTIVE NOTE: Rept. for 1 Jul 91-30 Jun 92.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jan-31 Dec 92.

DEC 92

8P

JAN 93

18P

PERSONAL AUTHORS: Lu, Z. -L.; Williamson, S. J.; Kaufman,
L.

PERSONAL AUTHORS: Franklach, Michael; Wang, Hai

REPORT NO. 92-4

CONTRACT NO. AFOSR-91-0129

CONTRACT NO. AFOSR-91-0401

PROJECT NO. 2308

PROJECT NO. 2313

TASK NO. BS

TASK NO. BS

MONITOR: AFOSR, XC
TR-93-0087, AFOSRMONITOR: AFOSR, XC
TR-93-0087, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Magnetic source imaging (MSI) makes it possible to identify the cortical area in the human brain whose activity reflects the decay of sensory storage of information about sounds (echoic memory). The lifetime for decay of the neuronal activation trace in primary auditory cortex is found to range from 0.8 sec to 3.4 sec for the subjects studied. Extensive behavioral studies that determine the duration of memory for the loudness of a tone show that these physiological measures predict the lifetime of echoic memory to within the uncertainty of 0.2 sec for each of the subjects.... Sensory memory, Echoic memory, Memory lifetime, Primary auditory cortex, Neuronal activation trace, Magnetic source imaging.

DESCRIPTORS: (U) *LOUDNESS, *SOUND, *AUDIO TONES, *CEREBRAL CORTEX, ACTIVATION, BRAIN, DECAY, HUMANS, STORAGE, MEDICAL RESEARCH, PSYCHOLOGICAL TESTS, MEMORY (PSYCHOLOGY), MAGNETIC RESONANCE.

IDENTIFIERS: (U) PEG1102P, MSI (Magnetic Source Imaging), Echoic memory, Primary auditory cortex, Sensory memory, Memory lifetime, Neuronal activation trace.

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ABSTRACT: (U) During the second twelve-month period of the project, progress has been made in the following areas: (1) The computational study of sooting limits in laminar premixed flames was completed. It was found that the critical equivalence ratios for soot appearance, both the absolute values and temperature dependencies, can be predicted fairly close to the experimental observations. Sensitivity and reaction path analyses were performed to examine the factors responsible for the predicted behavior. (2) New estimation techniques were developed and applied for calculations of standard-state enthalpies of formation and binary gaseous diffusion coefficients of polycyclic aromatic hydrocarbons (PAHs) and their radicals, thus providing critical information for accurate modeling of soot formation in flames. (3) Theoretical studies of a bench-mark ion-molecule reaction were completed. (4) Computer simulations of the effect of pressure on soot formation were initiated. (5) Several manuscripts summarizing the results obtained have been completed and submitted for publication.... Soot formation, Computer modeling.

DESCRIPTORS: (U) *SOOT, *GROWTH (GENERAL), AROMATIC HYDROCARBONS, BEHAVIOR, COEFFICIENTS, COMPUTERS, DIFFUSION, FLAMES, HYDROCARBONS, IONS, MOLECULES,

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OBSERVATION, PRESSURE, RATIOS, SENSITIVITY, STANDARDS,
TEMPERATURE, COMPUTATIONS, COMPUTERIZED SIMULATION.

MASSACHUSETTS UNIV AMHERST DEPT OF COMPUTER AND
INFORMATION SCIENCE

IDENTIFIERS: (U) PE81102F, WUAFOSR230885.

(U) Intelligent, Real-Time Problem Solving. Phase 3.

DESCRIPTIVE NOTE: Final rept. 1 Nov 90-30 Apr 92.

APR 92 37P

PERSONAL AUTHORS: Cohen, Paul R.; Lesser, Victor R.; Hart,
David M.

CONTRACT NO. AFOSR-91-0087

PROJECT NO. 5958

TASK NO. 00

MONITOR: AFOSR, XC
TR-93-0083, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Progress was made in the IRTPS Initiative in five areas: resolving the relationship between deliberative and reactive planning with a framework for their effective combination; modeling the real-time performance of the Phoenix planner through the application of a powerful statistical technique - path analysis that can be used to build causal models from observed behavior; developing and applying design-to-time scheduling to design a solution that uses all available resources to maximize solution quality within available time; extending previous work on the real-time monitoring and control structure we call envelopes; and finally, in a new body of research started in Phase III, delineating a taxonomy of monitoring problems found in real-time domains, and developing optimal monitoring strategies to address these problems.

DESCRIPTORS: (U) *REAL TIME, *SCHEDULING, BEHAVIOR,
MONITORING, PATHS, PHASE, PLANNING, QUALITY, RESOURCES,
STRATEGY, STRUCTURES, TAXONOMY.

IDENTIFIERS: (U) WUAFOSR595800.

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VIRGINIA UNIV CHARLOTTESVILLE DEPT OF ASTRONOMY

HARVARD UNIV CAMBRIDGE MA DEPT OF PSYCHOLOGY

(U) Chromospheric Activity in Algol Binaries.

(U) Perception and the Temporal Properties of Speech.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 91-30 Sep 92,

DESCRIPTIVE NOTE: Final rept. Jul 89-Jul 92,

AUG 92 4P

JAN 93 42P

PERSONAL AUTHORS: Richards, Mercedes T.

PERSONAL AUTHORS: Gordon, Peter C.

CONTRACT NO. F49620-92-J-0024

CONTRACT NO. AFOSR-89-0481

PROJECT NO. 2311

PROJECT NO. 2313

TASK NO. BS

TASK NO. A4

MONITOR: AFOSR, XC
TR-93-0044, AFOSRMONITOR: AFOSR, XC
TR-93-0042, AFOSR

UNCLASSIFIED REPORT

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ABSTRACT: (U) A literature search was performed for the probable magnetic properties of 15 Algol-type binaries. The properties examined included detection of Calcium, Hydrogen and Potassium emission, the x-ray luminosity determined from x-ray flares, detection of radio emission and type of polarization, evidence of variations in the brightness of the cool secondary and changes in the orbital periods of the binary which can be linked to changes in the polarity of the magnetic field of the cool star. The technique of Doppler Tomography was used in an attempt to isolate the source of the emission seen in the Hydrogen alpha difference profiles of Algol. The Doppler images indicate that most of the emission is not associated with the cool star but with the mass transfer process and, in particular, with gas found between the two stars.

DESCRIPTORS: (U) *MAGNETIC FIELDS, *BINARY STARS, *CHROMOSPHERE, BRIGHTNESS, CALCIUM, DETECTION, EMISSION, FLARES, HYDROGEN, IMAGES, LUMINOSITY, MAGNETIC PROPERTIES, MASS TRANSFER, POLARITY, POLARIZATION, POTASSIUM, PROFILES, RADIO EQUIPMENT, SECONDARY, STARS, TOMOGRAPHY, VARIATIONS, X RAYS, ASTRONOMY, ORBITS, DOPPLER SYSTEMS, GASES, ASTROPHYSICS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2311BS, *Algol binaries, Cool star.

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ABSTRACT: (U) This research examines the interaction of acoustic and lexical information in the identification of words in lexically ambiguous phoneme sequences. In Experiment 1, subjects show priming for the meaning of a large word like tulips when presented with a sequence of combinable short words like two lips. In Experiment 2 priming is found for the meaning of the second short word in similar sequences (e.g. lips in two lips). Finally, Experiment 3 demonstrates that listeners do not show priming for a short word like lips when it is pronounced as part of a larger word like tulips. The results of these experiments show that listeners sometimes access words other than those intended by speakers, and that they may simultaneously access words associated with several alternative parses of ambiguous sequences. Furthermore, they suggest that acoustic marking of word onsets places constraints on the success of lexical access. To account for these results, we present a new model of lexical access and segmentation, the Good Start model, which gives a principled account of these properties.

DESCRIPTORS: (U) *ACOUSTICS, *IDENTIFICATION, *INTERACTIONS, *PHONEMES, *AUDITORY PERCEPTION, *WORDS(LANGUAGE), ACCESS, MODELS, SEQUENCES, LINGUISTICS, PARSERS.

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IDENTIFIERS: (U) PE61102F, WJAFOSR2313A4, Lexical access,
Good start model, Phoneme sequences.

NEW HAMPSHIRE UNIV DURHAM HANS-LUKAS TEUBER VISION LAB

(U) Receptoral and Neural Aliasing.

DESCRIPTIVE NOTE: Final rept. 1 Nov 89-30 Apr 92.

JAN 93 48P

PERSONAL AUTHORS: Smith, Robert A.

CONTRACT NO. AFOSR-89-0126

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR, XC
TR-93-0080, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This project saw some unexpected successes, and some even more unexpected failures. Chief among the latter was our total failure to replicate Williams' observations of receptoral aliasing, either in the fovea or the parafovea. Despite much communication between us and Williams, no explanation of this discrepancy has been found. We present substantial evidence below to eliminate the possibility of technical failure in our experiments. Unable to study aliasing directly, we pursued a very different approach to the problems of retinal geometry and aliasing: we studied methods to directly map the parafoveal visual field into its constituent summation areas (presumably receptive fields). Although we have not fully solved the very difficult problem of eye-movements, several successful studies were performed, notably: (1) the development of a precise new method for measuring fixation accuracy using afterimages, and (2) studies of spatial summation for isoluminant spots in the parafovea. In addition, a computer model was designed that produces sample ganglion cell lattices and models the process of chromatic identification. Finally, we diverged considerably from the original focus of the project to design what we believe to be the most powerful stimulus display for visula research currently available. This is now a commercial product, showing both scientific and financial success.

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DESCRIPTORS: (U) *EYE MOVEMENTS, *FOVEA, ACCURACY, AFTERIMAGES, CELLS, COMPUTERS, EYE, FAILURE, GEOMETRY, IDENTIFICATION, MAPS, OBSERVATION, CHROMATICITY, RETINA, COMPUTERIZED SIMULATION, GANGLIA.

WISCONSIN UNIV-MADISON

(U) Computation and Theory in Large-Scale Optimization.

DESCRIPTIVE NOTE: Final rept. 15 Nov 90-14 Nov 92.

IDENTIFIERS: (U) PEG1102F, WJAFOSR2313A5, *Parasfovea, *Atlasing.

JAN 93 5P

PERSONAL AUTHORS: Robinson, Stephen M.

CONTRACT NO. AFOSR-91-0089

MONITOR: AFOSR, XC
TR-93-0144, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The principal objectives of this research project were (1) improvement of algorithms for solving large-scale, block-structured convex programming problems, (2) approximation of optimization problems for purposes of computational solution, and (3) improvement of algorithms for nonsmooth optimization, as well as (4) use of the research results to improve problem-solving ability in application areas. Progress was achieved in all of these areas, and was documented in eight papers prepared for journal publication as well as one Ph.D. dissertation and two technical reports.... Nonsmooth optimization, Convex programming, Large-scale optimization.

DESCRIPTORS: (U) *OPTIMIZATION, *MATHEMATICAL PROGRAMMING, ALGORITHMS, COMPUTER PROGRAMMING, PROBLEM SOLVING, THESES.

IDENTIFIERS: (U) *Convex programming.

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MARYLAND UNIV COLLEGE PARK OFFICE OF RESEARCH
ADMINISTRATION AND ADVANCEMENT

(U) Coordinated Action in 3-D Space.

DESCRIPTIVE NOTE: Annual rept. 15 Jan 92-14 Jan 93.

FEB 93

7P

PERSONAL AUTHORS: Steirman, Robert M.

CONTRACT NO. AFDSR-91-0124

PROJECT NO. 2313

TASK NO. CS

MONITOR: AFOSR, XC
TR-93-0136, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This grant: (1) tests alternative hypotheses about the mechanism that controls gaze-shifts when nearby objects are manipulated: Two quite different mechanisms have been proposed, namely, (a) on-line feedback and (b) learned, preplanned patterns of coordinated movements, and (2) studies the speed and accuracy of visually-guided hand movements and the correlation of these performance measures with binocular gaze-errors. The latter studies seek to determine how accurate binocular fixation must be to assure rapid and accurate manual performance in nearby 3-D space. The answer to this (and derivative questions) is not known because, until recently, binocular gaze-errors could not be measured accurately when nearby objects were handled by a subject free to move naturally. During this past year, a unique movement monitoring instrument (the Maryland RFM) was used to make the first measurements that can be used to answer these questions. More than 200 Mb of eye and head movement data were recorded, and detailed analyses are underway. Arrangements have been made to disseminate the answers obtained widely at a number of international conferences during the remaining months of 1993. Manuscripts testing models of shape and size perception and reading of unspaced texts have been in preparation for submission publication soon.... Eye-hand coordination, Shape perception, Size perception,

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Reading.

DESCRIPTORS: (U) *EYE MOVEMENTS, *THREE DIMENSIONAL, *VISION, ACCURACY, CONTROL, CORRELATION, ERRORS, FEEDBACK, HANDS, HEAD(ANATOMY), HYPOTHESES, MEASUREMENT, MODELS, MONITORING, PATTERNS, VISUAL PERCEPTION, READING, SHAPE, TEST AND EVALUATION, VELOCITY, PATTERN RECOGNITION, SPACE(ROOM), SIZES(DIMENSIONS).

IDENTIFIERS: (U) WUAFOSR2313CS, PE61102F, Hand eye coordination, Mb(Megabytes), Binocular gaze errors.

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ILLINOIS UNIV AT URBANA DEPT OF PSYCHOLOGY

CHICAGO UNIV IL JAMES FRANCK INST

(U) Reminding-Based Learning.

(U) Dynamics of Gas-Surface Interactions.

DESCRIPTIVE NOTE: Annual technical rept. 21 Jan 92-20 Jan 93.

DESCRIPTIVE NOTE: Final technical rept. 1 Jun 88-31 Oct 92.

FEB 93 16P

JAN 93 47P

PERSONAL AUTHORS: Ross, Brian H.

PERSONAL AUTHORS: Sibener, Steven J.

CONTRACT NO. AFOSR-88-0447

CONTRACT NO. AFOSR-88-0194

PROJECT NO. 2313

PROJECT NO. 2303

TASK NO. A4

TASK NO. BS

MONITOR: AFOSR, XC
TR-93-0066, AFOSR

MONITOR: AFOSR, XC
TR-93-0038, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) When learning new cognitive skills involving problem solving, novices are often reminded of earlier problems. The use of earlier problems is a common means of problem solving and affects the learning of the skill. This project has three aims in understanding this learning. First, the representation of the resulting generalizations is being examined. Generalizations formed from reminders are likely to be conservative, in that they may be more tied to the examples than many current theories allow. A main aim of the project is to distinguish and test different forms of this conservatism. Second, the development of problem solving expertise is examined by focusing on differences in how typical and atypical problems are solved. Third, the effects of such reminding-based learning in everyday problem solving is examined to extend the findings and test some theoretical ideas that are difficult to investigate in more formal domains. This report provides an overview of this work and the progress on these objectives during the last year.

DESCRIPTORS: (U) *COGNITION, *LEARNING, *PROBLEM SOLVING, *SKILLS, TEST AND EVALUATION, THEORY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313A4.

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ABSTRACT: (U) This research initiative deals with the interaction of neutral particle, electron, and optical beams with well-characterized single crystal surfaces. These studies are motivated by a desire to understand and control surface reactions, such as surface oxidation, 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. Experiments aimed at determining the surface phonon dispersion relations for a variety of clean and adsorbate covered systems play a central role in this program. Such measurements are crucial for elucidating how the force constants at a surface differ from those characteristic of the bulk for a given material, and how adsorption of atomic and molecular species modify the force constants, and hence electron density distributions, at and in the vicinity of the surface. The experimental program utilizes two, now fully operational, scattering laboratories that were constructed with significant DoD funding. One of these is a high resolution (energy and momentum) neutral particle scattering apparatus which routinely carries out single phonon inelastic as well as diffractive scattering measurements. The other laboratory houses an inelastic

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electron scattering instrument which also produces momentum-resolved inelastic scattering data. The capabilities of these two facilities complement each other in many important and useful ways. . . . Electron scattering results, Gas-surface interactions, Electron-surface interactions, Inelastic scattering, Metallic alloys, Surface oxidation, Surface phonon spectroscopy, Gas-surface energy transfer.

OHIO STATE UNIV COLUMBUS

(U) Electrical Conductivity of Ion Implanted Ladder and Semi-Ladder Polymers.

DESCRIPTIVE NOTE: Final rept. 1 Sep 90-31 Oct 91.

OCT 92 3SP

DESCRIPTORS: (U) *GAS SURFACE INTERACTIONS, *SURFACE REACTIONS, ADSORPTION, ADSORBATES, ADSORPTION, ALLOYS, CHEMICAL REACTIONS, COLLISIONS, CONSTANTS, CONTROL SURFACES, CRYSTALS, DENSITY, DISPERSION RELATIONS, DISPERSIONS, DISPOSAL, ELECTRON DENSITY, ELECTRON SCATTERING, ENERGY TRANSFER, EXCHANGE, FILMS, NICKEL, HIGH RESOLUTION, ILLUMINATION, INELASTIC SCATTERING, INTERACTIONS, LABORATORIES, MATERIALS, MEASUREMENT, MOMENTUM, NEUTRAL, GOLD, HELIUM, OXIDATION, PARTICLES, PHONONS, PHYSICAL PROPERTIES, VIBRATION, COPPER, SINGLE CRYSTALS, SPECTROSCOPY, PARTICLE BEAMS, OPTICS, FORCE(MECHANICS), SURFACE ENERGY, THIN FILMS, TRANSFER.

PERSONAL AUTHORS: Epstein, Arthur J.

CONTRACT NO. F49620-90-C-0072

PROJECT NO. 2419

TASK NO. 00

MONITOR: AFOSR, XC
TR-93-0035, AFOSR

UNCLASSIFIED REPORT

IDENTIFIERS: (U) PE81102F, WUAFOSR2303BS.

ABSTRACT: (U) Aromatic heterocyclic ordered rigid rod, ladder and semi-ladder polymers (including BBL, P80, and B88) combine exceptional high temperatures stability with excellent mechanical properties as well as environmental stability. We have carried out systemic coordinated investigation of the morphological, chemical, optical and electrical properties of ion implanted rigid rod, ladder and semi-ladder polymers. XPS data of films reveal significant reduction in the heteroatoms. An increase carbon content after implantation together with the scanning electron microscopy and Raman studies indicate that the implanted material is no longer polymeric but perhaps better described as a carbon network. The implanted polymers have a featureless broad optical absorption from the infrared to the UV. They have a very weakly temperature-dependent conductivity (typically ~100 S/cm at room temperature). The initial conductivity, thermoelectric power and magnetotransport studies suggest that these implanted polymers behave as disordered metals. Further studies on are necessary to elucidate the role of implant ion beam energy and current as well as to determine the microscopic charge conduction mechanism.

DESCRIPTORS: (U) *ION IMPLANTATION, ABSORPTION, CARBON, CHEMICALS, ELECTRICAL PROPERTIES, ELECTRON MICROSCOPY, ENERGY, FILMS, HIGH TEMPERATURE, ION BEAMS, IONS.

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MATERIALS, MECHANICAL PROPERTIES, METALS, MICROSCOPY, NETWORKS, POLYMERS, POWER, REDUCTION, RODS, ROOM TEMPERATURE, SCANNING, STABILITY, TEMPERATURE, ELECTRICAL CONDUCTIVITY, AROMATIC COMPOUNDS, RIGIDITY, OPTICS.

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG
(U) Computational Methods for Flow Problems - Parallel Algorithms, Flow Control, and Novel Approaches.

IDENTIFIERS: (U) PE82102F, WUAFOSR241900, *Ladder polymers, *Semi-ladder polymers, Rigid rod, P80(Poly(14-phenylene-28-benzobisoxazole)), BBL(Benzimidazobenzophenanthroline).

DESCRIPTIVE NOTE: Final technical rept. 1 Mar 90-30 Nov 92.

NOV 92 19P

PERSONAL AUTHORS: Gunzburger, Max D.

CONTRACT NO. AFOSR-90-0178

PROJECT NO. 2304

TASK NO. CS

MONITOR: AFOSR, XC
TR-93-0041, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A review of the research that has been carried out under the sponsorship of Air Force Office of Scientific Research grant number AFOSR-90-0178 is given. Details are given about two research programs, namely flow control and superconductivity. In both instances we have modeled realistic physical problems. We have performed rigorous analysis on the mathematical models, we have developed approximation schemes which we have also analyzed, and we have written computer codes implementing our computational method. In both instances, we were the first to carry out such a comprehensive research program, and in so doing, have developed robust and useful algorithms that also embarked on a joint research program with personnel at AEDC facility in Tullahoma, Tennessee. We also briefly discuss other accomplishments related to this grant, including other research project invited talks, journal articles, etc.

DESCRIPTORS: (U) *FLOW, *MATHEMATICAL MODELS, *SUPERCONDUCTIVITY, AIR FORCE, ALGORITHMS, COMPUTERS, GRANTS, PERSONNEL, PARALLEL PROCESSING, COMPUTATIONS, TENNESSEE.

IDENTIFIERS: (U) WUAFOSR2304CS, PE81102F, Flow control.

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RICE UNIV HOUSTON TX DEPT OF MATHEMATICAL SCIENCES

PRINCETON UNIV NJ DEPT OF PHYSICS

(U) Linear-Programming Tools in Integer Programming: The Travelling Salesman.

(U) The Physics of Spin Polarized Gases.

DESCRIPTIVE NOTE: Final rept. 1 Nov 81-31 Oct 92.

DESCRIPTIVE NOTE: Final rept. 1 Mar 88-28 Feb 92.

OCT 92 SP

JAN 93 20P

PERSONAL AUTHORS: Bixby, Robert

PERSONAL AUTHORS: Cates, G. D.

CONTRACT NO. F49620-92-J-0053

CONTRACT NO. AFOSR-88-0185

PROJECT NO. 2304

PROJECT NO. 2301

TASK NO. DS

TASK NO. A4

MONITOR: AFOSR, XC
TR-93-0092, AFOSR

MONITOR: AFOSR, XC
TR-93-0103, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) New branching rules and new methods to control the size of LP's resulted in a world's record for the solution of large traveling salesman problems.

ABSTRACT: (U) Over the four year period covered by this grant, we have carried out extensive research involving polarized atoms and nuclei. Using laser optical pumping, high polarizations can be produced in alkali-metal vapors. From this starting point, angular momentum can be transferred to other atoms and nuclei through several different types of spin-exchange collisions. This powerful technique enables us to study a wide variety of spin interactions and spin related phenomena. Among the systems we work with are polarized noble gases, which display extremely long spin-relaxation times that vary from several minutes to many weeks. The use of optical pumping and spin exchange has grown enormously over the past four years.

DESCRIPTORS: (U) *LINEAR PROGRAMMING, *INTEGER PROGRAMMING, TOOLS, COMPUTATIONS, METHODOLOGY, PROBLEM SOLVING.

DESCRIPTORS: (U) *GASES, *POLARIZATION, *SPIN STATES, PHYSICS, FREQUENCY SHIFT, RELAXATION, MAGNETIC FIELDS, HOMOGENEITY, XENON, SURFACES, INTERACTIONS, SOLIDS, ATOMS, NUCLEI, OPTICAL PUMPING, ALKALI METALS, VAPORS, ANGULAR MOMENTUM, COLLISIONS, ATOMIC PROPERTIES, EXCHANGE, NUCLEAR SPINS, HELIUM, MUONS, PIONS, ELECTRON SCATTERING.

IDENTIFIERS: (U) WUAFOSR2304DS, PE81102F, Travelling salesman problem.

IDENTIFIERS: (U) WUAFOSR2301A4, PE81102F, Noble gases.

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YALE UNIV NEW HAVEN CT

COLUMBIA UNIV NEW YORK DEPT OF PSYCHOLOGY

(U) Solution of Nonlinear Boundary Value Problem on Successively Refined Grids.

(U) Visual Perception of Elevation.

DESCRIPTIVE NOTE: Final rept. 1 Aug 88-30 Apr 92.

DESCRIPTIVE NOTE: Annual rept. 1 Jan-31 Dec 92.

APR 92 8P

JAN 93 12P

PERSONAL AUTHORS: Smooke, Mitchell

PERSONAL AUTHORS: Martin, Leonard

CONTRACT NO. F49620-88-C-0086

CONTRACT NO. AFOSR-91-0146

PROJECT NO. 2304

PROJECT NO. 2313

TASK NO. CS

TASK NO. CS

MONITOR: AFOSR, XC

TR-93-0080, AFOSR

MONITOR: AFOSR, XC

TR-93-0084, AFOSR

UNCLASSIFIED REPORT

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ABSTRACT: (U) Our AFOSR supported research (F49620-88-C-0086DEF) has focused on four main areas: (1) the development and analysis of adaptive continuation methods for the solution of nonlinear two-point boundary value problems; (2) the investigation of flame stretch and flame curvature in tubular premixed laminar flames; (3) the study of fresh reactant-hot product counterflow flames; and (4) the formulation of a parallel multidimensional elliptic boundary value solver for use in complex chemistry combustion problems.

ABSTRACT: (U) The work at the Columbia laboratory concentrated on two matters: (1) expansion of the work that began last year aimed at uncovering the laws of spatial summation between and within members of parallel line sets with regard to the influence on the setting of visually perceived eye level (VPEL); (2) to begin work on the separation of components of the body-referenced mechanism and to determine their separate influence on VPEL. The work on summation was reported at 4 presentations at professional meetings in 1992 and a fifth set of experiments has been submitted for presentation in 1993. The completed experimental work on the body-referenced mechanism has been submitted for presentation in 1993. In addition to the above, at Columbia we have begun work in which eye movements are being measured (scleral search coil technique) in conjunction with variation of visual field pitch with the first interest in determining whether a subject's setting of eye level to VPEL is differentially influenced by the visual field than is the discrimination of VPEL.... Spatial localization, Pitch, Roll, Eye level, Visual localization, VPEL, VPV, Perception, Egocentric spatial localization, Vertical.

DESCRIPTORS: (U) *BOUNDARY VALUE PROBLEMS, *FLAMES, *NONLINEAR ANALYSIS, *GRIDS, BOUNDARIES, CHEMISTRY, COMBUSTION, CURVATURE, PROBLEM SOLVING.

IDENTIFIERS: (U) WJAFOSR2304CS, PE81102F.

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DESCRIPTORS: (U) *HUMAN BODY, *VISUAL PERCEPTION.

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DISCRIMINATION, EYE, EYE MOVEMENTS, LABORATORIES,
PERCEPTION, ROLL, PITCH(INCLINATION).

NORTHERN ILLINOIS UNIV DE KALB

IDENTIFIERS: (U) PE61102F, WJAFOSR2313CS, Scleral search
coil technique, Spatial summation, Visual field pitch,
Body referenced mechanisms, Visually perceive eye level.

(U) Estimating the Reliability of a System on the Basis of
Sample Paths.

DESCRIPTIVE NOTE: Final rept. 15 Jun 89-14 Dec 91.

DEC 91 4P

PERSONAL AUTHORS: Ebrahimi, Nader; Ramalingam, T.

CONTRACT NO. AFOSR-89-0402

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XC
TR-83-0040, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Synergism or the so-called dependence among the components of multivariate process induces a host of probabilistic structures among the hitting times of the processes. Conventionally, hitting times have been studied for isolated processes or for families of processes exhibiting specific dependence structures. Whereas this approach has been very useful, stochastic modeling of hitting times per se is equally fruitful. For example, it is possible to derive useful bounds for the reliability of a complex system like the wing of an aircraft if the joint dependence structure of the hitting times to failure of the components of the system is known adequately. The joint behavior of two or more hitting times, one each from the components of multivariate process is, therefore, of paramount importance in a plethora of disciplines. Research has continued on the development of positive (negative) dependence ideas and applied them to a number of areas.

DESCRIPTORS: (U) *MULTIVARIATE ANALYSIS, *PATHS,
AIRCRAFT, APPROACH, BEHAVIOR, FAILURE, RELIABILITY, WINGS,
STOCHASTIC PROCESSES.

IDENTIFIERS: (U) PE61102F.

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CALIFORNIA UNIV SAN DIEGO LA JOLLA DEPT OF NEUROSCIENCES

(U) Comparative Analytical Study of Evoked and Event Related Potentials as Correlates of Cognitive Processes.

AD-A261 388

CONTINUED

*OSCILLATION, BRAIN, DYNAMICS, FISHES, HUMANS, INTERVALS, LABORATORIES, MODELS, RESPONSE, TIME, TURTLES.

IDENTIFIERS: (U) Event related potentials, Evoked potentials, Elasmobranchs, Electroencephalogram.

DESCRIPTIVE NOTE: Final technical rept. 1 Feb 91-31 Oct 92.

DEC 92

5P

PERSONAL AUTHORS: Bullock, Theodore H.

CONTRACT NO. AFOSR-91-0191

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XC
TR-93-0043, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This project permitted collaboration between Prof. Erol Basar in Lubeck and Dr. Bullock on new views and analyses of cognitive Event Related Potentials (ERPs), evoked oscillations (Induced Rhythms, IRs) and their relations to the EEG. ERPs have been found for the first time in nonmammalian models (fish, turtles), especially Omitted Stimulus Potentials (OSPs) and oddball ERPs and Mismatch Potentials. To compare the dynamics of these models with human ERPs, a new series of human subjects has been run, extending the range of interstimulus intervals; this showed two types of QSP with distinct dynamics - including a short ISI type not heretofore recognized. Basar and Bullock co-edited a book on a new theme: Induced Rhythms in the Brain (Birkhauser Boston, 1992), with 22 chapters by invited experts. The phenomenon of triggered or modulated oscillations has been known for more than 50 years but not been recognized or studied as a category of brain responses; it is now under active investigation in ours and several other laboratories as a possible correlate of certain kinds of cognition.... Electroencephalogram, Event Related Potentials, Evoked Potentials.

DESCRIPTORS: (U) *COGNITION, *ELECTROENCEPHALOGRAPHY,

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MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF AERONAUTICS
AND ASTRONAUTICS

(U) Active Stabilization of Aeromechanical Systems.

DESCRIPTIVE NOTE: Final technical rept. 1 Nov 89-31 Oct
82.

JAN 93

181P

PERSONAL AUTHORS: Epstein, Alan H.; Greitzer, Edward M.;
Dugundji, John; Garnier, Vincent H.; Gysling, Daniel L.

CONTRACT NO. AFOSR-90-0059

PROJECT NO. 2307

TASK NO. CS

MONITOR: AFOSR, XC
TR-93-0142, AFOSR

IDENTIFIERS: (U) PEB1102F, WUAFOSR2307CS.

COMPRESSION, COMPRESSORS, CONTROL, CONTROL SYSTEMS,
DAMPING, DYNAMICS, ENGINEERING, ENGINES, EXPERIMENTAL
DATA, FLOW, FLUIDS, INTERACTIONS, LOOPS, METHODOLOGY,
MODELS, PRECURSORS, RESPONSE, STABILIZATION, STRATEGY,
STRUCTURES, SURGES, THEORY, TURBINES, UNSTEADY FLOW, WORK,
INSTABILITY.

UNCLASSIFIED REPORT

ABSTRACT: (U) This report details the work on the active control of surge and stall in gas turbine engines. The use of small amplitude waves predicted by theory as stall precursors were tested with experimental data. The nonlinear behavior of such waves was shown to explain much of the data in the literature. This theory was used to design an active stabilization system for rotating stall which was tested on both a single-stage and a three-stage axial compressor, increasing the stable operating range of the single-stage compressor by 25%. The dynamics of the three-stage compressor were shown to match closely with theory. The open-loop forced response characteristics of the compressors were measured and methodology developed in which this data was used to design the compressor control system. The models then developed were used to evaluate alternate control strategies. Engineering of the structural dynamics of the compression system was also shown to be successful in damping rotating stall and surge.... Active control, Compression system flow instabilities, Unsteady flow, Fluid-Structure interaction.

DESCRIPTORS: (U) *GAS TURBINE ROTORS, *STABILIZATION
SYSTEMS, *AXIAL FLOW COMPRESSORS, AMPLITUDE, BEHAVIOR,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4I17L

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AD-A261 360 CONTINUED

CALIFORNIA UNIV SANTA BARBARA DEPT OF ELECTRICAL AND
COMPUTER ENGINEERING

METHODOLOGY.

(U) Nonlinear System Design: Adaptive Feedback
Linearization with Unmodeled Dynamics.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304AS.

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 89-30 Sep
92.

DEC 92 16P

PERSONAL AUTHORS: Kokotovic, Petar V.

CONTRACT NO. F48620-92-J-0004

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XC
TR-93-0088, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The main goal of this research has been to develop a unified geometric-asymptotic-adaptive methodology for feedback design of nonlinear control systems. Such a methodology is needed because the existing differential geometric results are restrictive and often violated by small modeling errors. Effects of these errors can be analyzed asymptotically by singular perturbation methods, which, however, are still lacking a clear geometric interpretation. Neither geometric, nor perturbational problem formulations can cope with large parametric uncertainty, for which an adaptive approach seems suitable. Conversely, both geometric and asymptotic techniques can become constructive steps in the design of an adaptive scheme and in the analysis of its robustness. In our research these three heretofore separate techniques have been to be merged into a methodology which eliminates their individual shortcomings. In a separate research direction we have initiated a study of systems with practically important nondifferentiable nonlinearities such as dead-zone, backlash and hysteresis. These systems can not be analyzed by existing methods.

DESCRIPTORS: (U) *NONLINEAR SYSTEMS, *ADAPTIVE CONTROL
SYSTEMS, *SYSTEMS ANALYSIS, *FEEDBACK, OUTPUT,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

AD-A261 359 20/3 11/2

AD-A261 359 CONTINUED

VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG

(U) Investigation of Coupled Analysis Techniques for Adaptive Material Structural Systems.

DESCRIPTIVE NOTE: Final technical rept. 15 Sep 91-14 Sep 92.

NOV 92 112P

PERSONAL AUTHORS: Rogers, Craig A.

CONTRACT NO. AFOSR-91-0416

PROJECT NO. 2302

TASK NO. DS

MONITOR: AFOSR, XC
TR-93-0146, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objective of this research program is to investigate coupled analysis techniques for adaptive material structural systems. There are two aspects of this research: one is to develop a nonlinear full-field constitutive model for ferroelectric materials, including piezoelectric and electrostrictive materials; the other is to develop an impedance-based analysis technique for adaptive material systems. A coupled electro-thermal-mechanical nonlinear constitutive relation for piezoelectric materials has been developed and verified based on experimental data from the literature. This model uses the polarization fraction as a newly established internal variable. This internal variable is related to other parameters such as electric field, stress, frequency, etc., using a hyperbolic tangent function, which accurately describes the nonlinearity, including the hysteresis of ferroelectric materials. The same approach has also been utilized in the modeling of relaxor ferroelectric PMN-PT materials. An impedance methodology for the dynamic analysis of adaptive material systems has been developed. This approach can provide accurate theoretical prediction of the dynamic response of a structure driven by any type of actuator and yet reflect the physical essence of the actuator/structure interaction. This model has been experimentally verified.

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.. Nonlinear modeling, Piezoelectric actuators, Impedance, Dynamics, Adaptive materials.

DESCRIPTORS: (U) *FERROELECTRIC MATERIALS, *PIEZOELECTRIC MATERIALS, *COUPLINGS, ACTUATORS, APPROACH, DYNAMIC RESPONSE, DYNAMICS, ELECTRIC FIELDS, EXPERIMENTAL DATA, FREQUENCY, FUNCTIONS, HYSTERESIS, IMPEDANCE INTERACTIONS, INTERNAL MATERIALS, METHODOLOGY, MODELS, PARAMETERS, POLARIZATION, PREDICTIONS, RESPONSE, STRUCTURES, TANGENTS, VARIABLES, ELECTROSTRICTION, STRESSES, SPECIAL FUNCTIONS(MATHEMATICS), HYPERBOLAS, NONLINEAR SYSTEMS, CERAMIC MATERIALS, TEMPERATURE, ELECTROMECHANICAL DEVICES.

IDENTIFIERS: (U) WUAFOSR2302DS, *Adaptive materials, Electrostrictive materials, Fraction, Relaxor, PMN-PT Materials.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4I17L

AD-A261 332 7/8 20/8 7/3 AD-A261 332 CONTINUED

HCC SCIENCE AND TECHNOLOGY CO INC SUMMIT NJ

(U) Development of Organic Nonlinear Optical Materials.

DESCRIPTIVE NOTE: Final rept. 1 Aug 89-30 Oct 92.

OCT 92 187P

PERSONAL AUTHORS: Sounik, J.; Norwood, R.; McCulloch, I.;
Song, K.; DeMartino, R.

CONTRACT NO. F49620-89-C-0097

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XC
TR-93-0036, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The design of organic polymers as active mediums for nonlinear optics has attracted much attention because their nature of versatility in synthetic chemistry and in fabrication. A series of new side chain polymers were synthesized and characterized for the second and third order NLO applications. Linear copolymers containing maleic anhydride as an active functional group on the main chain were prepared in this work. The maleic anhydride group reacts, by ring opening esterification with an appropriate alcohol containing an NLO functionality. These copolymers were also found to be suitable for branching or crosslinking reactions with alpha. omega-diols. A series of substituted silicon and aluminum phthalocyanines has been synthesized to study their third order nonlinear responses. A nitro/amino substituted aluminum phthalocyanine has been made along with mixtures of benzo substituted silicon phthalocyanines. A synthetic route has been investigated to directly give donor acceptor phthalocyanines. To increase mechanical property of phthalocyanine compounds, copolymers with MMA have been synthesized and characterized. All of the copolymers show excellent film forming characteristics.

DESCRIPTORS: (U) *NONLINEAR OPTICS, *ORGANIC MATERIALS, ALCOHOLS, ALUMINUM, ANHYDRIDES, NITRO RADICALS.

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ELECTROOPTICS, PORPHYRINS, METHYL RADICALS, METHACRYLATES, CYANINE, NAPHTHALENES, CHEMISTRY, COPOLYMERS, FABRICATION, FILMS, FOUR WAVE MIXING, MECHANICAL PROPERTIES, MIXTURES, OPENINGS, OPTICS, PHTHALOCYANINES, POLYMERS, RINGS, SILICON, WAVEGUIDES, SYNTHESIS, CROSSLINKING(CHEMISTRY).

IDENTIFIERS: (U) PEB1102F, Degeneration, Maleic anhydrides, Side chains, Esterification, Functional groups, Alpha-diols, Omega-diols, Amino groups, Benzo groups, Naphthalocyanines, Third Order, MMA(Methyl Methacrylate).

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

AD-A261 267 20/6 9/5

AD-A261 258 6/1 6/15

OPTICAL SOCIETY OF AMERICA WASHINGTON DC

MISSISSIPPI STATE UNIV MISSISSIPPI STATE COLL OF
VETERINARY MEDICINE

(U) Organization of the Optical Society of America
Photonic Science Topical Meeting Series, Volume 6.
Conference Edition: Summaries of Papers Presented at
the Optical Computing Topical Meeting Held in Salt
Lake City, Utah on 4-6 March 1991.

DESCRIPTIVE NOTE: Final rept. 1 Jan-31 Dec 91.

MAY 92 327P

PERSONAL AUTHORS: Quinn, Janis W.

CONTRACT NO. AFOSR-91-0178

CONTRACT NO. AFOSR-91-0338

PROJECT NO. 2305

PROJECT NO. 2312

TASK NO. A1

TASK NO. AS

MONITOR: AFOSR, XC

MONITOR: AFOSR, XC

TR-92-0817, AFOSR

TR-93-0088, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Attach list of reports supported by
Optical Society of America: Photorefractive Materials,
Effects, and Devices; Integrated Photonics Research;
Nonlinear Guided Wave Phenomena; Optical Amplifiers and
Their Applications; Optical computing; Picosecond
Electronics and Optoelectronics; Quantum Optoelectronics;
Photonics Switching; Microphysics of Surfaces: Beam
Induced Processes; Soft X-ray Projection Lithography;
Short Wavelength Coherent Radiation, Generation and
Applications; and Persistent Spectral Hole-Burning:
Science and Applications.

DESCRIPTORS: (U) *SYNOPSIS, *PHOTONICS, AMPLIFIERS,
COHERENT RADIATION, ELECTRONICS, LITHOGRAPHY, MATERIALS,
ABSTRACTS, OPTICAL SWITCHING, SHORT WAVELENGTHS, SOFT X
RAYS, NEURAL NETS, ELECTROOPTICS, X RAYS, DIGITAL SYSTEMS.

IDENTIFIERS: (U) WJAFOSR2308A1, PE91102F, *Optical
Society of America, Optical computing, Optoelectronics.

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ABSTRACT: (U) The project, which was designed to conduct
a quantitative structure-activity relationship study on a
series of chlorinated alicyclic compounds (a number of
which are insecticides or their metabolites or
degradation products) was initiated, with the
neurochemical characterization being conducted at
Mississippi State University and the physicochemical
characterization being conducted at Iowa State University.
Experiments quantified the inhibitory potency of the
compounds for the binding of 35S-t-
butylbicyclophosphorothionate (TBPS), which binds to the
gamma-aminobutyric acid (GABA) receptor, the target for
the test compounds. A wide range of potencies were
discovered (IC50's of 4.2-22,734 nM), which correlated
well with acute toxicity levels. NMR analysis of the
compounds has been run and the molecular connectivity
calculations have been initiated. . . . Chlorinated alicyclic
compounds, QSAR, GABA Receptors.

DESCRIPTORS: (U) *INSECTICIDES, *METABOLITES, *TOXICITY,
ACIDS, DEGRADATION, POTENCY, STRUCTURES, TARGETS, TEST
AND EVALUATION, AMINO ACIDS, IN VITRO ANALYSIS, RECEPTOR
SITES(PHYSIOLOGY), RATS, BRAIN, LIPOPHILIA, PROTEINS,
MEMBRANES(BIOLOGY).

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DTIC REPORT BIBLIOGRAPHY

SEARCH CONTROL NO. T4117L

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AD-A261 182 12/7 5/8

IDENTIFIERS: (U) *Quantitative structure activity relationships, GABA Receptor, Chlorinated alicyclic compounds, 7BPS(t-butylbicyclicphosphorothionate), PES1102F, WUAFOSR2312AS.

MOORE SCHOOL OF ELECTRICAL ENGINEERING PHILADELPHIA PA
(U) Computation and Learning in Neural Networks With Binary Weights.

DESCRIPTIVE NOTE: Final rept. 1 Sep 89-31 Aug 92.

NOV 92 325P

PERSONAL AUTHORS: Venkatesh, Santosh S.

CONTRACT NO. AFOSR-89-0523

PROJECT NO. 2305

TASK NO. 83

MONITOR: AFOSR, XC
TR-93-0086, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Under the aegis of the AFOSR grant they have been investigating computational learning attributes of networks of formal neurons. The formal neurons considered are linear threshold elements which produce binary outputs based on the sign of a linear form of a set of inputs. The researchers have been interested in (1) exploring the theoretical limitations on what can be computed or learnt in neural network architectures, and (2) developing and analysing learning algorithms which specify weights as a function of a set of examples of a computation.

DESCRIPTORS: (U) *COMPUTATIONS, *LEARNING, *NEURAL NETS, ALGORITHMS, INPUT, LIMITATIONS, NERVE CELLS, OUTPUT, WEIGHT, COMPUTER ARCHITECTURE, COMPUTER AIDED INSTRUCTION.

IDENTIFIERS: (U) Binary weights.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L
AD-A261 165 21/2 20/4 21/9.1 CONTINUED

CALIFORNIA UNIV IRVINE DEPT OF MECHANICAL AND AEROSPACE
ENGINEERING

(U) Fundamental Studies of Droplet Interactions in Dense
Sprays.

DESCRIPTIVE NOTE: Final rept. 1 Nov 89-31 Oct 92.

DEC 92 138P

PERSONAL AUTHORS: Sirignano, W. A.; Elghobashi, S. E.;
Kim, I.; Chiang, C. H.

CONTRACT NO. AFOSR-90-0084

PROJECT NO. 2308

TASK NO. 85

MONITOR: AFOSR, XC
TR-93-0073, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The research addressed interactions amongst droplets in a dense spray. The effects of neighboring droplets, that were a few droplet diameters away, on a vaporizing droplet were examined by theoretical and computational analyses for two basic configurations: (1) the axisymmetric convective situation where two or three droplets moved in tandem and (2) the fully three-dimensional convective situation where droplets moved side-by-side. Droplets in the wake of other droplets experienced a reduction in drag force, transport rates, and vaporization rate, sometimes causing collisions. Sufficiently close droplets moving side-by-side, approximately in parallel, experienced a repulsive lift force and an increased drag force. Vaporizing liquid oxygen droplets in a hydrogen gas environment were studied at both subcritical and supercritical pressures considering the variable liquid density with the associated droplet swelling during heating and the dependence of the local critical state upon local composition. Droplet surface conditions could be subcritical even if pressures were supercritical for pure oxygen due to diffusing hydrogen. The critical surface regressed towards the droplet surface as the droplet heated. Engineering correlations for the drag

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coefficients, Nusselt numbers, and Sherwood numbers for hydrocarbon fuel droplets in dense sprays were obtained. Dense sprays, Droplet interactions, Droplet spray, Fuel spray and droplet heating and vaporization, Oxygen droplet heating and vaporization supercritical droplet behavior.

DESCRIPTORS: (U) *FUEL SPRAYS, *DROPS, *LIQUID ROCKET FUELS, *COMBUSTION, AXISYMMETRIC, COLLISIONS, DENSITY, DIAMETERS, DRAG, FUELS, HEATING, HYDROCARBONS, HYDROGEN, INTERACTIONS, LIFT, LIQUID OXYGEN, OXYGEN, PRESSURE, SPRAYS, SURFACE PROPERTIES, THREE DIMENSIONAL, TRANSPORT, VAPORIZATION, WAKE, THREE DIMENSIONAL FLOW, REYNOLDS NUMBER, VORTICES, SPHERES, RADIUS(MEASURE), VELOCITY, COMBUSTORS, NAVIER STOKES EQUATIONS, FLUID FLOW, HEAT TRANSFER, FLUID DYNAMICS.

IDENTIFIERS: (U) PE61102F, Liquid fuels, Vorticity.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

AD-A261 164 11/2

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FLORIDA UNIV GAINESVILLE DEPT OF AEROSPACE ENGINEERING
MECHANICS AND ENGINEERING SCIENCE*CRACKING(FRACTURING), COMPRESSION, CRACKS, DAMAGE,
DENSITY, FLUORESCENT DYES, IMAGES, LENGTH, MICROSTRUCTURE,
PATTERNS, SURFACES, TEST AND EVALUATION, CRACK
PROPAGATION, PETROGRAPHY, DAMAGE ASSESSMENT,
STRAIN(MECHANICS), STRAIN RATE, STRESS STRAIN RELATIONS,
AGGREGATES(MATERIALS), DESIGN CRITERIA.(U) Rate and Confinement Effects on Cracking and Failure
in Uniaxial Compression of Concrete.

DESCRIPTIVE NOTE: Final rept. 15 Nov 89-29 Jun 92.

NOV 92 87P

PERSONAL AUTHORS: Malvern, Laurence E.; Jenkins, David A.;
DeHoff, Robert T.

CONTRACT NO. AFOSR-90-0074

MONITOR: AFOSR, XC
TR-93-0071, AFOSRIDENTIFIERS: (U) Slump, Uniaxial leads, Split hopkinson
pressure bar, Sieve analysis, Portland cement.

UNCLASSIFIED REPORT

ABSTRACT: (U) Crack patterns on longitudinal sections of specimens subjected to quasistatic and high-rate uniaxial compression, interrupted after various levels of maximum strain, so that intact specimens could be recovered, were examined. Damaged specimens were stabilized by an infiltrant containing a fluorescent dye to make the cracks stand out clearly under ultraviolet light, facilitating automated image analysis. Macroscopic cracking began near the lateral surface at maximum strains less than the peak-stress critical strain, and spread inward. The image analysis showed that total crack length, number of branch points, and number of end points, each reckoned per unit area, all increase roughly linearly with strain, with dynamic values significantly higher than static values at each level of maximum strain. When branch and end point counts were plotted against crack length per unit area, however, the static and dynamic plots coincided, showing that the crack pattern structure was determined by the microstructure of the medium, while all the rate dependence of the mechanical response was a result of the rate dependence of the evolution of a crack density parameter related to the crack length per unit area.... Concrete, Rate effects, Damage, Cracking, Compressive tests, Petrographic examination, Stereology automated image analysis, Failure.

DESCRIPTORS: (U) *CONCRETE, *COMPRESSIVE STRENGTH,
*ULTRAVIOLET DETECTION, *FAILURE(MECHANICS),

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

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AD-A261 106 20/6 12/1

YALE UNIV NEW HAVEN CT DEPT OF APPLIED PHYSICS

(U) Heuristic Model for the Growth and Coupling of
Nonlinear Processes in Droplets.

DESCRIPTIVE NOTE: Rept. for 1 Feb 92-31 Jan 93,

JUN 92 14P

PERSONAL AUTHORS: Serpenguzei, Ali; Chen, Gang; Chang,
Richard K.; Hsieh, Wen-Feng

CONTRACT NO. AFOSR-91-0150

PROJECT NO. 2308

TASK NO. CS

MONITOR: AFOSR, XC
TR-93-0127, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of the Optical Society of
America B, v9 n6 p871-883, Jun 92. Available to DTIC
users only. No copies furnished by NTIS.

ABSTRACT: (U) Standard one-dimensional nonlinear-wave
equations are modified to accommodate the growth and
coupling of nonlinear waves in droplets. The propagation
direction of the nonlinear waves along the length of an
optical cell is changed to be along the droplet rim. The
model includes radiation losses due to nonzero absorption,
leakage from the droplet, and depletion in generating
other nonlinear waves. For multimode-laser input, the
growth and decay of the first- through fourth-order
Stokes stimulated Raman scattering (SRS) are calculated
as a function of the phase matching of the four-wave
mixing process and the model-dependent Raman gain
coefficient. The Raman gain coefficient determines the
delay time of the first-order SRS, while the phase
matching determines the correlated temporal profiles of
the multiorder SRS. Both the Raman gain and the phase
matching are found to be enhanced in the droplet. The
spatial distribution of the internal input-laser
intensity is calculated with the Lorenz-Mie formalism.
The temporal profile of the input-laser intensity used in
the calculations is identical to the experimentally

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observed laser time profile. The delay time and the
correlated growth and decay of nonlinear waves resulting
from the numerical simulation compares favorably with
those of the experimental observations. Similar
calculations are made for single-mode laser input, where
the stimulated Brillouin scattering achieves its
threshold before the SRS and subsequently pumps the SRS....
Stimulated Raman scattering, Stimulated Brillouin
scattering, Microparticles, nonlinear optics, and Lorenz-
Mie scattering.

DESCRIPTORS: (U) *NONLINEAR OPTICS, *WAVE EQUATIONS,
*DROPS, *HEURISTIC METHODS, ABSORPTION, CELLS,
COEFFICIENTS, COUPLINGS, DECAY, DELAY, DEPLETION, FOUR
WAVE MIXING, GAIN, INPUT, INTENSITY, INTERNAL, LASERS,
LENGTH, LOSSES, MATCHING, MIE SCATTERING, MIXING, PHASE,
MULTIMODE, OBSERVATION, ONE DIMENSIONAL, OPTICS, PROFILE,
PUMPS, RADIATION, SCATTERING, SIMULATION, SPATIAL
DISTRIBUTION, STANDARDS, TIME, MATHEMATICAL
MODELS, REPRINTS, RAMAN SPECTRA.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308CS, *Droplets.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

AD-A261 086 CONTINUED

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TOPICAL TESTING INC SALT LAKE CITY UT
APPLICATIONS, RABBITS, TEST AND EVALUATION, TISSUE
CULTURE, BENEFITS, CELLS, COLLECTION, DELIVERY, NUMBERS,
(U) A Biological Model of the Effects of Toxic Substances.
RESPONSE(BIOLOGY), STIMULI, TOXINS AND ANTITOXINS, IN
Annual Technical Report No. 2.
VIVO ANALYSIS, IN VITRO ANALYSIS.

DESCRIPTIVE NOTE: Final rept. 1 Nov 90-31 Oct 92.

IDENTIFIERS: (U) PE89502F, WUAFOSR3008A1, Rabbit eye
test, Topical testing, Environmental toxins, Draize test.

DEC 92 208P

PERSONAL AUTHORS: Tuckett, Robert P.

CONTRACT NO. F49820-91-C-0012

PROJECT NO. 3008

TASK NO. A1

MONITOR: AFOSR, XC
TR-93-0034, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Due to the basic nature of military operations, it is sometimes necessary for Air Force personnel to be exposed to toxic chemicals in their work environment, either as a protracted, low-level exposure or as an acute, high-level exposure. Hence, there is a need to establish quantitative tests for the biological effects of chemical exposure. The Draize rabbit eye test for acute irritancy has come under severe criticism by the animal rights movement and maybe banned in the near future. Therefore, it is important to replace the Draize test with procedures that are not performed on awake animals. Tissue culture has many advantages: it is commercially viable, well controlled, reproducible, and capable of studying the specific effects of chronic chemical exposure. Topical Testing has submitted a patent application on the concept of: (1) identifying cultured sensory neurons that respond to 'pain-related' chemicals, and (2) determining whether these neurons respond to a test chemical. (3) If so, it can be concluded that the test chemical has a potential for producing pain in humans.... Bioassay, Environmental toxins, Detoxification, Tissue culture.

DESCRIPTORS: (U) *AIR FORCE PERSONNEL, *CHEMICALS,
*DETOXIFICATION, *EYE, *WORK, BIOASSAY, LOW LEVEL,
MILITARY OPERATIONS, NERVE CELLS, PAIN, PATENT

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AD-A261 082 12/1

AD-A261 053 20/5

COLORADO UNIV AT DENVER

YALE UNIV NEW HAVEN CT DEPT OF APPLIED PHYSICS

(U) Multilevel Techniques in Large Scale Computation.

(U) Fluorescence Seeding of Weaker-Gain Raman Modes in Microdroplets: Enhancement of Stimulated Raman Scattering.

DESCRIPTIVE NOTE: Final rept. 1 Feb 91-30 Sep 92.

OCT 92 9P

DESCRIPTIVE NOTE: Rept. for 1 Feb 92-31 Jan 93.

PERSONAL AUTHORS: McCormick, Stephen F.

SEP 92 4P

CONTRACT NO. AFOSR-91-0158

PERSONAL AUTHORS: Kwok, Alfred S.; Chang, Richard K.

PROJECT NO. 2304

CONTRACT NO. AFOSR-91-0150

TASK NO. A3

PROJECT NO. 2308

MONITOR: AFOSR, XC
TR-93-0085, AFOSR

TASK NO. CS

MONITOR: AFOSR, XC
TR-93-0130, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Techniques have been demonstrated for time dependent problems that allow rare activation of finest grids; new multiscale approaches in statistical mechanics and many particle problems; fast integral transforms and solvers for integro-differential equations; fast Dirac solvers, and multigrid algorithms on decomposed domains.

DESCRIPTORS: (U) *COMPUTATIONS, *NUMERICAL METHODS AND PROCEDURES, ACTIVATION, ALGORITHMS, DIFFERENTIAL EQUATIONS, GRIDS, INTEGRAL TRANSFORMS, INTEGRALS, INTEGRAL EQUATIONS, TIME DEPENDENCE, STATISTICAL MECHANICS, TIME.

IDENTIFIERS: (U) PE61102F.

ABSTRACT: (U) Fluorescence seeding by dissolving a fluorescent dye in a liquid droplet enhances the stimulated Raman scattering of a weaker-gain Raman mode. With the dye fluorescence at the Stokes wavelength of the weaker-gain Raman mode, the weaker-gain Raman mode can now build up from the much stronger fluorescence instead of from the weaker spontaneous Raman scattering. With fluorescence seeding, the weaker-gain C-C-O Raman mode of ethanol can be observed at a much lower input-laser intensity and can be more intense than the stronger-gain C-H Raman mode.... Stimulated Raman scattering. Fluorescence, Microdroplets, Species identification and Raman seeding.

DESCRIPTORS: (U) *FLUORESCENCE, *SEEDING, ETHANOLS, RAMAN SPECTRA, STOKES RADIATION, PHOTONS, REPRINTS, FLUORESCENT DYES, INTENSITY, LASERS, SCATTERING.

IDENTIFIERS: (U) PE61102F, WJAFOSR2308CS, *Stimulated raman scattering, Weaker gain raman mode.

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AD-A261 048 6/4

AD-A261 048 CONTINUED

SMITH-KETTELVELL EYE RESEARCH INST SAN FRANCISCO CA

(U) Visual Processing of Object Velocity and Acceleration.

DESCRIPTIVE NOTE: Annual technical rept. 16 Jan 92-15 Jan 93.

FEB 93 3P

PERSONAL AUTHORS: McKee, Suzanne

CONTRACT NO. F48620-92-J-0156

PROJECT NO. 2313

TASK NO. A5

MONITOR: AFOSR, XC
TR-93-0134, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The visual system can use local speed information to determine whether one surface or two transparent surfaces are visible. The local speed signals are very noisy, so a large difference in speed is necessary to produce surface segregation. Once the segregation has occurred, the visual system then integrates the local speed signals associated with each surface to improve the precision of the speed information. To study this phenomenon, speed discrimination was measured for a display composed of random dots all moving in one direction, but at two different speeds. When the speeds were sufficiently different to create the perception of two transparent planes, speed discrimination was as precise for either of the two speeds as when each was viewed alone. The local motion vectors specifying the two speeds had to be present simultaneously to produce segregation (and good speed discrimination). If all dots alternated rapidly between the two speeds in synchrony, no segregation was observed. On the other hand, asynchronous alternation, in which different subsets of dots changed speed in every frame, produced excellent segregation.

DESCRIPTORS: (U) *MOTION, *VISUAL PERCEPTION, DISCRIMINATION, PRECISION, SIGNALS, VELOCITY, PSYCHOPHYSICS, SYNCHRONISM, ASYNCHRONOUS SYSTEMS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

AD-A261 047 CONTINUED

FLORIDA STATE UNIV TALLAHASSEE DEPT OF METEOROLOGY

(U) Prediction of Global Cloud Cover with a Very High Resolution Global Spectral Model.

DESCRIPTIVE NOTE: Interim rept. 15 Nov 90-14 Nov 92.

DEC 92 4P

PERSONAL AUTHORS: Krishnamurti, T. N.

CONTRACT NO. AFOSR-91-0023

PROJECT NO. 2310

TASK NO. CS

MONITOR: AFOSR, XC
TR-93-0135, AFOSR

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *WEATHER FORECASTING, *CLOUD COVER, *RAINFALL INTENSITY, ARTIFICIAL SATELLITES, CLOUDS, DEBRIS, ERRORS, FORECASTING, GLOBAL, HUMIDITY, MODELS, PREDICTIONS, RAIN, SPIN DOWN, VARIABLES, WEATHER, HIGH RESOLUTION.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2310CS, Relative humidity.

ABSTRACT: (U) Currently in numerical weather prediction, two avenues for cloud forecasting are being pursued by the research community. The conventional one defines cloud coverage as a function of prevailing relative humidity. The new method explicitly predicts clouds as a variable of the model. Our research effort covers both avenues. The major results of our research are: (1) The threshold relative humidity approach exhibits a decay of cloud fractions during the medium range weather forecasts. The major errors in the prediction appear to occur in the first 24 hours, an initialization problem. Observed clouds appear to exhibit more of a resilience than is demonstrated by the models. Long lasting cloud debris (i.e., non precipitating elements) are not reasonably handled by the model. This deficiency is related to the strong selection rules imposed by the model for the existence of clouds; (2) The explicit treatment of clouds where the cloud water mixing ratio is used as a dependent variable of the model, appears to handle long lasting clouds in a more realistic manner. It does not show the rapid spin-down feature present in the threshold relative humidity approach; and (3) A large effort on physical initialization is currently underway in our global modeling effort. This provides a consistent analysis of the humidity variable with respect to the rain rates (as seen from satellite based measurements).

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4I17L

AD-A261 046

20/5

YALE UNIV NEW HAVEN CT DEPT OF APPLIED PHYSICS

(U) Stimulated Anti-Stokes Raman Scattering in Microdroplets.

DESCRIPTIVE NOTE: Rept. for 2 Feb 92-31 Jan 93.

MAR 92

4P

PERSONAL AUTHORS: Leach, David H.; Chang, Richard K.; Acker, William P.

CONTRACT NO. AFOSR-91-0180

PROJECT NO. 2308

TASK NO. CS

MONITOR: AFOSR, XC
TR-93-0131, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Optics Letters, v17 n8 p387-389, 15 Mar 92. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Stimulated anti-Stokes Raman scattering (SARS) generated by one input beam is observed from CC14, ethanol, and water droplets. The first-order SARS intensity is 104 times lower than the first-order stimulated-Raman-scattering (SRS) intensity for ethanol droplets. Simultaneous detection of SARS and SRS for water droplets shows an occasional lack of correlation between the SARS and SRS spectra.... Microparticles, stimulated anti-stokes Raman scattering, stimulated Raman scattering, droplets, and four wave mixing.

DESCRIPTORS: (U) *RAMAN SPECTROSCOPY, DETECTION, ETHANOLS, FOUR WAVE MIXING, REPRINTS, CARBON TETRACHLORIDE, NONLINEAR OPTICS, MORPHOLOGY, LASER BEAMS, INTENSITY, MIXING, WATER.

IDENTIFIERS: (U) PEG1102F, WJAFOSR2308CS, *SARS(Stimulated Antistokes Raman Scattering), Combustion diagnostics, *Stimulated raman scattering, Microdroplets.

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AD-A260 974

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UTAH UNIV SALT LAKE CITY

(U) The Relationship Between Repetition Priming and Skill Acquisition.

DESCRIPTIVE NOTE: Final rept. Jun 91-Nov 92.

JAN 93

58P

PERSONAL AUTHORS: Woltz, Dan J.

CONTRACT NO. AFOSR-91-0238

PROJECT NO. 2313

TASK NO. A7

MONITOR: AFOSR, XC
TR-93-0100, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research investigated the existence and generalizability of individual differences in the implicit memory phenomena of repetition priming (i.e., performance facilitation on repeated cognitive processing of events that does not depend on conscious recollection of the relevant prior events). In particular, the research estimated the relationship between individual differences in repetition priming and differences in cognitive skill acquisition. Three hundred and five Air Force enlisted personnel performed nine computerized cognitive tasks designed to measure repetition priming, event recognition (an explicit memory measure), and skill acquisition in the verbal, quantitative, and spatial processing domains. Individual differences in repetition priming were consistent across differing trial contents within each processing domain. These differences generalized across processing domains to a lesser extent. Contrary to expectations from current theory, priming and event recognition were correlated, especially within processing domain. Finally, consistent with the notion that repetition priming and skill acquisition reflect shared memory mechanisms, individual differences in priming uniquely predicted differences in skill acquisition. Cognition, individual differences, memory, implicit memory, skill acquisition, Learning.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

AD-A260 974 CONTINUED

AD-A260 960 20/5

DESCRIPTORS: (U) *COGNITION, *MEMORY(PSYCHOLOGY),
*LEARNING, *SKILLS, ACQUISITION, ENLISTED PERSONNEL, AIR
FORCE PERSONNEL, AIR FORCE RESEARCH, RECOGNITION, THEORY.

YALE UNIV NEW HAVEN CT DEPT OF APPLIED PHYSICS
(U) Characteristics and Applications of Stimulated Raman
Scattering in Microdroplets.

IDENTIFIERS: (U) PE81102F, WJAFOSR2313A7, Individual
difference, Implicit memory.

DESCRIPTIVE NOTE: Rept. for 1 Nov 92-31 Jan 93.

JAN 93 5P

PERSONAL AUTHORS: Chang, Richard K.; Serpenguezel, Ali

CONTRACT NO. AFOSR-91-0150

PROJECT NO. 2308

TASK NO. CS

MONITOR: AFOSR, XC
TR-93-0128, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Review is made of the feedback and gain
enhancement mechanisms unique to microdroplets. In
particular, the growth of stimulated Raman scattering is
considered in the presence of two-photon absorption as
well as the usual optical losses inside the droplet
because of scattering and leakage out of the droplet
cavity.... Microparticles, stimulated Raman scattering,
stimulated Brillouin scattering, and two-photon
absorption.

DESCRIPTORS: (U) *RAMAN SPECTROSCOPY, CAVITIES, FEEDBACK,
GAIN, REPRINTS, STOKES RADIATION, REFRACTIVE INDEX,
PHOTONS, TWO PHOTON ABSORPTION.

IDENTIFIERS: (U) PE81102F, WJAFOSR2308CS, *Stimulated
Raman scattering, Microdroplets, Stimulated Brillouin
scattering.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

AD-A260 959 CONTINUED

IDENTIFIERS: (U) PEG1102F, WJAFOSR2304GS.

AD-A260 959 12/8

OREGON STATE UNIV CORVALLIS COMPUTER CENTER

(U) Real-Time Value-Driven Monitoring and Repair.

DESCRIPTIVE NOTE: Final rept. 1 Sep 90-31 Aug 92.

DEC 92 39P

PERSONAL AUTHORS: D'Ambrosio, Bruce

REPORT NO. OSU-CS-92-30-08

CONTRACT NO. AFOSR-90-0348

PROJECT NO. 2304

TASK NO. GS

MONITOR: AFOSR, XC
TR-93-0141, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Monitoring and repair (diagnosis, for short) are often thought of as isolated tasks in theoretical reasoning (reasoning with the goal of updating our beliefs about the world). We present a decision-theoretic interpretation of diagnosis as a task in practical reasoning (reasoning with the goal of acting in the world), and sketch components of our approach to this task. These components include an abstract problem description, a decision-theoretic model of the basic task, a set of inference methods suitable for evaluating the decision representation in real-time, and a control architecture to provide the needed continuing coordination between the agent and its environment. A principal contribution of this work is the representation and inference methods we have developed, which extend previously available probabilistic inference methods and narrow, somewhat, the gap between probabilistic and logical models of diagnosis.... Intelligent Real-Time Problem Solving.

DESCRIPTORS: (U) *REAL TIME, *COMPUTER AIDED DIAGNOSIS, *DECISION THEORY, CONTROL, ENVIRONMENTS, MODELS, MONITORING, PROBLEM SOLVING, REASONING, REPAIR, TIME, COMPUTER ARCHITECTURE, EMBEDDING, MAINTENANCE MANAGEMENT.

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SEARCH CONTROL NO. T4117L

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AD-A260 957 21/2 20/4

RUTGERS - THE STATE UNIV PISCATAWAY NJ

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF
MECHANICAL ENGINEERING

(U) Discrete Methods and their Applications.

(U) Flame-Turbulence Interactions.

DESCRIPTIVE NOTE: Final technical rept. 1 Oct 89-30 Sep
92.

DESCRIPTIVE NOTE: Final technical rept. 1 Nov 89-1 Oct 92.

FEB 93 41P

JAN 93 118P

PERSONAL AUTHORS: Hammer, Peter L.; Roberts, Fred S.;
Gunzburger.

PERSONAL AUTHORS: Santavicca, Domenic A.

CONTRACT NO. AFOSR-90-0008

CONTRACT NO. AFOSR-90-0025

PROJECT NO. 2304

PROJECT NO. 2308

TASK NO. A8

TASK NO. BS

MONITOR: AFOSR, XC
TR-93-0143, AFOSRMONITOR: AFOSR, XC
TR-93-0138, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) A new algorithm for clustering which constructs better cluster than the well known k-means algorithm has been developed. A new column generation approach has allowed the solution of very large tool-generation problems.

ABSTRACT: (U) The interaction between individual vortices and a premixed laminar flame was investigated in order to characterize the underlying dynamics of flame-turbulence interactions and thereby gain an improved understanding of premixed turbulent flames. In addition, previous two-dimensional flame structure measurements made in turbulent premixed flames were re-analyzed in order to obtain flame curvature and orientation statistics.... Premixed Turbulent Flames, Flame-Vortex Interactions, Turbulence-Flame Interactions, Turbulent Flame Structure.

DESCRIPTORS: (U) *ALGORITHMS, *CLUSTERING, TOOLS,
PROBLEM SOLVING.DESCRIPTORS: (U) *FLAMES, *TURBULENCE, ADDITION,
CURVATURE, DYNAMICS, GAIN, INTERACTIONS, MEASUREMENT,
STATISTICS, STRUCTURES, TWO DIMENSIONAL, VORTICES.

IDENTIFIERS: (U) WJAFOSR2304A8, Discrete mathematics.

IDENTIFIERS: (U) PE61102F, WJAFOSR2308BS.

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AD-A260 779 17/8 4/2

AD-A260 743 7/4 20/5 20/12

NEW MEXICO INST OF MINING AND TECHNOLOGY SOCORRO

OKLAHOMA STATE UNIV STILLWATER DEPT OF CHEMISTRY

(U) Remote Sensing of Precipitation and Electrification with a Dual-Polarization, Coherent, Wideband Radar System.

(U) Chemical Dynamics Studies of High Energy Species.

DESCRIPTIVE NOTE: Final rept. 1 Nov 89-31 Oct 92.

DESCRIPTIVE NOTE: Interim rept. no. 2 15 Jul 90-14 Jul 91.

NOV 92 29P

SEP 92 9P

PERSONAL AUTHORS: Thompson, Donald L.

PERSONAL AUTHORS: Kretzbien, Paul R.; Gray, Grant

CONTRACT NO. AFOSR-90-0048

CONTRACT NO. AFOSR-89-0450

PROJECT NO. 2303

PROJECT NO. 2310

TASK NO. FS

TASK NO. A1

MONITOR: AFOSR, XC
TR-93-0018, AFOSR

TR-92-1002, AFOSR

UNCLASSIFIED REPORT

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ABSTRACT: (U) The radar has been upgraded through improvements to the receiver and addition of an inexpensive PC-based Digital Signal Processing system to allow real-time processing and display of radar parameters. A Sun Microsystems SPARCstation was added to the system for processed data archive as well as post analysis. The radar system was shipped to Kennedy Space Center for electrification studies during the summer of 1991.

DESCRIPTORS: (U) *ATMOSPHERIC PRECIPITATION, *LIGHTNING, *RADAR SIGNALS, POLARIZATION, PRECIPITATION, RADAR, REAL TIME, RECEIVERS, SIGNAL PROCESSING, REMOTE DETECTION, CLOUDS, CONVECTION(ATMOSPHERIC), RADAR RECEIVERS, ECHOES, DIGITAL SYSTEMS.

IDENTIFIERS: (U) PE61102F, WUAFOSR2310A1, Remote sensing.

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ABSTRACT: (U) We report the results of a theoretical/computational research program to develop methods and to investigate the fundamental chemical dynamics of elementary processes important in systems that can potentially yield large amounts of energy when they react. We describe a research program designed to further develop methods and to perform dynamics calculations for fundamental reactions in polyatomic molecules in which tunneling, electronic nonadiabatic processes, and vibrationally mode-selected reactions occur using theoretical methods based on classical trajectories and transition-state theory. Semiclassical corrections were employed to treat nonclassical processes such as tunneling and electronic transitions.... Chemical dynamics, Nonadiabatic reactions, Tunneling effects, Mode selective behavior.

DESCRIPTORS: (U) *DYNAMICS, *POLYATOMIC MOLECULES, *CHEMICAL REACTIONS, *HIGH ENERGY, ELECTRONICS, MOLECULES, THEORY, TRAJECTORIES, TRANSITIONS, TUNNELING(ELECTRONICS), COMPUTATIONS, VIBRATION, MOLECULAR STATES, EXCITATION.

IDENTIFIERS: (U) PE61102F, Species, Nonadiabatic reactions, Mode selective behavior.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

AD-A260 577 20/11 11/8

AD-A260 559 4/1 8/7 3/2

LABORATOIRE DE MECANIQUE ET TECHNOLOGIE CACHAN (FRANCE)

KANSAS UNIV LAWRENCE DEPT OF PHYSICS AND ASTRONOMY

(U) Micromechanics of Fatigue.

(U) A Nitrate Signal of Solar Flares in Polar Snow and Ice.

DESCRIPTIVE NOTE: Final rept. 15 Mar 89-14 Mar 92,

DESCRIPTIVE NOTE: Annual 1 Nov 91-31 Oct 92.

JUN 92 81P

NOV 92 25P

PERSONAL AUTHORS: Lemaitre, Jean; Billardon, Rene

PERSONAL AUTHORS: Dreschhoff, Gisela A.; Zeller, Edward J.

REPORT NO. 134

CONTRACT NO. AFOSR-88-0085

PROJECT NO. 2302

PROJECT NO. 2311

TASK NO. BS

TASK NO. AS

MONITOR: AFOSR, XC
TR-93-0018, AFOSR

MONITOR: AFOSR, XC
TR-92-0899, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) In this final report, the results given in the first two annual reports are recalled. Application of the derived tools to Apha-Two-Titanium Aluminum Alloy is made with a first series of strain controlled fatigue tests the locally coupled model is first identified and then checked on a second series of stress controlled fatigue tests. The good agreement allows to use this locally coupled method to predict fatigue crack initiation on brittle or quasibrittle materials.

DESCRIPTORS: (U) *MICROMECHANICS, *TITANIUM ALLOYS, *FATIGUE(MECHANICS), ALLOYS, ALUMINIDES, CRACKS, MODELS, TEST AND EVALUATION, TITANIUM, TITANIUM ALUMINIDE, STRAIN(MECHANICS), CRACKING(FRACTURING), BRITTLENESS, DUCTILITY, DAMAGE ASSESSMENT, FINITE ELEMENT ANALYSIS, FAILURE(MECHANICS), FATIGUE TESTS(MECHANICS), STRESS ANALYSIS, MODULUS OF ELASTICITY.

IDENTIFIERS: (U) PE01102F, WUAFOSR23028S.

ABSTRACT: (U) The operations described in this report are separated into two sections, one involving the high-resolution sampling, analysis, and interpretation of a firm core from Windless Bight Antarctica and a second section concerned with the acquisition of a 120 meter firm core from the GISP2 site in Central Greenland. Most of the Antarctic work is involved with detailed correlation with records from two-drill cores located 10 km apart on the Ross Ice Shelf where snow deposition involves little mixing and highly precise correlations are possible with known solar flare events. In Greenland, a much longer time period of roughly 400 years has been sampled. The core drilling was completed in June 1992 and the cores have been shipped to the National Ice Core Storage Facility in Denver, Colorado. The upper - 12 meters of firm core was analyzed on site in Greenland and shows that a high quality ice core record can be obtained.

DESCRIPTORS: (U) *ICE, *SOLAR FLARES, *NITRATES, *CORE SAMPLING, CORE STORAGE, DEPOSITION, DRILLING, GREENLAND, RECORDS, SNOW, POLAR REGIONS, SOLAR ACTIVITY, IONIZATION, STRATOSPHERE, CHEMICAL ANALYSIS, AURORAE.

IDENTIFIERS: (U) PE01102F, Windless Bight(Antarctica), Firm core.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

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MICHIGAN STATE UNIV EAST LANSING DEPT OF PEDIATRICS/
HUMAN DEVELOPMENT

(U) In Vitro Analysis of Modulators of Intercellular
Communication: Implications of Biologically Based Risk
Assessment Models for Chemical Exposure,

90 10P

DESCRIPTORS: (U) *CARCINOGENESIS, *MODULATORS, CANCER,
CHEMICALS, DAMAGE, HEALTH, REPRINTS, IN VITRO ANALYSIS,
CELLS(BIOLOGY), BIOLOGY, RISK, EXPOSURE(PHYSIOLOGY),
MODELS, ENVIRONMENTAL IMPACT, DEOXYRIBONUCLEIC ACIDS,
TOXICITY, GENETICS, BIOASSAY, TISSUES(BIOLOGY),
ORGANS(ANATOMY), HOMEOSTASIS, BIOCHEMISTRY, HUMANS,
LABORATORY ANIMALS, MUTAGENS, OBSERVATION, SIGNS AND
SYMPTOMS, TEST AND EVALUATION.

PERSONAL AUTHORS: Trosko, James E.; Chang, C. C.;
Madhukar, B. V.

IDENTIFIERS: (U) PE61102F, *Intracellular communications,
Assessment, Xeroderma pigmentosum, Genotoxicity.

CONTRACT NO. AFOSR-89-0325

PROJECT NO. 2312

TASK NO. AS

MONITOR: AFOSR, XC
TR-82-0054, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Toxicology in Vitro, v4 n4/5 p835-
843 1990. Available only to DTIC users. No copies
furnished by NTIS.

ABSTRACT: (U) Ever since the publication of Silent
Spring (Carson, 1962), we have heightened our concern
about the potential environmental and human health
effects caused by exposure to natural and man-made
chemicals. With the demonstration that a known carcinogen
could induce DNA damage that was not repaired, in a
manner similar to ultraviolet light-induced DNA damage in
a cancer-prone human syndrome, xeroderma pigmentosum
(Lieberman, 1971), the 'intellectual seed' was set for
the development of a major paradigm in the field of
chemical carcinogenesis (Trosko et al., 1989c). The
hypothesis stating carcinogens are mutagens (Ames et al.,
1973), and the term, genotoxicity (Ehrenberg et al., 1973)
were quick to follow. Subsequently, an explosion of
experimental observations resulted from tests designed to
examine if chemicals could cause cancer in laboratory
animals (bioassays) and if these same chemicals had
genotoxic properties. The effectiveness of both the
paradigm, which underpinned the design, and the
interpretation of all these studies have been shown to be
very weak (Tennant et al., 1987).

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CALIFORNIA UNIV BERKELEY DEPT OF MOLECULAR BIOLOGY

STANFORD UNIV CA DEPT OF CIVIL ENGINEERING

(U) Computer Based Analysis and Synthesis of Retinal Function.

(U) Anaerobic Microbial Transformation of Aromatic Hydrocarbons and Mixtures of Aromatic Hydrocarbons and Halogenated Solvents.

DESCRIPTIVE NOTE: Annual rept. 1 Feb 91-31 Jan 92.

DESCRIPTIVE NOTE: Final rept. 30 Sep 88-31 Mar 92.

DEC 92 SP

AUG 92 151P

PERSONAL AUTHORS: Verblin, Frank S.

PERSONAL AUTHORS: Edwards, Elizabeth A.; Liang, Li-Nuo; Dunia, Grbic-Galic

CONTRACT NO. AFOSR-91-0186

PROJECT NO. 2313

REPORT NO. CE319

TASK NO. AS

CONTRACT NO. AFOSR-88-0351

MONITOR: AFOSR, XC
TR-93-0027, AFOSR

PROJECT NO. 2312

TASK NO. A4

MONITOR: AFOSR, XC
TR-93-0019, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The vertebrate retina sequentially transforms patterns of neural activity through 5 separate, serially arranged sheets of cells. These neuronal patterns become increasingly complex at each successive layer. Our objectives is to determine the parameters in space and time for the transfer functions that transform the patterns at successive layers. We have extracted the space and time constants for retinal processing from the physiological data taken from single cells at each retinal layer. These space-time parameters drive an image processing computer, the PIPE. The resulting program represents a tentative blueprint for design of a retina, and some of these values have been used by modelers to make artificial retinas, including the silicon retina developed by Misha Mahowald in Carver Mead's laboratory.

DESCRIPTORS: (U) *RETINA, *VERTEBRATES, *SYNTHESIS(CHEMISTRY), IMAGE PROCESSING, LAYERS, PARAMETERS, PATTERNS, SHEETS, SILICON, TRANSFER FUNCTIONS, PATTERN RECOGNITION, NERVE CELLS, NEURAL NETS, SIMULTANEOUS EQUATIONS, PHOTORECEPTORS, MODELS.

IDENTIFIERS: (U) PE81102F, Intracellularly, Live retina, Cellular networks, Ganglion cells.

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UNCLASSIFIED REPORT

ABSTRACT: (U) Anaerobic microbial transformation of monoaromatic hydrocarbons (NM), chlorinated benzenes (CB), and mixtures of MAH and CB, as well as MAH and chlorinated aliphatic solvents (tetrachloroethylene -- PCE, and carbon tetrachloride -CT) was studied in laboratory microcosms derived from hydrocarbon-contaminated groundwater aquifers. Some MAH, such as toluene and o-xylene, were completely degraded to CO₂ and CH₄ by mixed methanogenic cultures from a creosote-contaminated aquifer. This degradation was inhibited by the addition of accessory electron acceptors (oxygen, nitrate, sulfate), indicating acclimation of the microbial community to methanogenic conditions. The addition of preferred substrates, such as acetate, propionate, methanol, fatty acids, glucose, casamino acids, pepton, yeast extract, or acetone also inhibited MAH degradation, indicating that the presence of natural organic substrates may preclude anaerobic biodegradation of in situ. Cyclohexane, CT, and high concentrations of toluene and o-xylene had a toxic effect. Under sulfate-reducing conditions, several MAH -- toluene, all three xylene isomers, and benzene were mineralized to CO₂ by

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4I17L

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AD-A260 395 12/3

microorganisms from a petroleum-contaminated, sulfidogenic aquifer. Whereas 2 toluene and xylenes were sequentially degraded in a mixture, benzene was degraded only if alone, or slowly transformed in a mixture with toluene. This explains previously reported recalcitrance of benzene under anaerobic conditions. The addition of preferred substrates (lactate, glucose, or yeast extract) to the cultures temporarily inhibited the degradation of MAH. Methanogenic microcosms from the creosote-contaminated aquifer reductively dechlorinated hexa-, penta-, tetra-, tri-, and di-chlorobenzene.

DESCRIPTORS: (U) *OXYGEN, *SOLVENTS, *TRANSFORMATIONS, *ANAEROBIC PROCESSES, *AROMATIC HYDROCARBONS, *HALOGENATED HYDROCARBONS, ACETATES, ACETONES, AQUIFERS, ATMOSPHERES, BENZENE, BIODETERIORATION, CARBON TETRACHLORIDE, CHLOROBENZENE, CHLOROFORM, CREOSOTE, CRUDE OIL, CULTURE, CYCLOHEXANES, DEGRADATION, ELECTRON ACCEPTORS, ELECTRON DONORS, FATTY ACIDS, GLUCOSE, GRANULES, ISOMERS, LABORATORIES, LACTATES, METABOLITES, METHANOLS, MICROORGANISMS, MICROSCOPY, MIXTURES, NITRATES, PEPTONES, PROPIONATES, SOLIDS, SUBSTRATES, SUBSURFACE, SULFATES, TOLUENES, TRICHLOROETHYLENE, XYLENES, YEASTS, ALIPHATIC HYDROCARBONS, GROUND WATER, CONTAMINATION, CARBON DIOXIDE, METHANE, TOXICITY, CHEMICAL ANALYSIS, MICROBIOLOGY.

IDENTIFIERS: (U) PEB1102F, *Microbial, Tetrachloroethylene, Methanogenic, Casamino acids, In situ, Sulfidogenic.

FLORIDA STATE UNIV TALLAHASSEE DEPT OF STATISTICS

(U) A Partly Parametric Additive Risk Model.

DESCRIPTIVE NOTE: Technical rept.,

JAN 93 24P

PERSONAL AUTHORS: McKeague, Ian W.; Sasieni, Peter D.

REPORT NO. FSU-TR-M-882

CONTRACT NO. DAAL03-90-G-0103, SAFOSR-91-0048

MONITOR: ARO, USARO, AFOSR, XA
27808.23-NA, TR-D-131, TR-91-277, ARO

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with Imperial Cancer Research Fund, London (United Kingdom).

ABSTRACT: (U) Aalen's additive risk model allows the influence of covariates on a hazard function to vary over time, and to do so in a different fashion for each covariate. Although allowing greater flexibility than a Cox model, which has a more parsimonious temporal structure, the number of covariates that can be handled by Aalen's model is quite limited. One way around this difficulty is to impose some a priori structure on the form of the model, thereby reducing the number of functions to be estimated. In this paper we introduce a partly parametric version of Aalen's model in which only a small number of the covariates are selected to have their influence vary nonparametrically over time, and the influence of the remaining covariates is restricted to be constant in time. Efficient procedures for fitting this new model are developed and studied. The approach is applied to data from the British Medical Research Council's myelomatosis trials.... Aalen's linear hazards model, Counting processes, Right-censored data, Semiparametric.

DESCRIPTORS: (U) *RISK, *COVARIANCE, *PARAMETRIC ANALYSIS, *MATHEMATICAL MODELS, CONSTANTS, HAZARDS, MEDICAL RESEARCH.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

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CITY UNIV OF NEW YORK CENTER FOR LARGE SCALE COMPUTATION

FOURIER ANALYSIS, COMPUTATIONS, OPTICAL CIRCUITS.

(U) Application and Development of Wavelet Analysis.

IDENTIFIERS: (U) PE62301E, Gabor transform, Ambiguity function, Wigner Ville distribution, Wavelet transform.

DESCRIPTIVE NOTE: Final rept. 15 Aug 90-15 Aug 92.

AUG 92 30P

PERSONAL AUTHORS: Tolimieri, Richard

CONTRACT NO. AFOSR-90-0348, \$SDARPA Order-8674

MONITOR: AFOSR, XC
TR-93-0021, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) We have attacked the problem of designing efficient time-frequency computational tools by: (a) Developing selection procedures which shape an analyzing signal from a priori and precomputed front-end computations on input data based on Zak transform and ambiguity function. (b) Implementing and comparing code for computing Gabor coefficients based on methods found in 3, 11. This code uses fast FFT algorithms developed under DARPA contract F49620-89-C-0020. We have determined that the algorithm based on the deconvolution formula in 4 produces the fastest code and have applied this code using the one-sided exponential window to transient signal detection. (c) Developed a new algorithm for computing classical Gabor coefficients based on the concept of a generalized biorthogonal. This algorithm delays the effects of zero theorems and provides for numerically stable computation of Gabor coefficients locally around known Gabor coefficients. (d) Developed the proper form of finite discrete Gabor transform by periodizing and sampling and presented the results in 10, 32). We have applied these results to Gabor representational schemes for submicron filtering, image reconstruction and image transfer for application to submicron lithography and to designing and constructing optical devices to implement time-frequency representations and to carry out processing on such representations including transient signal detection.

DESCRIPTORS: (U) *OPTICAL PROCESSING, *SIGNAL PROCESSING, ALGORITHMS, COEFFICIENTS, COMPUTATIONS, DELAY, DETECTION, FILTRATION, FREQUENCY, FUNCTIONS, INPUT, THEOREMS, TIME,

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MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MECHANICAL
ENGINEERING

IDENTIFIERS: (U) PEB1102F, WJAFOSR2308BS, Vorticity,
Shear Layers.

(U) The Three-Dimensional Structure of Periodic Vorticity
Layers Under Non-Symmetric Conditions.

92 41P

PERSONAL AUTHORS: Knio, Omar M.; Ghoniem, Ahmed F.

CONTRACT NO. AFOSR-88-0491

PROJECT NO. 2308

TASK NO. BS

MONITOR: AFOSR, XC
TR-82-0001, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Fluid Mechanics, v243 p353-
392 1992. Available only to DTIC users only. No copies
furnished by NTIS.

ABSTRACT: (U) Numerical simulations of a three-
dimensional temporally growing shear layer are obtained
at high Reynolds number and zero Froude number using a
vortex scheme modified for a variable-density flow.
Attention is focused on the effect of initial vorticity
and density distributions on the interaction between
instability modes which lead to the generation and
intensification of streamwise vorticity. Results show
that the three-dimensional instabilities evolve following
the formation of concentrated spanwise vorticity
We also find that initially asymmetric vorticity
distribution does not, as suggested before, lead to
asymmetric spacing between the streamwise vortices. It is
concluded that the experimentally observed asymmetric
spacing must arise after pairing.... Three-dimensional
motion, Vortex methods, Streamwise vorticity and
baroclinicity.

DESCRIPTORS: (U) *VORTICES, *TURBULENT FLOW, DENSITY,
FROUDE NUMBER, INSTABILITY, INTERACTIONS, LAYERS, MOTION,
REYNOLDS NUMBER, VORTICES, SIMULATION, THREE DIMENSIONAL,
MATHEMATICAL MODELS, REPRINTS, SHEAR STRESSES, COMBUSTION.

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STANFORD UNIV CA

IDENTIFIERS: (U) PEG11030, WUAFOSR3484AS.

(U) Two- and Three-Dimensional Effects in the Supersonic Mixing Layer.

APR 92 11P

PERSONAL AUTHORS: Clemens, N. T.; Mungal, M. G.

CONTRACT NO. AFOSR-90-01B1

PROJECT NO. 3494

TASK NO. AS

MONITOR: AFOSR, XC
TR-92-0990, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in AIAA Jnl., V30 N4 p973-981 Apr 92.
Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Experimental results are presented that compare the structure of the turbulent, planar mixing layer for three values of convective Mach number (0.28, 0.82, and 0.79), which span the range from low to moderate compressibility. Extensive planar laser Mie scattering visualizations are presented, where either mixed fluid or high-speed fluid is marked. The visualizations show that the supersonic mixing layer, when driven to low convective Mach number, behaves as an incompressible layer with characteristic two-dimensional, organized, Brown-Roshko structure. As convective Mach number increases, however, the mixing layer becomes highly three-dimensional, with little apparent two-dimensional, large-scale organization. This change in structure is a compressibility effect and is not a Reynolds number effect....Supersonic mixing layer, Visualization, Compressibility Reynolds number effect, Boundary layer condition.

DESCRIPTORS: (U) *SUPERSONIC FLOW, *TURBULENT FLOW, BOUNDARY LAYER, COMPRESSIVE PROPERTIES, LASERS, MACH NUMBER, MIE SCATTERING, MIXING, REYNOLDS NUMBER, SCATTERING, THREE DIMENSIONAL, TWO DIMENSIONAL, REPRINTS, BOUNDARY LAYER FLOW.

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STATE UNIV OF NEW YORK AT ALBANY ATMOSPHERIC SCIENCES
RESEARCH CENTER

OPTICAL SOCIETY OF AMERICA WASHINGTON DC

(U) The Use of the Air Force Cloud Cover Data to Evaluate and Improve Cloud Forecast and Parameterization in Mesoscale Meteorology Models.

(U) Organization of the 1991 Society of America Photonic Science Topical Meeting Held in Monterey, California on September 26 - 28, 1991. 1991 Technical Digest Series, Volume 16, Conference Edition.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 91-30 Sep 92,

DESCRIPTIVE NOTE: Final rept. 1 Jan-31 Dec 91,

NOV 92 42P

MAY 92 349P

PERSONAL AUTHORS: Walcek, Chris J.

PERSONAL AUTHORS: Quinn, Jarus W.

CONTRACT NO. F49621-92-J-0018

CONTRACT NO. AFOSR-91-0176

PROJECT NO. 2310

PROJECT NO. 2301

TASK NO. CS

TASK NO. A1

MONITOR: AFOSR, XB
TR-92-1006, AFOSRMONITOR: AFOSR, XC
TR-92-0514, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) This research program utilizes satellite and surface-derived cloud observations together with standard meteorological measurements to evaluate and improve our ability to accurately diagnose cloud coverage. Results of this research will be used to complement existing or future parameterizations of cloud effects in global and regional-scale meteorology forecast models, since nearly all cloud parameterizations must specify a fractional area of cloud coverage when calculating radiative or dynamic cloud effects, and current parameterizations rely on rather crude cloud cover estimates.

DESCRIPTORS: (U) *CLOUD COVER, *METEOROLOGICAL DATA, *WEATHER FORECASTING, ARTIFICIAL SATELLITES, CLOUDS, GLOBAL, METEOROLOGY, MODELS, OBSERVATION, SURFACES, METEOROLOGICAL SATELLITES.

IDENTIFIERS: (U) PEG1102F, WJAFOSR2310CS..

ABSTRACT: (U) Partial Contents: Spectral Diffusion: Observables and Dynamics; Optical Processing and Holography; High Temperature and Photon Gating; Linewidth and Relaxation; Novel Spectroscopies and Systems...

DESCRIPTORS: (U) *HOLOGRAPHY, *OPTICAL PROPERTIES, *SPECTRA, GLASS, OPTICAL MATERIALS, PHOTONS, NEURAL NETS, TIME DOMAIN, SYMPOSIA.

IDENTIFIERS: (U) WJAFOSR2301A1, PEG1102F, Hole burning..

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UTAH UNIV SALT LAKE CITY CENTER FOR ATMOSPHERIC AND
REMOTE SOUNDING STUDIES

(U) Modeling of Cloud/Radiation Processes for Tropical
Anvils.

DESCRIPTORS: (U) *CLOUD COVER, *CIRRUS CLOUDS,
*CONVECTION(ATMOSPHERIC), *RADIATIVE TRANSFER, CUMULUS
CLOUDS, TROPICAL REGIONS, MATHEMATICAL MODELS, ICE
FORMATION, ATMOSPHERE MODELS, MOISTURE CONTENT.

IDENTIFIERS: (U) Satellite images, Anvil clouds, Ice
crystals, PEG1102F.

DESCRIPTIVE NOTE: Annual rept. 1 Nov 91-31 Oct 92,

NOV 92 108P

PERSONAL AUTHORS: Fu, Q.; Liou, K. N.; Krueger, S. K.

CONTRACT NO. AFOSR-91-0039

PROJECT NO. 2310

TASK NO. CS

MONITOR: AFOSR, XC
TR-93-0025, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Satellite imagery suggests that large portions of the tropics are covered by extensive cirrus cloud systems. Tropical cirrus clouds evolve during the life cycle of the mesoscale convective systems and are modulated by large-scale disturbances. Outflow cirrus clouds from tropical cumulonimbi appear to be maintained in a convectively active state by radiative flux gradients within the clouds, as suggested by Danielson (1982). Extensive anvils are likely to become radiatively destabilized by cooling at tops and warming at bases. This would drive convective fluxes which in turn would provide an upward flux of water vapor within the cloud. The additional moisture at cloud top levels would promote rapid ice crystal growth and fallout. Ackerman et al. (1988) have computed radiative heating rates in typical tropical anvils. The heating rate differences between the cloud bottom and top ranges from 30 to 200 K/day. Lilly (1988) has analyzed the dynamic mechanism of the formation of cirrus anvils using a mixed layer model, and has shown that destabilization of the layer could be produced by strong radiative heating gradients. The importance of radiative processes in the life cycle of tropical anvils and convective systems has also been illustrated by Chen and Cotton (1988) and Dudhia (1989).

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NEW YORK UNIV MEDICAL CENTER NY

(U) Measurement and Regulation of Central Noradrenergic Receptors.

DESCRIPTIVE NOTE: Annual rept. 1 Dec 91-30 Sep 93.

JAN 93 10P

PERSONAL AUTHORS: Stone, Eric A.; Bing, Guoying; Zhang, Yi

CONTRACT NO. F49620-92-J-0084, \$AFOSR-89-0208

PROJECT NO. 2312

TASK NO. BS

MONITOR: AFOSR, XC
TR-93-0030, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) As proposed in the original application, research this year has concerned studies of the central noradrenergic neuronal system in reactions to stress. We have focused on the role of the noradrenergic system in long-term changes in brain function produced by stress. In previous work we had shown that activation of the noradrenergic system by the sympathomimetic drug, yohimbine (YOH), or by stress increases the mRNA levels of the immediate early gene (IEG), c-fos. IEGs serve to regulate the transcription of other genes and may mediate long-term structural and functional changes in the brain during stress. In work done this year, we have shown that lesions of central noradrenergic neurons block the effects of YOH and stress on c-fos. This confirms the importance of norepinephrine (NE) release in the mediation of the central c-fos response. We have also shown that YOH can activate the gene for nerve growth factor (NGF) in the brain. NGF is a neurotrophic agent and may mediate the long-term structural and functional changes produced by noradrenergic activity during stress. With regard to the nature of these long-term effects we have shown that the noradrenergic system has protective actions on neurons in the substantia nigra during the administration of a neurotoxin. Thus protection of neurons from damage may be one of the long-term functions

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of the noradrenergic system during stress. In addition to these functional studies, we have also made progress on methodological problems associated with the measurement of noradrenergic neurotransmission in vivo. We have found that an increase in beta adrenoceptor activation during stress can be detected from measurement of extra cellular levels of cyclic AMP by micro dialysis. These findings may facilitate future studies of noradrenergic function in vivo during stress.

DESCRIPTORS: (U) *MEASUREMENT, *NERVE CELLS, *NOREPINEPHRINE, *ENERGY, BRAIN, DAMAGE, DIALYSIS, DRUGS, FUNCTIONS, GENES, INDOLE ALKALOIDS, LESIONS, MANAGEMENT, NEUROTOXINS, PROTECTION, RELEASE, RESPONSE(BIOLOGY), RECEPTOR SITES(PHYSIOLOGY), RIBONUCLEIC ACIDS, IN VIVO ANALYSIS, STRESS(PHYSIOLOGY), NEUROTOXINS, CATECHOLAMINES.

IDENTIFIERS: (U) PE81102F, Substantia nigro, Sympathomimetic drug, Yohimbine.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

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TORONTO UNIV (ONTARIO)

(U) Mesomechanical Model for Fibre Composites: The Role of the Interface.

DESCRIPTIVE NOTE: Final rept. 1 Jun 89-31 May 92.

JUL 92 44P

PERSONAL AUTHORS: Piggott, Michael R.

CONTRACT NO. AFOSR-89-0385

PROJECT NO. 2302

TASK NO. B1

MONITOR: AFOSR, XC

TR-93-0017, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This work was initially conceived as providing a theoretical framework linking microphenomena and macroscale properties in fibre composites. In addition, experimental data were to be obtained to lend substance to the theoretical constructs. Experiments were therefore carried out on the interface, and on composites which were particularly sensitive to interfacial effects, i.e. those containing short aligned fibres. Pull out tests were used for interface studies. These showed that most fibre-polymer interfaces were strong (usually stronger than the polymer) and brittle. This brittleness was an important observation which goes a long way towards explaining the properties of fibre composites containing many fibre ends. Short aligned fibre composites were manufactured, with carbon fibres having lengths of 0.5, 1.0, 2.0 and 4.0 mm. Alignment was not perfect, nor were fibre lengths all equal to the nominal lengths, so both alignments and lengths were checked in the actual composites. Composite strengths and Young's moduli were measured and compared with predictions based on slip and shear lag theory. The agreement for moduli was moderately good, but for strengths it was very poor. Since, in addition, the stress strain plots were straight, the slip theory is not supported at all by this work. Instead, it appears highly likely that a mesomechanical theory involving crack initiation and development would

work much better. Theoretical development led to the concept of the mesostructure as a basis for mesomechanical analysis. The mesostructure was defined as adventitious small-scale structures which are present in fibre composites, but normally neglected, such as fibre waviness and uneven packing. Fibre reinforced polymers, Mechanics of composites.

DESCRIPTORS: (U) *INTERFACES, *FIBER REINFORCED COMPOSITES, ALIGNMENT, BRITTLENESS, CARBON, CRACKS, EXPERIMENTAL DATA, MECHANICS, OBSERVATION, POLYMERS, PREDICTIONS, SCALE, TEST AND EVALUATION, THEORY.

IDENTIFIERS: (U) PEB1102F. 226

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TEXAS UNIV AT EL PASO

SUCTION, TEST AND EVALUATION, TIME, TRANSIENTS,
VISCOELASTICITY.

(U) Behavior of Unsaturated Clayey Soils at High Strain Rates.

IDENTIFIERS: (U) PE81102F, WUAFOSR2302CS, Unsaturated soils, High strain rates.

DESCRIPTIVE NOTE: Final rept. Jun 89-Aug 92.

OCT 92 432P

PERSONAL AUTHORS: Picornell, Miguel; Nazarian, Soheil

CONTRACT NO. F49620-89-C-0077

PROJECT NO. 2302

TASK NO. CS

MONITOR: AFOSR, XC
TR-92-1014, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Specimens of clayey soils with a controlled pore solution chemistry were prepared, consolidated, and equilibrated at three different soil suction levels. Some specimens were subjected to creep/recovery tests in conventional triaxial cells. These results were used to select viscoelastic models that could explain the specimen behavior. Duplicate specimens equilibrated at the same soil suction levels were tested in a dynamic triaxial test system. For this purpose, the specimen was subjected to a series of stress controlled pulses of 50msec duration and consisting of a ramp-up to a peak deviatoric stress and a ramp-down to zero. The peak stress was increased for successive pulses. The response of the specimen, and the strain-time history, was then recorded. The non-linear viscoelastic models fitted to creep-recovery tests were used in combination with the modified superposition principle to predict the expected response of the specimen. The viscoelastic models that were fitted to the steady creep phase did not provide the best match. It was rather necessary to use the models fitted to the initial part of the transient creep phase.... Creep, High strain rates, Unsaturated clayey soils.

DESCRIPTORS: (U) *CLAYEY SOILS, *CREEP, *SOIL MECHANICS, DYNAMICS, MODELS, PHASE, RECOVERY, RESPONSE, STRAIN RATE,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

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 FLORIDA AGRICULTURAL AND MECHANICAL UNIV TALLAHASSEE
 FLUID MECHANICS RESEARCH LAB
 CALIFORNIA UNIV SAN DIEGO LA JOLLA
 (U) On the Displacement Effects of Laminar Flames.

(U) Unsteady Flow Past a Pitching Airfoil at Moderately High Subsonic Free Stream Mach Numbers.

DESCRIPTIVE NOTE: Final rept. 1 Jun 89-31 May 92,

OCT 92 80P

PERSONAL AUTHORS: Krothapalli, A.; Buzyna, G.; Lourenco, L.

REPORT NO.: FMRL-TR-7

CONTRACT NO. F49620-89-C-0067

PROJECT NO. 2307

TASK NO. CS

MONITOR: AFOSR, XC
 TR-92-1011, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) An experimental and computational investigation was carried out to study the flow past a NACA 0012 airfoil undergoing pitch up motion at free Mach numbers ranging 0.3 to 0.8. The flow velocity field was captured using PIV demonstrating the ability of the technique to characterize high speed separated flows. A companion computational study was conducted to assess the effect of wind tunnel walls on the dynamic stall process..
 ..NACA 0012, Airfoil, Flow Velocity.

DESCRIPTORS: (U) *AIRFOILS, *AERODYNAMIC CHARACTERISTICS, *STALLING, *FIGHTER AIRCRAFT, MACH NUMBER, MOTION, VELOCITY, WALLS, WIND, WIND TUNNELS, ANGLE OF ATTACK, AIR FLOW, UNSTEADY FLOW, SUBSONIC FLOW, FLOW SEPARATION.

IDENTIFIERS: (U) PE81102F, WUAFOSR2307CS, PIV(Particle Image Velocimetry).

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PERSONAL AUTHORS: Kim, J. S.; Libby, Paul A.; Williams, Forman A.

CONTRACT NO. AFOSR-89-0410

PROJECT NO. 2308

TASK NO. BS

MONITOR: AFOSR, XC
 TR-92-0988, AFOSR

UNCLASSIFIED REPORT

Availability: Pub in Combustion Science and Technology, v87 p1-25 1992. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Asymptotic methods for large Reynolds numbers are used to show that through displacement effects the heat release associated with both premixed and nonpremixed laminar flames in laboratory counterflow configurations result in significant alterations of the rate of strain attributed to the flow external to the flame. The analysis involves the classical sequence of calculating the first order inviscid flow, which in the present case yields the currently available expression for the rate of strain, the first order inner flow describing the structure of the flame including the displacement thickness of the flame and finally the second order outer flow yielding the correction to the rate of strain. Comparisons are made with some experimental and fully numerical results to demonstrate the significant alterations in the rate of strain produced by the displacement effects associated with heat release....Flame, Combustion, Asymptotic analysis, Reynolds number.

DESCRIPTORS: (U) *DISPLACEMENT, *FLAMES, COMBUSTION, COMPARISON, CONFIGURATIONS, CORRECTIONS, EXTERNAL, FLOW, HEAT, INVISCID FLOW, LABORATORIES, NUMBERS, RATES, RELEASE, REYNOLDS NUMBER, SEQUENCES, STRUCTURES.

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THICKNESS, YIELD, REPRINTS, LAMINAR FLOW,
STRAIN(MECHANICS), ASYMPTOTIC SERIES, FUELS.

WISCONSIN UNIV-MADISON

(U) Molecular Properties and Fate of Organic Chemicals.

IDENTIFIERS: (U) PE61102F, WUAFOSR2308BS, Counterflowing
fuel-oxidizer streams.

DESCRIPTIVE NOTE: Final rept. 15 Aug 88-14 Aug 92.

SEP 92 231P

PERSONAL AUTHORS: Andren, Anders W.

CONTRACT NO. AFOSR-88-0301

PROJECT NO. 2312

TASK NO. A4

MONITOR: AFOSR, XC
TR-92-1016, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Quantitative structure property relationships (QSPRs) utilizing total molecular surface area (TSA) are evaluated for predicting physical-chemical properties (aqueous solubility and saturation vapor pressure) used to determine environmental partitioning and transport of hydrophobic organic contaminants. The theoretical relationship between the physical-chemical properties and TSA is reexamined and, methods and parameters for calculating TSA were compared including: standard (planar) geometries and bond lengths versus energy minimized molecular coordinates, van der Waals versus contact/reentrant surface area, and van der Waals radii. Two assumptions for estimating the molar free energy of fusion are also evaluated. A strong, thermodynamically sound relationship between TSA and aqueous solubility allows for solubility predictions of aromatic chemicals from 5 deg C to 40 deg C with an average absolute error of 92 degrees. A weaker, empirical relationship between saturation vapor pressure and TSA yields vapor pressure estimates for organic contaminants with an average absolute error of 232% between 5 deg C and 40 deg C. The results indicate that the work of cavity formation in water and/or the work of adhesion between the solute and water is the dominant term in the dissolution process, and is adequately described via a TSA-QSPR. Conversely, the work required to remove a molecule from bulk liquid to vapor is loosely related to

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TSA. The predicted physical-chemical properties can be used to determine the air/water partition coefficients of organic contaminants at environmental temperatures.

WORCESTER POLYTECHNIC INST MA

(U) Center for Shape Optimization and Material Layout.

DESCRIPTORS: (U) *CONTAMINANTS, *ORGANIC COMPOUNDS, *CHEMICAL COMPOUNDS, ADHESION, AIR, CAVITIES, CHEMICAL PROPERTIES, CHEMICALS, COEFFICIENTS, COORDINATES, ENERGY, ERRORS, ESTIMATES, FREE ENERGY, LIQUIDS, MOLECULES, PARAMETERS, PREDICTIONS, PRESSURE, SATURATION, SOLUBILITY, SOLUTES, SOUND, STANDARDS, STRUCTURES, SURFACES, TEMPERATURE, TRANSPORT, VAPOR PRESSURE, VAPORS, WATER, WORK, YIELD, MOLECULAR PROPERTIES, HYDROPHOBIC PROPERTIES, CHEMICAL BONDS, THERMODYNAMICS, AROMATIC COMPOUNDS, COLLOIDS, CHLORINATED HYDROCARBONS, DEGRADATION, ABIOTIC PROCESSES, THESES, POLYCHLORINATED BIPHENYLS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2312A4, QSPR(Quantitative Structure Property Relationships), Van der Waals radii, Fusion, TSA(Total Surface Area), PCBs.

DESCRIPTIVE NOTE: Final rept. 1 Jun 90-31 Oct 92,

92 233P

PERSONAL AUTHORS: Lurie, Konstantin A.; Northrup, James I.

CONTRACT NO. AFOSR-90-0288

PROJECT NO. 2304

TASK NO. A1

MONITOR: AFOSR, XC
TR-93-0009, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The final report reflects the development of a direct method of solving problems of optimal design of systems described by elliptic equations of the 2nd and 4th order. This method is based on a special 'polysaddle' transformation of the integrand of the corresponding maximum - problem applied to construct the appropriate two-sided bounds; an analytical and computational technique is developed to make this construction possible. Geometrical aspects of the above transform are discussed in detail as well as the material implementation of the corresponding layouts. The results obtained provide a theoretical basis for a direct computational assembling of the global layout from special laminar microstructures determined analytically by the aforementioned technique... Direct relaxation, Polysaddle transform, Convex hulls.

DESCRIPTORS: (U) *MICROSTRUCTURE, *NUMERICAL ANALYSIS, *SYSTEMS ENGINEERING, *CONDUCTION(HEAT TRANSFER), CONSTRUCTION, EQUATIONS, GLOBAL, MATERIALS, RELAXATION, TRANSFORMATIONS, ELASTIC PROPERTIES, OPTIMIZATION, SHAPE, PROBLEM SOLVING, COMPUTATIONS, TWO DIMENSIONAL.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A1.

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4I17L

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COLUMBIA UNIV NEW YORK DEPT OF CHEMISTRY

(U) Probing the Exchange Interaction Through Micelle Size.
1. Probability of Recombination of Triplet Geminate Radical Pairs.

DESCRIPTIVE NOTE: Scientific rept. 1991-1992.

92 11P

PERSONAL AUTHORS: Tarasov, Valery F.; Ghatila, Naresh D.;
Buchachenko, Anatolii L.; Turro, Nicholas J.

CONTRACT NO. AFOSR-91-0340

PROJECT NO. 2303

TASK NO. B2

MONITOR: AFOSR, XC
TR-92-0887, AFOSR

UNCLASSIFIED REPORT

Availability: Pub in Jnl. of American Chemical Society,
v114 p9517-9526 1992. Available only to DTIC users. No
copies furnished by NTIS.

ABSTRACT: (U) The probability of recombination (Pr) of
the primary geminate radical pairs derived from optically
active methyldeoxybenzoin (MDB) and from
diastereomerically pure 2,4-diphenylpentan-3-one (DPP)
have been determined in alkyl sulfate micelles of
different sizes. These probabilities have been measured
by monitoring the extent of isomerization in the
recovered ketone as a function of conversion. The Pr
values for these two ketones, as a function of micelle
size, display disparate behavior: P, for MDB increases as
the micelle size increases. While P, for DPP decreases as
the micelle size increases. Simple kinetic models which
neglect distance-dependent interactions fail, even
qualitatively, in predicting this trend. A theoretical
treatment which explicitly considers (1) a distance-
dependent electron spin exchange interaction (ESE); (2)
micelles with a permeable boundary and (3) a coefficient
of mutual diffusion that is a function of the micelle
size is presented. The permeability of the micelle
boundary is treated by introduction of boundary factor in

an improved theoretical model. This adjustment allows us
to model radical escape as only occurring from the
boundary and does not force us to consider it as a site-
independent monoexponential process. Experimental
evidence for a micelle size-dependent coefficient of
mutual diffusion is presented. Reasonable fits for MDB
and DPP, at both the qualitative and quantitative levels,
are obtained using this model; omission of any one of the
three parameters during the fitting procedure results in
an unacceptable deterioration in the quality of the match
between the measured and the calculated values....
Micelles, Primary geminate radical pairs, Electron spin
exchange.

DESCRIPTORS: (U) *EXCHANGE, *INTERACTIONS, *PROTOPLASM,
BOUNDARIES, COEFFICIENTS, CONVERSION, CROSSINGS,
DETERIORATION, DIFFUSION, ELECTRONS, FITTINGS, FUNCTIONS,
ISOMERIZATION, KETONES, KINETICS, MODELS, MONITORING,
PARAMETERS, PERMEABILITY, PROBABILITY, QUALITY, RATES,
SITES, SULFATES, VALUE, REPRINTS, PROBES, OPTICAL
PROPERTIES, BENZOIN, ORGANIC COMPOUNDS, ALKYL RADICALS,
CHEMICAL REACTIONS, MOLECULES.

IDENTIFIERS: (U) PE81102F, WUAFOSR230382, *Micelles,
Recombination, Triplet geminate radical pairs,
MDB(Methyldeoxybenzoin), DPP(2-4-Diphenylpentan-3-one),
ESE(Electron Spin Exchange), *Distance-dependent,
Interactions.

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AD-A260 083 7/2 6/1 6/4 AD-A260 083 CONTINUED

COLUMBIA UNIV NEW YORK LOWELL MEMORIAL LIBRARY

Ascidians, Vanadium, Tunichromes, Electron paramagnetic spectroscopy.

(U) Reactivity of Tunichromes: Reduction of Vanadium (V) and Vanadium (IV) to Vanadium (III) at Neutral pH.

DESCRIPTIVE NOTE: Scientific rept. 1991-1992.

DESCRIPTORS: (U) *OXIDATION REDUCTION REACTIONS,

*VANADIUM, *ORGANIC PIGMENTS, BLOOD, ACCUMULATION, BUFFERS, ELECTRONS, MIXTURES, OCEANS, SEA WATER, SIGNALS, SPECTROSCOPY, WATER, REPRINTS, REACTIVITIES, PH FACTOR, ELECTRON PARAMAGNETIC RESONANCE, BIOLOGY, IONS, LIGANDS, OXYGEN, IN VIVO ANALYSIS.

92 3P

PERSONAL AUTHORS: Ryan, Daniel E.; Ghatlia, Narash D.; McDermott, Ann E.; Turro, Nicholas J.; Nakanishi, Koji

IDENTIFIERS: (U) PE61102F, WJAF0SR2303B2, *Tunichromes, Ascidians, Complexation, Catechals..

CONTRACT NO. AFOSR-91-0340

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR, XC
TR-92-0986, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of American Chemical Society. p9859-9860 1992. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) It is well known that some species of ascidians concentrate vanadium from sea water 10(exp 3)-10(exp 7) fold. However, despite the effort of many groups, the mechanism for this concentration and the biological role of vanadium has remained elusive. It has been suspected that tunichromes (a family of ascidian blood pigments) are involved in this, extraordinary accumulation by complexation and/or reduction, but any relationship between tunichromes and vanadium in vivo has not been revealed. We now have obtained the first evidence showing the ability of tunichrome to generate V(III) in vitro. Reactions-between synthetic tunichrome (Mn-1) and V(V) or V(IV) were carried out in pH 7 buffer. In order to determine the oxidation state(S) of the product vanadium, product mixtures were adjusted to pH 2 and the V(IV) EPR signal of each mixture was measured. Subsequent treatment with O2 converted V(III) to V(IV) at pH 2, and any increase in the EPR signal was measured. Mn-1 was found to completely reduce V(V) (1 mol-equiv) to V(III). Furthermore, Mn-1 reduces V(IV) to V(III), apparently after complexation of Mn-1 is complete....

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4I17L

AD-A260 059 20/4

MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF MECHANICAL
ENGINEERING(U) Three-Dimensional Vortex Simulation of Rollup and
Entrainment in a Shear Layer.

NOV 91 52P

PERSONAL AUTHORS: Knio, Omar M.; Ghoniem, Ahmed F.

CONTRACT NO. AFOSR-89-0491

PROJECT NO. 2308

TASK NO. 8S

MONITOR: AFOSR, XC
TR-92-0889, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Computational Physics, v87
n1 p172-223 Nov 91. Available only to DTIC users. No
copies furnished by NTIS.

ABSTRACT: (U) The transport element method is extended to three dimensions to study the evolution of scalar fields in a flow with high vorticity concentration. Two grid-based on two grid-free methods for the computation of vorticity stretching are implemented. The methods are applied to study the evolution of an initially two-dimensional shear layer, perturbed in the streamwise and spanwise directions. Preferential entrainment is detected along the spanwise direction due to the streamwise vorticity... Numerical analysis, Vortex methods, Shear layers.

DESCRIPTORS: (U) *VORTICES, *TURBULENT FLOW, COMPUTATIONS, ENTRAINMENT, FLOW, GRIDS, LAYERS, NUMERICAL ANALYSIS, TRANSPORT, TWO DIMENSIONAL, THREE DIMENSIONAL, TURBULENT BOUNDARY LAYER, EQUATIONS OF MOTION.

IDENTIFIERS: (U) PE81102F, WJAFOSR23088S, Vorticity, Shear layers, *Shear flow.

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WISCONSIN UNIV-MADISON DEPT OF CHEMISTRY

(U) New 2,4,6-Trisopropylphenyl-Substituted Disilenes,

92 7P

PERSONAL AUTHORS: Archibald, R. S.; van den Winkel, Yvar;
Millevoite, Anthony J.; Desper, John M.; West, Robert

CONTRACT NO. AFOSR-89-0004

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR, XC
TR-92-0885, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Organometallics, v11 p3276-3281
1992. Available only to DTIC users. No copies furnished
by NTIS.

ABSTRACT: (U) In this paper we report the synthesis of E and Z isomers of the first silyl-substituted disilene, 1,2-bis(trimethylsilyl)-1,2-bis(2,4,6-trisopropylphenyl) disilene (1), as well as the analogous tert-butyl compounds (E)-2 and (Z)-2. In addition, the synthesis of several heteroatom-substituted trisilanes, $\text{Is(X)Si(Me)Si}2$, is reported, along with results of photolysis of these compounds.

DESCRIPTORS: (U) *ORGANOMETALLIC COMPOUNDS, REPRINTS, POLYSILANES, PHENYL RADICALS, PROPYL RADICALS, SYNTHESIS, PHOTOLYSIS, X RAYS, CRYSTAL STRUCTURE ISOMERS, DIMERS, SILICON, CHEMICAL BONDS, BUTYL RADICALS, ATOMS, ORGANIC COMPOUNDS, SYNTHESIS.

IDENTIFIERS: (U) PE81102F, WJAFOSR230382, *2,4,6-Trisopropylphenyl, *Disilenes, Silyl radicals, Substituents, Heteroatoms.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

AD-A280 058 7/8 7/4 11/2
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

AD-A280 047 12/3
STANFORD UNIV CA

(U) Organosilicon Compounds and Polymers and Silicon Ceramics.

(U) Topics in Stochastic Systems, Failure Time Models Change-Point Problems, and Sequential Analysis.

DESCRIPTIVE NOTE: Final rept. 1 Nov 88-31 Dec 92.

DESCRIPTIVE NOTE: Final rept. 1 Jun 89-31 May 92.

NOV 92 15P

DEC 92 5P

PERSONAL AUTHORS: Seyferth, Dietmar

PERSONAL AUTHORS: Siegmund, David

CONTRACT NO. AFOSR-88-0040

CONTRACT NO. AFOSR-89-0355

PROJECT NO. 2303

PROJECT NO. 2304

TASK NO. B2

TASK NO. A5

MONITOR: AFOSR, XC
TR-92-1015, AFOSR

MONITOR: AFOSR, XC
TR-93-0010, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) A three-year summary of the principal investigator's research on organosilicon chemistry directed toward ceramics synthesis.... Preceramic polymers, Polysilanes, Polycarbosilanes, Silicon carbide.

ABSTRACT: (U) Fundamental progress was made in the sequential and fixed sample detection and estimation of abrupt changes in stochastic systems and in the related problem of adaptive control of dynamical systems with time varying parameters. Also studied were recursive estimation and adaptive control of linear stochastic systems, where an essentially complete asymptotic solution was developed for the problem of adaptive estimation of inputs to keep the output of a system close to a fixed target. Advances were made in regression analysis of censored failure time data, inference in nonlinear regression models, and sequential analysis. Related probability theory involving boundary crossing problems and approximate distributions of maxima of random fields was developed.

DESCRIPTORS: (U) *POLYMERS, *SILICON, *ORGANIC COMPOUNDS, CARBIDES, CHEMISTRY, POLYSILANES, SILICON CARBIDES, SYNTHESIS, CERAMIC MATERIALS, CATALYSIS.

DESCRIPTORS: (U) *SEQUENTIAL ANALYSIS, *STATISTICAL SAMPLES, *STOCHASTIC PROCESSES, BOUNDARIES, CONTROL, DETECTION, DISTRIBUTION, FAILURE, INPUT, OUTPUT, PARAMETERS, PROBABILITY, REGRESSION ANALYSIS, TIME, ADAPTIVE CONTROL SYSTEMS, ESTIMATES, MATHEMATICAL MODELS, VARIATIONS.

IDENTIFIERS: (U) PE81102F, WJAFOSR2303B2, *Organosilicon compounds, Polycarbosilanes, Preceramic polymers, Poly(Vinylsilane), Borasilazanes, Poly(Methylsilane), Metallocene.

IDENTIFIERS: (U) PE81102F, WJAFOSR23041A5.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

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AD-A260 039 CONTINUED

COLUMBIA UNIV NEW YORK COLUMBIA ASTROPHYSICS LAB

MATHEMATICAL MODELS, FLUID DYNAMICS.

(U) Chaotic Dynamics of the Solar Cycle.

IDENTIFIERS: (U) Helioseismology, Solar tachocline,
Nonlinear oscillators, PE61102F, WJAFOSR2311AS.

DESCRIPTIVE NOTE: Annual rept. 1 Nov 91-30 Nov 92,

NOV 92 7P

PERSONAL AUTHORS: Spiegel, Edward A.

CONTRACT NO. F49620-92-J-0061

PROJECT NO. 2311

TASK NO. AS

MONITOR: AFOSR, XC
TR-92-0996, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In modeling the solar cycle we proceed on the assumption that the processes driving the solar cycle are deterministic. In that case, a chaotic model is a good choice for a description of its complexity. In our modeling, we suppose that the solar activity variation is composed of two distinct, coupled processes, one a conventionally chaotic system, and the other a nonlinear oscillator. This idea comes directly from our analysis of the observations. Since the sun's rotation period is one month, we do not use the daily sunspot number, but work with its monthly average. This quantity shows both the cyclic variation on the eleven year time scale and additional strong fluctuations. If we smooth the data to remove periods less than a year to two, we see the solar cycle clearly exposed. When we subtract this smoothed sunspot number from the monthly average, we obtain the fluctuations in the sunspot number. In figure 1 we show a comparison between the monthly averaged number and the fluctuations for a few cycles. There is a clear correlation between the level of solar activity, as measured by the sunspot number, and the amplitude of the fluctuations in this number. The fluctuations and the cyclic behavior, we suggest correspond to two distinct but interacting processes.

DESCRIPTORS: (U) *SOLAR CYCLE, *SUNSPOTS, *CHAOS,
DYNAMICS, PERIODIC VARIATIONS, SOLAR ACTIVITY,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

AD-A259 958 12/1 12/5

AD-A259 957 5/8

PROGRAM DEVELOPMENT CORP OF SCARSDALE INC NY

GEORGIA UNIV RESEARCH FOUNDATION INC ATHENS

(U) Interactive Grid Generation on Small Computers.

(U) Effects on Learning of Individual Differences in Inferencing Ability.

DESCRIPTIVE NOTE: Final rept. 30 Sep 90-29 Sep 92,

DESCRIPTIVE NOTE: Final rept. 1 Jun 89-31 Aug 92.

NOV 92 52P

SEP 92 57P

PERSONAL AUTHORS: Lu, Ming; Nikfetrat, Koorosh; Eiseman, Peter

PERSONAL AUTHORS: Britton, Bruce K.

CONTRACT NO. F49620-90-C-0080

CONTRACT NO. AFOSR-89-0515

PROJECT NO. 3005

PROJECT NO. 2313

TASK NO. A1

TASK NO. A9

MONITOR: AFOSR, XC
TR-93-0022, AFOSRMONITOR: AFOSR, XC
TR-93-0012, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) Progress has been made in both algebraic and elliptic grid generation. (1) The control point form (CPF) of algebraic grid generation has been improved in two aspects. First, new blending functions are developed which allow a computer software user to specify the locations of control surfaces arbitrarily. Second, a new implementation scheme is used in the CPF to recapture the clustering feature of given grids. (2) An effective technique of curvature control in elliptic grid generation has been developed and implemented to control the grid point distribution along curved boundaries.

DESCRIPTORS: (U) *GRIDS, *INTERACTIVE GRAPHICS, BLENDING, BOUNDARIES, CLUSTERING, COMPUTERS, CONTROL, CONTROL SURFACES, CURVATURE, SURFACES, CORRECTIONS.

IDENTIFIERS: (U) PE85502F, WJAFOSR3005A1.

ABSTRACT: (U) In an earlier report, we accounted for about 83% of the variance in learning from instructional text, by regression equations using cognitive gaps in the text, with gap frequency measured by Kintsch's computer model of reading. The present studies tested three ways to improve Air Force recruits' learning from instructional text: (1) We developed an individual differences model of recruits' abilities needed to overcome the negative effects of the cognitive gaps in text. Tests on 211 Air Force recruits showed the model accounted for 54% of the variance in learning. The individual differences tests can be used to select and classify recruits; (2) We developed cognitive science methods of revising Air Force instructional texts to improve their learnability. The methods more than doubled the learnability of the revised text; and (3) We developed two computer job aids that editors can use to improve Air Force instructional texts by implementing our revision methods. Tests showed that (a) cognitive gaps were present at high frequency in each of a random sample of Air Force texts, and (b) measures calculated by the job aids were correlated as much as .62 with learning from instructional text. The revision methods can be used to improve most Air Force instructional texts.... Learning, Individual differences, Inference, Comprehension, Working memory, Prior knowledge.

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AD-A259 956 12/3

WHARTON SCHOOL PHILADELPHIA PA

DESCRIPTORS: (U) *LEARNING, *READING, *ACHIEVEMENT TESTS, *APTITUDE TESTS, *TEST CONSTRUCTION(PSYCHOLOGY), *FUNCTIONAL MATERIALS, COGNITION, COMPREHENSION, JOBS, MODELS, RECRUITS, INDIVIDUALIZED TRAINING, AIR FORCE PERSONNEL, TRAINING DEVICES, REGRESSION ANALYSIS, CLASSIFICATION, PERSONNEL SELECTION, AIR FORCE RESEARCH, COMPUTER APPLICATIONS.

(U) Probability and Statistics Applied to the Theory of Algorithms.

DESCRIPTIVE NOTE: Final rept. 1 May 91-31 May 92.

DEC 92 14P

IDENTIFIERS: (U) PE81102F, WUAFOSR2313A9, Kintsch computer reading model, Cognitive science, Computer job aids, Inference.

PERSONAL AUTHORS: Steele, J. M.

CONTRACT NO. AFOSR-91-0259

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XC
TR-93-0015, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This grant has the central aim of exploring when, and how, probability is useful in the theory of algorithms. Most of the problems reviewed have their origins in the area of Euclidean Combinatorial Optimization, which might be operationally defined as the theory that has evolved out of the study Euclidean traveling salesman problem (TSP), the minimal spanning tree problem, and the minimal matching problem. Probability enters the study of such problems by two different paths. One path calls on exogenous randomization in the course of a genuine probabilistic algorithm. This path is of increasing importance in many areas, and on an elementary level is well illustrated by the method of simulated annealing. A second path of considerable importance calls on the introduction of stochastic models for the problem inputs. One then uses probability theory to understand as deeply as possible the behavior of the associated objective functions. This understanding is used subsequently to guide algorithm design.

DESCRIPTORS: (U) *ALGORITHMS, *PROBABILITY, *SYSTEMS APPROACH, ANNEALING, GRANTS, INPUT, MATCHING, MODELS, OPTIMIZATION, PATHS, THEORY, TREES, APPLIED MATHEMATICS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5.

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AD-A259 954 6/5 5/8 6/4

RUTGERS - THE STATE UNIV NEW BRUNSWICK NJ DEPT OF
PHYSIOLOGY

TEXAS UNIV MEDICAL SCHOOL AT HOUSTON DEPT OF NEUROBIOLOGY
AND ANATOMY

(U) Eye Movements and Visual Information Processing.

(U) Analysis and Synthesis of Adaptive Neural Elements and
Assemblies.

DESCRIPTIVE NOTE: Annual rept. 30 Sep 91-29 Sep 92.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 91-30 Sep 92.

92 4P

DEC 92 8P

PERSONAL AUTHORS: Kowler, Eileen

PERSONAL AUTHORS: Byrne, John H.

CONTRACT NO. AFOSR-91-0342

CONTRACT NO. AFOSR-91-0027

PROJECT NO. 2313

PROJECT NO. 2312

TASK NO. CS

TASK NO. A1

MONITOR: AFOSR, XC

TR-93-0024, AFOSR

MONITOR: AFOSR, XC

TR-93-0028, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The central goal of the project funded by the current grant is the understanding of how saccadic eye movements are used to accurately localize objects in space. Explaining accurate localization is a real problem because the objects we choose to look at are relatively large -- typically extending over several degrees of space -- but the saccadic eye movement must land at one place within the target. Our published research suggests that the computation requires a sequence of two stages: (1) voluntary attentional weighting of information in the visual display, and (2) automatic-spatial-pooling of the weighted formation (He and Kowler, 1989; 1991).

ABSTRACT: (U) Between October 1, 1991 and September 30, 1992, progress was made in four areas. First, the capabilities of SNAPE, a general purpose Simulator for Neural Networks and Action Potentials, were enhanced by incorporating mathematical descriptions of intracellular levels of Ca^{2+} and second messenger systems, which in turn modulate membrane conductances. Second, cellular mechanisms underlying operant conditioning were investigated in simulations of neural networks with biologically realistic properties. In one neural network, a learning rule (activity-dependent neuromodulation), which has been proposed as a cellular mechanism for classical conditioning, was demonstrated to support many features of operant conditioning. A second neural network was developed that simulates the biophysical properties of the neurons and synaptic interactions in a central pattern generator (CPG) underlying aspects of feeding behavior -- a behavior that can be modified by operant conditioning. Third, experiments characterized the modulatory actions of transmitters on the synaptic connections and the intrinsic biophysical properties of neurons in the feeding CPG. Fourth, extensions were made to the single-cell model of associative learning by incorporating quantitative descriptions of the modulation of membrane currents by 5-HT... Learning, Memory.

DESCRIPTORS: (U) *EYE MOVEMENTS, *POSITION(LOCATION), *VISUAL TARGETS, *WEIGHTING FUNCTIONS, *VISION, AUTOMATIC, COMPUTATIONS, EYE, SEQUENCES, AIR FORCE RESEARCH.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313CS, Saccadic eye movements.

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AD-A259 954 CONTINUED

Information storage, Artificial intelligence, Neuronal and neural network computations.

DESCRIPTORS: (U) *NERVE CELLS, *NEURAL NETS, *SIMULATION, *CONDITIONING(LEARNING), *ARTIFICIAL INTELLIGENCE, *SYNAPSE, *PATTERN RECOGNITION, BEHAVIOR, COMPUTATIONS, INTERACTIONS, LEARNING, MEMBRANES, MODELS, MODULATION, NETWORKS, SIMULATORS, STORAGE, TRANSMITTERS, MEMORY(PSYCHOLOGY), AIR FORCE RESEARCH, CALCIUM.

IDENTIFIERS: (U) PE81102F, WUAFOSR2312A1, CPG(Central Pattern Generator), SNNAP(Simulator for Neural Networks and Action Potentials), Information storage.

AD-A259 953 24/4 7/2 13/8 7/3

TECHNICAL RESEARCH ASSOCIATES INC SALT LAKE CITY UT

(U) The Minimization of Organic and Metallic Industrial Waste Via LEMNA MINOR Concentration.

DESCRIPTIVE NOTE: Final rept. 1 Sep 91-1 Dec 92,

DEC 92 43P

PERSONAL AUTHORS: Bowers-Irons, Gail L.

CONTRACT NO. F49620-91-C-0078

PROJECT NO. 2312

TASK NO. A4

MONITOR: AFOSR, XC
TR-93-0032, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In recent years, new strict environmental laws have required improved and cost-effective water purification methods by Air Force complexes. Naturally assisted primary units (microbiological) and secondary units (macrophyte) could bring waste treatment systems into tighter compliance. Aquatic macrophytes which have rapid growth rates and absorb large quantities of nutrients could provide a practical and economic method for more complete wastewater maintenance, hazardous waste clean-up or river, lake and ground water purification. This work has shown that Lemna minor, or Common Duckweed, can successfully and thoroughly accumulate organics and metals from Air Force wastewaters.

DESCRIPTORS: (U) *PURIFICATION, *WATER, *ORGANIC MATERIALS, *INDUSTRIAL PLANTS, AIR, AIR FORCE, COSTS, ECONOMICS, GROUND WATER, HAZARDOUS WASTES, LAKES, MAINTENANCE, METALS, NUTRIENTS, QUANTITY, RATES, RIVERS, SECONDARY, WASTE TREATMENT, WASTE WATER, WASTES, WORK, METALS, ENVIRONMENTAL PROTECTION, MICROBIOLOGY.

IDENTIFIERS: (U) PE81102F, WUAFOSR2312A4, Minimization, Lemna minor concentration, Macrophyte, Common duckweed.

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MICHIGAN UNIV ANN ARBOR GAS DYNAMICS LABS

(U) High Resolution Measurements of Mixing and Reaction Processes in Turbulent Flows.

mixing and non-equilibrium reaction chemistry in turbulent combustion.... Turbulent flows, Turbulent mixing, Turbulent reacting flows, Turbulent combustion, Turbulent flames.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 91-31 Sep 92,

NOV 92 34P
DESCRIPTORS: (U) *HIGH RESOLUTION, *MEASUREMENT, *MIXING, *TURBULENT FLOW, *CHEMICAL REACTIONS, APPROACH, CHEMICALS, CHEMISTRY, COMBUSTION, DISSIPATION, DISTRIBUTION, EXTINCTION, FINES, FLAMES, FOLDING, FORMULATIONS, FOUR DIMENSIONAL, LAYERS, MAPS, MODELS, PARAMETERS, RATES, REACTION KINETICS, REGIONS, RESOLUTION, SCALE, SEPARATION, STRUCTURES, TOPOLOGY, IMAGES, MOLECULAR STATES, AIR BREATHING, PROPULSION SYSTEMS.

PERSONAL AUTHORS: Dahm, Werner J.

CONTRACT NO. AFOSR-89-0541

PROJECT NO. 2308

TASK NO. BS

MONITOR: AFOSR, XC
TR-93-0029, AFOSR

IDENTIFIERS: (U) PE81102F, WUAFOSR2308BS, Scalar dissipation, Nonequilibrium reaction, Thin layers, Spatio-temporal imaging, Lognormal, Stretching and folding process, reacting flow.

UNCLASSIFIED REPORT

ABSTRACT: (U) High resolution multi-dimensional imaging measurements were reported of the detailed structure of mixing and combustion processes in turbulent flows. These measurements are unique because they provide the first fully-resolved quantitative data on scalar dissipation rate field structure in turbulent reacting flows. These molecular mixing rate data were coupled with a two-parameter non-equilibrium reaction chemistry formulation to generate instantaneous maps of combustion species concentration and reaction rate fields in turbulent flames under varying degrees of chemical non-equilibrium. Results showed that the reaction zone structure transitioned smoothly from a thin layer-like structure to broad distributed reaction zones as the flame extinction limit was approached. Additionally, fully-resolved four-dimensional spatio-temporal imaging measurements were used to measure the larger scale topology of these scalar dissipation layers. Results showed that the distribution of layer separations is very nearly lognormal. This finding verified a recent analytical model of the multiplicative character of the repeated stretching and folding processes leading to this layer-like structure in the scalar dissipation fields in turbulent flows. This model, coupled with this two-parameter non-equilibrium reaction chemistry formulation, provides a simple approach for predicting the fine structure of molecular

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COGNITECH INC SANTA MONICA CA

AD-A259 950 20/6

ARIZONA UNIV TUCSON DEPT OF MATHEMATICS

(U) Feature-Oriented Signal Processing Under Nonlinear
Partial Differential Equations.

(U) Nonlinear Optics and Turbulence.

DESCRIPTIVE NOTE: Final rept. 1 Nov 89-31 Oct 92,

DESCRIPTIVE NOTE: Final rept. 1 Dec 89-30 Nov 92.

92 33P

OCT 92 28P

PERSONAL AUTHORS: Osher, Stanley; Rudin, Leonid

PERSONAL AUTHORS: Newell, Alan C.

CONTRACT NO. F49620-90-C-0011

CONTRACT NO. AFOSR-90-0021

PROJECT NO. 2304

PROJECT NO. 3396

TASK NO. A5

TASK NO. A5

MONITOR: AFOSR, XC
TR-93-0023, AFOSR

MONITOR: AFOSR, XC
TR-93-0013, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) A successful nonlinear partial differential equation based approach to restoration was carried out. ENO least squares, shock filters, feature detectors and total variation based deconvolution techniques were combined. Also rigorous morphological methods and wavelet analysis were developed and used to restore noisy, blurry images.

ABSTRACT: (U) The ongoing and primary goal of the research is the pursuit of understanding of nonlinear processes in natural phenomena arising in optics and fluids. A considerable share of our attention is devoted to nonlinear optics, a relatively young subject, extremely rich in scientific and technological potential. While the studies focus on scientific questions connected with laser diode arrays, beam instabilities and the behavior of light beams at interfaces between nonlinear dielectrics, the technological ramifications and future opportunities are in many cases obvious. Optics also serves as a useful paradigm for gaining an increased understanding in other fields. For example, turbulence in patterns and defects which appear in feedback cavities and counterpropagating beams may be more analytically tractable than in other branches of continuous mechanics. There is little doubt that nonlinear optics is a subject in which interest is increasing.

DESCRIPTORS: (U) *NONLINEAR DIFFERENTIAL EQUATIONS, *SIGNAL PROCESSING, *APPLIED MATHEMATICS, DETECTORS, DIFFERENTIAL EQUATIONS, FILTERS, IMAGES, PARTIAL DIFFERENTIAL EQUATIONS, SHOCK, VARIATIONS, IMAGE PROCESSING.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5.

DESCRIPTORS: (U) *NONLINEAR OPTICS, ARRAYS, CAVITIES, DIELECTRICS, DIODES, FEEDBACK, FILAMENTS, FLUIDS, INTERFACES, LASERS, LIGHT, OPTICS, TURBULENCE, NONLINEAR SYSTEMS, LASER BEAMS, ELECTROMAGNETIC WAVE PROPAGATION, FLUID MECHANICS.

IDENTIFIERS: (U) PE81103F, WUAFOSR3396A5.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

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AD-A259 949 CONTINUED

NAVAL RESEARCH LAB WASHINGTON DC LAB FOR COMPUTATIONAL
PHYSICS AND FLUID DYNA MICS

LAYER, COMBUSTION, COMPUTATIONS, DEFLAGRATION, ENERGY,
FLOW, FUELS, LAYERS, MODELS, REGIONS, SHOCK, SIMULATION,
STABILITY, SUPERSONIC FLOW, TIME, NAVIER STOKES EQUATIONS.

(U) Numerical Studies for the RAM Accelerator.

IDENTIFIERS: (U) PEB1102F, WUAFOSR2308BS, Ram
accelerators.

DESCRIPTIVE NOTE: Final rept. 1 Jan 80-30 Sep 92.

DEC 92 19P

PERSONAL AUTHORS: Oran, Elaine S.; Li, Chipping;
Kallasanath, K.

PROJECT NO. 2308

TASK NO. 8S

MONITOR: AFOSR, XC
TR-93-0020, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Time-dependent, multidimensional computations were performed to study basic issues related to the structure of shocks, detonations, and modes of combustion affecting the feasibility or performance of the ram accelerator. A focus was on understanding of the structure and stability of oblique detonations generated by oblique shocks in supersonic fuel-air mixtures. The simulations show that steady, oblique detonations can be stabilized in supersonic flows and that they have very complex, multidimensional structures. Basic elements of such detonation structure include: (1) a nonreactive, oblique shock, (2) an induction zone, (3) a set of deflagration waves, and (4) a reactive shock in which the shock front is closely coupled with the energy release. This structure is stable and resilient to disturbances in the flow in a wide range of flow and mixture conditions. The conditions under which the overall detonation structure becomes unstable have also been identified. Preliminary studies which compared extremely resolved Navier-Stokes simulations to a boundary-layer model indicate some fundamental disagreements between the model and the simulations which require further investigations to resolve... Ram-accelerators, Oblique detonations, Supersonic flows, Numerical simulation.

DESCRIPTORS: (U) *DETONATIONS, *MIXTURES, *FUEL AIR
RATIO, *NUMERICAL ANALYSIS, AIR, BOUNDARIES, BOUNDARY

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CALIFORNIA INST OF TECH PASADENA

(U) Mixing in Gas Phase Turbulent Jets.

DESCRIPTIVE NOTE: Doctoral thesis.

88 267P

PERSONAL AUTHORS: Dowling, David R.

CONTRACT NO. AFOSR-83-0213

PROJECT NO. 2308

TASK NO. BS

MONITOR: AFOSR, XC
TR-82-0995, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This work is an experimental investigation of the mixing of the nozzle fluid of a round, turbulent jet with the entrained reservoir fluid, using laser-Rayleigh scattering methods. The measurements, at Reynolds numbers of 5,000 and 18,000 cover the axial range from 20 to 80 jet exit diameters and resolve the full range of temporal and spatial concentration scales. The measured mean and rms values of the concentration, and the mean scalar dissipation rate, when estimated from the time derivative of concentration, are consistent with jet similarity laws. Concentration fluctuation power spectra are found to be self-similar along rays emanating from the virtual origin of the jet, and are consistent with the universal form of scalar spectra proposed by Gibson (1988 II). The probability density functions for the concentration, the time derivative of concentration, and the square of the time derivative of concentration, are compiled and are also found to be self-similar along rays. Features of the measured distributions and spectra are consistent with the existence of large-scale structures within the flow that span the local diameter of the jet's turbulent cone. On the centerline of the jet, the scaled probability density function of jet gas concentration is found to be almost independent of the Reynolds number while the local mixing rate in the inner part of the jet is not. The usual assumptions concerning isotropy and correlation of

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derivatives are found to lead to erroneous results for the probability density function of the scalar dissipation rate.

DESCRIPTORS: (U) *JET FLOW, *JET MIXING FLOW, *TURBULENT FLOW, *NOZZLE GAS FLOW, *ARGON LASERS, *PHOTODETECTORS, DENSITY, DIAMETERS, DISSIPATION, EXITS, FLOW, FLUIDS, LASERS, MEAN, MEASUREMENT, MIXING, POWER SPECTRA, PROBABILITY DENSITY FUNCTIONS, RAYLEIGH SCATTERING, RESERVOIRS, SCATTERING, SPECTRA, THESES, TIME, DATA ACQUISITION, TEMPERATURE, VELOCITY, ANALOG TO DIGITAL CONVERTERS, LIGHT SCATTERING, UNSTEADY FLOW.

IDENTIFIERS: (U) Rayleigh scattering, Turbulent mixing, Turbulent jets, Scalar dissipation, PE81102F, WUAFOSR2308BS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

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MINNESOTA UNIV MINNEAPOLIS SCHOOL OF PHYSICS AND ASTRONOMY

(U) High Temperature Superconducting Compounds.

DESCRIPTIVE NOTE: Final rept. 1 Sep 87-30 Sep 92.

NOV 92 19P

PERSONAL AUTHORS: Goldman, Allen M.

CONTRACT NO. AFOSR-87-0372

PROJECT NO. 2306

TASK NO. C1

MONITOR: AFOSR, XC
TR-93-0003, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The major accomplishment of this grant has been to develop techniques for the in situ preparation of high-Tc superconducting films involving the use of ozone-assisted molecular beam epitaxy. The techniques are generalizable to the growth of trilayer and multilayer structures. Films of both the DyBa2Cu3O(7-x) and YBa2Cu3O(7-x) compounds as well as the La(2-x)Sr(x)CuO4 compound have been grown on the usual substrates, SrTiO3, YSZ, MgO, and LaAlO3, as well as on Si substrates without any buffer layer. A bolometer has been fabricated on a thermally isolated SiN substrate coated with YSZ, an effort carried out in collaboration with Honeywell Inc. The deposition process facilitates the fabrication of very thin and transparent films creating new opportunities for the study of superconductor-insulator transitions and the investigation of photo-doping with carriers of high temperature superconductors. In addition to a thin film technology, a patterning technology has been developed. Trilayer structures have been developed for FET devices and tunneling junctions. Other work includes the measurement of the magnetic properties of bulk single crystal high temperature superconductors, and in collaboration with Argonne National Laboratory, measurement of electric transport properties of Ti-based high-Tc films.

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DESCRIPTORS: (U) *HIGH TEMPERATURE SUPERCONDUCTORS, ADDITION, BOLOMETERS, BUFFERS, CRYSTALS, DEPOSITION, DOPING, FABRICATION, FILMS, GRANTS, HIGH TEMPERATURE, JUNCTIONS, LABORATORIES, LAYERS, MAGNETIC PROPERTIES, MEASUREMENT, MOLECULAR BEAMS, OZONE, PREPARATION, SILICON, SINGLE CRYSTALS, STRUCTURES, SUBSTRATES, SUPERCONDUCTORS, TEMPERATURE, THIN FILMS, TRANSITIONS, TRANSPORT, TRANSPORT PROPERTIES, TUNNELING, WORK, INORGANIC COMPOUNDS, SILICON NITRIDES, FIELD EFFECT TRANSISTORS, COMPOSITE MATERIALS, EPITAXIAL GROWTH, DYSPROSIUM, BARIUM, COPPER, OXIDES, YTTRIUM, LANTHANUM, STRONTIUM, MAGNESIUM, TITANIUM, MAGNESIUM, ALUMINUM.

IDENTIFIERS: (U) WUAFOSR2306C1.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

AD-A259 925 20/11 12/5 12/1

AD-A259 925 CONTINUED

COMPUTATIONAL MECHANICS CD INC AUSTIN TX

(U) New Micro- and Macroscopic Models of Contact and Friction.

DESCRIPTIVE NOTE: Annual technical rept. no. 2, 1 Nov 81-31 Oct 92.

NOV 92 105P

PERSONAL AUTHORS: Tworzydło, W. W.; Cecot, W.; Oden, J. T.; Yew, C. H.

REPORT NO. TR-92-15

CONTRACT NO. F49620-91-C-0011

PROJECT NO. 2304, 2302

TASK NO. A3, C2

MONITOR: AFOSR, XC
TR-93-0008, AFOSR

UNCLASSIFIED REPORT

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

ABSTRACT: (U) This report summarizes work in the second year of a project devoted to the development of new asperity-based models of frictional interfaces. The main concept is to combine statistical homogenization methods with a realistic nonlinear finite element analysis of surface asperities, and thus produce new asperity-based models of contact and friction. The research in the first year of the project provided a complete theory and software for statistical homogenization of random surface parameters. In the second year of the project, the effort focused on the development of a finite element code for modeling of nonelastic surface asperities, as well as on the design and performance of the verification experiment. The asperity modeling code is based on an hp adaptive finite element kernel, with object-based data structure, error estimation and graphic user interface. The code is capable of modeling elastic and elasto-viscoplastic solids in contact with a rigid flat. In parallel with the code development, an experiment was designed and

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performed for custom-made asperities in contact with rigid surfaces. The results of these experiments compare favorably with numerical predictions of the finite element method. Finally, the results of the finite element analysis were used to construct the first asperity-based contact model of random surface. This work will continue in the next year.

DESCRIPTORS: (U) *FINITE ELEMENT ANALYSIS, *FRICTION, *SURFACE ROUGHNESS, *SOFTWARE ENGINEERING, ADHESION, ERRORS, GRAPHICS, INTERFACES, MODELS, PARAMETERS, PLATES, PREDICTIONS, SOLIDS, SURFACES, VERIFICATION, VISCOPLASTICITY, COMPUTER GRAPHICS, ELASTOPLASTICITY, MATHEMATICAL PREDICTION, TRACTION, DEFORMATION, LUBRICATION, CONTAMINANTS, STRESS STRAIN RELATIONS, DISPLACEMENT.

IDENTIFIERS: (U) *Friction, Asperity, Finite elements, WUAFOSR2304A3, WUAFOSR2302C2, Contact.

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AD-A259 877 CONTINUED

NORTHEASTERN UNIV BOSTON MA OFFICE OF SPONSORED PROJECTS

(U) Melatonin Action on the Circadian Pacemaker in Siberian Hamsters.

DESCRIPTIVE NOTE: Final rept. 1 Sep 91-31 Aug 92.

OCT 92 20P

PERSONAL AUTHORS: Darrow, Janet M.

CONTRACT NO. AFOSR-91-0393

PROJECT NO. 2312

TASK NO. A3

MONITOR: AFOSR, XC
TR-92-1017, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research investigates the effect of the hormone melatonin on the circadian clock of mammals, by examining daily locomotor activity rhythms in melatonin-infused Siberian hamsters, under a variety of environmental lighting conditions. Under conditions of constant darkness, daily melatonin infusions synchronized the hamster activity/rest rhythm. In constant light, melatonin also acted as a weak entraining agent and prevented the internal desynchronization which occurs in Siberian hamsters and in many mammals exposed to constant light. In a series of experiments simulating jet-lag conditions, melatonin infusions were found to alter the rate of re-entrainment of the circadian system after phase-shifting of the light cycle. These melatonin effects were influenced by light intensity and by phase of the hormone infusion. Measurements of melatonin receptor levels in the suprachiasmatic nuclei of Siberian hamsters has provided preliminary evidence for a daily rhythm of receptivity to melatonin in the circadian pacemaker of the mammalian hypothalamus, which may help explain the phase-dependency of melatonin effects on phase-shifting. Results of this study are relevant to the expanding clinical use of melatonin for treatment of a variety of temporal disorders, including jet-lag... Jet-lag, Melatonin, Circadian, Clock, Sleep/wake cycles.

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DESCRIPTORS: (U) *HAMSTERS, *MELATONIN, *PACEMAKERS, *CIRCADIAN RHYTHMS, CLOCKS, CYCLES, ENTRAINMENT, HORMONES, HYPOTHALAMUS, INFUSIONS, INTERNAL, JET LAG, LIGHT, MEASUREMENT, PHASE, SHIFTING, SLEEP, WAKE, REPRODUCTION(PHYSIOLOGY), DATA RATE, MEDICAL RESEARCH, SYNCHRONIZATION(ELECTRONICS), MENTAL DISORDERS, MOTOR DISORDERS.

IDENTIFIERS: (U) *Siberian hamsters, Circadian clock, Wheel running activity.

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AD-A259 836 CONTINUED

PENNSYLVANIA UNIV PHILADELPHIA DEPT OF BIOENGINEERING

(U) Multidimensional Signal Coding in the Visual System.

DESCRIPTIVE NOTE: Annual rept. no 2, 1 Nov 91-31 Oct 92.

NOV 92 8P

PERSONAL AUTHORS: Buchsbaum, Gershon

CONTRACT NO. AFDSR-91-0082

PROJECT NO. 2313

TASK NO. AS

MONITOR: AFDSR, XC
TR-92-1004, AFDSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The aims of this research are (1) To study the multidimensional spatio-temporo-chromatic signal processing capabilities of visual receptive fields. (2) To identify the key attributes of multidimensional image signals which are sensitive to receptive field filters and how these attributes are transformed for encoding beyond the receptive fields. By using digitized sequences of natural images, formulating a representation for natural images, and incorporating properties of specialized visual receptive fields and neural pathways we (1) Propose a model of how the early visual system efficiently codes natural time varying images, first by tracking part of the image, then by matching the spatiotemporal properties of the neural pathway to those of the tracked image. We also propose that retinal architecture which varies with eccentricity also matches the properties of the tracked image. (2) Develop a new model for signal propagation through multiple cell layers in the retina which can incorporate the different cell densities in retinal cell layers. (3) Propose that visual color receptive fields are matched to the spatio-chromatic structure of natural color images.... Visual system, Retina, Image coding.

DESCRIPTORS: (U) *CODING, *VISUAL PERCEPTION, *OPTICAL IMAGES, *COLOR VISION, *NEURAL NETS, *ARTIFICIAL INTELLIGENCE, CELLS, COLORS, DENSITY, ECCENTRICITY.

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FILTERS, MATCHING, MODELS, PROPAGATION, RETINA, SEQUENCES, SIGNAL PROCESSING, SIGNALS, TIME, TRACKING, TIME SIGNALS.
IDENTIFIERS: (U) PE61102F, WUAFDSR2313AS, Image coding, Visual system.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

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17/9

NEW MEXICO INST OF MINING AND TECHNOLOGY SOCORRO

AD-A259 805

20/14

ARIZONA UNIV TUCSON

(U) Remote Sensing of Precipitation and Electrification
With a Dual-Polarization, Coherent, Wideband Radar
System.

(U) Ultrastructure Processing of Advanced Materials.
DESCRIPTIVE NOTE: Final rept. 15 Feb 89-14 Aug 92,

DESCRIPTIVE NOTE: Annual rept. no. 3, 15 Jul 91-14 Jul 92,

NOV 92

750P

SEP 92

8P

PERSONAL AUTHORS: Uhlmann, Donald R.

PERSONAL AUTHORS: Krehbiel, Paul R.; Gray, Grant

CONTRACT NO. AFOSR-89-0238

CONTRACT NO. AFOSR-89-0480

PROJECT NO. 2303

PROJECT NO. 2310

TASK NO. A3

TASK NO. A1

MONITOR: AFOSR, XC

MONITOR: AFOSR, XC
TR-92-1001, AFOSR

MONITOR: AFOSR, XC

TR-92-0977, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The New Mexico Tech Wideband/Coherent Radar was shipped by rail to Kennedy Space Center on 17 July 1991. A problem in the transmitter cooling system delayed full operation until mid August. Electrification signatures were first observed on 15 September and numerous cases were documented between then and tear-down on 8 October. In addition, several cases of coordinated dual-Doppler and tomographic data were acquired in conjunction with the NCAR CP2 radar. Preliminary results have been presented in papers and conferences. After its return to New Mexico, several upgrades were made to the transmitter to increase reliability.

DESCRIPTORS: (U) *COHERENT RADAR, *ATMOSPHERIC ELECTRICITY, *STORMS, RELIABILITY, SIGNATURES, REMOTE DETECTORS, ATMOSPHERIC PRECIPITATION, CLOUD COVER, LIGHTNING, METEOROLOGY, RADAR EQUIPMENT.

IDENTIFIERS: (U) WUAFOSR2310A1, Wideband radar.

ABSTRACT: (U) The High Frequency(HF) radio band, commonly taken to be that portion of the electromagnetic spectrum lying between approximately 3 MHz and 30 MHz, remains a popular and often cost-effective alternative to communications satellites and terrestrial microwave links for low data rate signals such as teletype, and at sea or in underdeveloped areas. HF radio wave propagation is governed by reasonably well-understood, but not fully predictable, atmospheric phenomena. Determining the location of an HF transmitter is important since many vessels lack satellite terminals, and maritime distress signals must often be sent by HF, and requires both that a viable propagation path exists between the transmitter and receiver(s), and that the receiving station(s) be listening on the same frequency as the transmitter. This report reviews some of the fundamentals of HF propagation and investigates the relevance of historical information about which frequencies a given transmitter has used in the past under one set of atmospheric conditions to the question of what frequencies that same transmitter will use under a different, but known, set of atmospheric conditions.... High frequency radio band, HF radio wave propagation.

DESCRIPTORS: (U) *HIGH FREQUENCY, *RADIO TRANSMISSION, *ELECTROMAGNETIC WAVE PROPAGATION, ATMOSPHERICS, DISTRESS SIGNALS, MICROWAVES, PATHS, RADIO EQUIPMENT, RADIO WAVES,

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RECEIVERS, TRANSMITTERS, COMMUNICATION AND RADIO SYSTEMS,
IONOSPHERE, RADIOFREQUENCY.

IDENTIFIERS: (U) PES1102F, WUAFOSR2303A3, Ultrastructure,
Advanced, Alkaline, Sol-gel pathways, Clusters, Aerogels,
Xerogels.

AD-A259 803 6/4 6/1

KENT STATE UNIV OH

(U) Study of SCN Neurochemistry using In Vivo
Microdialysis in the Conscious Brain: Correlation with
Circadian Activity Rhythms.

DESCRIPTIVE NOTE: Final rept. 1 Nov 89-31 Oct 92.

DEC 92 14P

PERSONAL AUTHORS: Glass, J. D.; Hauser, U. E.; Randolph,
W.; Ferriers, S.; Rea, M. A.

CONTRACT NO. AFDSR-80-0047

PROJECT NO. 2312

TASK NO. A3

MONITOR: AFOSR, XC
TR-83-0031, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The central aim of this research is to provide information on the neurochemical processes that underlie the generation and entrainment of mammalian circadian rhythms. The studies are centered around the newly-developed in vivo brain microdialysis technique for assessing the daily patterns of neurotransmitter release in the suprachiasmatic nuclei (SCN) of freely-behaving hamsters. During the funded period, this approach has yielded several new findings related to the activities of serotonergic and excitatory amino acid systems in the SCN. Specifically, it was found that: there are daily variations in extracellular concentrations of 5-HIAA and glutamate in the SCN, with highest levels occurring at night; the daily release pattern of glutamate, but not serotonin, in the SCN is circadian in nature; the rhythm in glutamate measured in SCN microdialysate is based upon a non-synaptic, calcium-dependent mechanism and does not appear to be directly linked to the expression of locomotory behavior; and serotonergic transmission suppresses glutamate in SCN microdialysate, an effect possibly related to a modulatory effect of serotonin on glutamate release in the SCN. This also may be closely related to our finding that serotonin blocks light-induced Fos protein expression in the SCN.

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NEW JERSEY INST OF TECH NEWARK DEPT OF PHYSICS

DESCRIPTORS: (U) *CIRCADIAN RHYTHMS, *IN VIVO ANALYSIS,
*NEUROCHEMICAL TRANSMISSION, AMINO ACIDS, BEHAVIOR, BRAIN,
CALCIUM COMPOUNDS, HAMSTERS, NEUROTRANSMITTERS, PATTERNS,
PROTEINS, RELEASE, SEROTONIN, VARIATIONS, SEROLOGY,
SYNAPSIS, PACEMAKERS, IN VITRO ANALYSIS, GLUTAMIC ACID.

(U) Observation of Impulsive Acoustic Events and the
Excitation of Solar Oscillations.

DESCRIPTIVE NOTE: Annual rept. 1 Nov 91-31 Oct 92.

IDENTIFIERS: (U) PE81102F, WJAFOSR2312A3,
SCN(Suprachiasmatic Nuclei), *Glutamate.

DEC 92 14P

PERSONAL AUTHORS: Restaino, Sergio R.; Stebbins, Robin T.;
Goode, Philip R.

CONTRACT NO. F49620-92-J-0094

PROJECT NO. 2311

TASK NO. AS

MONITOR: AFOSR, XC
TR-92-1008, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The five-minute solar oscillation has been
exploited in numerous seismic studies in which internal
properties of the Sun have been inferred. It is generally
regarded that these modes are excited by turbulent
convection in the Sun's outermost layers. We observe the
oscillatory wakes caused by impulsive events, matching
those described by Lamb (1909). These correspond to the
events modeled by Goode, et al., which they associate
with excitation of the global five-minute oscillations....
Sun: Oscillations, Sun: Atmospheric motions, Sun:
Atmosphere.

DESCRIPTORS: (U) *ATMOSPHERIC MOTION, *OSCILLATION,
*SOLAR DISTURBANCES, *ACOUSTIC WAVES, EXCITATION, SUN,
WAKE, CONVECTION(ATMOSPHERIC), TURBULENCE, WAVE
PROPAGATION, ACOUSTIC VELOCITY.

IDENTIFIERS: (U) PE81102F.

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TEXAS UNIV AT AUSTIN DEPT OF PSYCHOLOGY

MASSACHUSETTS INST OF TECH CAMBRIDGE

(U) Individual Differences in Memory Decay and Retention.

(U) Vortex Simulation of Turbulent Combustion.

DESCRIPTIVE NOTE: Final rept. 1 Oct 90-30 Sep 92.

DESCRIPTIVE NOTE: Final rept. Sep 89-Aug 92.

92 9P

NOV 92 132P

PERSONAL AUTHORS: Young, Robert K.

PERSONAL AUTHORS: Ghoniem, Ahmed F.

CONTRACT NO. AFOSR-91-0014

CONTRACT NO. AFOSR-89-0491

PROJECT NO. 2313

PROJECT NO. 2308

TASK NO. A7

TASK NO. BS

MONITOR: AFOSR, XC
TR-92-1027, AFOSRMONITOR: AFOSR, XC
TR-92-1018, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) For nearly forty years the generally held belief has been that there were no individual differences in forgetting which were not the result of differences in original learning. This rather surprising conclusion was based on Underwood's 1954 article in which he looked at the retention of 'fast' and 'slow' learners. Initially, there were large differences between the retention of fast learners and slow learners. As might be expected, the fast learners recalled what they had learned at a much higher level than did the slow learners. But when Underwood then equated for initial learning, an interesting thing happened--the large difference in retention previously observed now disappeared. That is, when the probability of calling out an item was equated for fast and slow learners, the differences in retention between the fast and slow learners also disappeared. Several studies over the years confirmed Underwood's basic findings and it did indeed appear to be that there were no individual difference in forgetting or memory--only individual differences in initial learning.

DESCRIPTORS: (U) *LEARNING, *RETENTION(PSYCHOLOGY), PROBABILITY.

IDENTIFIERS: (U) *Memory, PE61102F, WJAFOSR2313A7.

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ABSTRACT: (U) During the course of this work, we focused on the extension of the vortex method and the transport element method to three-dimensional flows and to reacting flow with finite heat release, density variation and volumetric expansion. Problems explored in detail include the formation of streamwise vorticity in uniform-density and variable density flow, the effect of this vorticity on the rate of product formation and the effect of volumetric expansion due to heat release on shear layer growth rate.... Numerical Simulation, Turbulent combustion.

DESCRIPTORS: (U) *COMBUSTION, *SIMULATION, *TURBULENT FLOW, *VORTICES, DENSITY, EXPANSION, FLOW, HEAT, LAYERS, RATES, RELEASE, THREE DIMENSIONAL, TRANSPORT, UNIFORMS, VARIABLES, VARIATIONS, WORK, FLUID FLOW, SHEAR PROPERTIES, FLUID MECHANICS, NUMERICAL ANALYSIS.

IDENTIFIERS: (U) PE61102F, WJAFOSR2308BS.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4I17L

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COLUMBIA UNIV NEW YORK

gelsolin, Fluorescence, Excimers.

(U) Monomer and Excimer Fluorescence of Horse Plasma Gelsolin Labeled with N-(1-Pyrenyl)iodoacetamide.

DESCRIPTORS: (U) *EXCIMERS, *FLUORESCENCE, *HORSES, *MONOMERS, *MUSCLE PROTEINS, *BLOOD PLASMA, CHYMOTRYPSIN, CIRCULAR, DICHROISM, EMISSION, EXCITATION, GROUND STATE, GUANIDINES, HEAT, HEAT TREATMENT, HEATING, INTERACTIONS, MOLECULES, MUSCLES, PROBES, PROTEINS, RESIDUES, SPECTRA, STRUCTURES, REPRINTS, LABELED SUBSTANCES, ACETAMIDES, FOLDING, THERMAL PROPERTIES, DIMERS, MOLECULAR STRUCTURE.

PERSONAL AUTHORS: Ruiz Silva, Beatriz E.; Koepf, Edward K.; Burtnick, Leslie D.; Turro, Nicholas J.

CONTRACT NO. AFOSR-81-0340

IDENTIFIERS: (U) PE61102F, UAFOSR230382, *Gelsolin, *N-(1-Pyrenyl)iodoacetamide, Sulphydryl, Cys, Denaturation.

PROJECT NO. 2303

TASK NO. 82

MONITOR: AFOSR, XC
TR-92-0983, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Biochemistry and Cell Biology, v70 p573-578 1992. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) Horse plasma gelsolin was labeled with the sulphydryl-specific fluorescent reagent N(1-pyrenyl)iodoacetamide. The level of incorporation of probe was 1.8+ or -0.3 mol pyrene/mol gelsolin. The circular dichroism spectrum of pyrenyl-gelsolin and its ability to interact with muscle actin were not different from that found for unmodified gelsolin. The emission from pyrenyl-gelsolin was dominated by a broad emission band centered near 483 nm, characteristic of the presence of pyrene excimers. Analysis of excitation spectra for the monomer and excimer-type fluorescence suggested that ground-state pyrene pyrene interactions in doubly labeled gelsolin molecules, the modified Cys residues must be in close proximity in the folded protein structure. Thermal denaturation of gelsolin molecules, could be monitored by observing the decrease in excimer emission that accompanied heating and unfolding of the tertiary structure. While heat treatment alone did not eliminate excimer fluorescence, digestion of gelsolin with chymotrypsin completely abolished such emission. Also, pyrenyl-gelsolin prepared and studied in 6 M guanidine-HCl exhibited fluorescence characteristic of pyrene monomers exclusively..... Horse plasma gelsolin, Pyrenyl-

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AD-A259 743 CONTINUED

BOSTON UNIV MA

(U) Source Mechanisms and Radio Effects of Ionospheric
Plasma. IDENTIFIERS: (U) PE61102F, WUAFOSR23108S, Ionospheric
plasma.

DESCRIPTIVE NOTE: Annual rept. 1 Oct 91-30 Sep 92.

NOV 92 57P

PERSONAL AUTHORS: Lee, Min-Chang

CONTRACT NO. F49620-92-J-0001

PROJECT NO. 2310

TASK NO. 8S

MONITOR: AFOSR, XC
TR-92-1007, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: Prepared in cooperation with
Massachusetts Inst. of Technology, Cambridge, Mass. 02139,
Plasma Fusion Center.

ABSTRACT: (U) Since October 1, 1991 experimental and
theoretical research has been conducted by Prof. Min-
Chang Lee and his students at BU and MIT. This research
work is aimed at investigating the ionospheric plasma
disturbances which can affect significantly the radio
wave propagation in communications and space surveillance.
The research topics which have been investigated include:
(1) A source mechanism leading to the symmetric lower
hybrid sidebands and a low-frequency mode in the upper
atmosphere, (2) Characteristics of lightning-induced
plasmas, (3) Radio wave-produced plasmas and effects on
radio communications, (4) Plasma turbulence and formation
of field aligned density fluctuations as ionospheric
ducts.

DESCRIPTORS: (U) *LIGHTNING, *RADIO WAVES,
*PLASMAS(PHYSICS), *IONOSPHERIC DISTURBANCES, *RADIO
INTERFERENCE, ATMOSPHERES, DENSITY, LOW FREQUENCY, RADIO
EQUIPMENT, SIDEBANDS, SPACE SURVEILLANCE, TURBULENCE,
UPPER ATMOSPHERE, WAVE PROPAGATION, COMMUNICATION AND
RADIO SYSTEMS, ATMOSPHERIC SCATTERING, RADAR,
REFLECTIVITY.

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AD-A259 742 20/6 6/5 6/4 5/8 DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L
AD-A259 742 CONTINUED

YORK UNIV NORTH YORK (ONTARIO)

(U) Sensory Sensitivities and Discriminations and Their Roles in Aviation.

DESCRIPTIVE NOTE: Annual rept. 1 Nov 91-31 Oct 92.

NOV 92 138P

PERSONAL AUTHORS: Regan, D.

CONTRACT NO. AFOSR-91-0080

PROJECT NO. 2313, 2313

TASK NO. AS, CS

MONITOR: AFOSR, XC
TR-92-0997, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) (1) Evidence that intersubject differences in the ability to process motion-defined (MD) shape are not predicted by the ability to process luminance-defined (LD) shape, that motion is processed by hierarchical manner, that discrimination and detection can be dissociated for MD form, and that spatial discrimination for MD and LD form are not entirely mediated by the same mechanism is as follows. (A) Reducing presentation duration or dot lifetime from 1.0 to 0.1 sec progressively reduced the visibility of a MD bar, but did not reduce orientation discrimination for the bar when visibility was held constant. (B) Detection and/or recognition of MD letters can be degraded by removal of brain tissues underlying prestriate cortex without affecting contrast sensitivity, Snellen acuity, low contrast acuity or sensitivity to motion. (2) Shape discrimination for an MD rectangle can be as low as 2-3% as good as for an LD rectangle. (3) Evidence for a neural mechanism sensitive to shape independently of size. (4) Evidence for a neural mechanism directly sensitive to time to collision with an approaching object. A method for measuring intersubject differences in discrimination of time to contact. (5) A titration method for uncovering the color-defined form system. (6) the 40 Hz human brain response indexes magnocellular activity. (7) By recording

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the magnetic field of the brain we have identified an audio-visual integration area in the brain, we have also unconfounded responses to texture-defined form....Vision, Visual flying skills, Intersubject differences, Visual navigation, Perception of motion and self-motion, Stereo, Neuromagnetic recording, Models of visual and auditory processing, Multisensory convergence.

DESCRIPTORS: (U) *VISION, *VISUAL CORTEX, *NEUROLOGY, *MAGNETIC FIELDS, *AVIATION SAFETY, AIR FORCE RESEARCH, SHAPE, OPTICAL DETECTION, VISUAL PERCEPTION, AIR NAVIGATION, FOREIGN TECHNOLOGY.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313AS, WUAFOSR2313CS, MD(Motion Defined Shape), LD(Luminance Defined Shape), Ocular hypertension, Amblyopia, Multiple sclerosis, Time to collision, Neuromagnetic recording, Multisensory convergence.

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AD-A259 740 5/7

BOSTON UNIV MA

NORTHWESTERN UNIV EVANSTON IL DEPT OF PSYCHOLOGY

(U) Metallic Ions and Atoms in the Upper Atmosphere.

(U) Discourse Models, Pronoun Resolution, and the Implicit Causality of Verbs.

DESCRIPTIVE NOTE: Annual rept. 1 Jan-31 Dec 92.

DESCRIPTIVE NOTE: Annual rept. 1 Mar 91-28 Feb 92.

OCT 92 14P

NOV 92 42P

PERSONAL AUTHORS: Forbes, Jeffrey M.; Robie, R. G.

PERSONAL AUTHORS: McKoon, Gail; Greene, Steven B.; Ratcliff, Roger

CONTRACT NO. F49620-92-J-0092

PROJECT NO. 2310

CONTRACT NO. AFOSR-90-0246

TASK NO. BS

PROJECT NO. 2313

MONITOR: AFOSR, XC
TR-92-1009, AFOSR

TASK NO. A4

MONITOR: AFOSR, XC
TR-92-1000, AFOSR

UNCLASSIFIED REPORT

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ABSTRACT: (U) The main focus of research under AFOSR Grant F49620-92-J-0092 is to investigate the global and local transport of metallic ions in the upper atmosphere, in particular the layering of ionization, through use of comprehensive numerical models which account for realistic meteoric sources, chemical conversions and sinks, and transport by molecular and eddy diffusion, winds, and electric fields. The ultimate goal is to better understand the mechanisms producing ionization layers, and ultimately the seasonal, latitudinal, local time, and temporal variations in the occurrences of ionization layers. Plasma layering can affect HF communications by introducing new reflection paths thus complicating the propagating modes, and presumably in extreme cases by producing blanketing effects. In addition, plasma irregularities may also accompany the sharp gradients characterizing the plasma layers.

DESCRIPTORS: (U) *ATMOSPHERES, *IONIZATION, *LAYERS, *METALS, *IONS, *ATOMS, *ADDITION, *CHEMICALS, *CONVERSION, *DIFFUSION, *ELECTRIC FIELDS, *GLOBAL, *GRADIENTS, *IONS, *MODELS, *PATHS, *REFLECTION, *TIME, *TRANSPORT, *UPPER ATMOSPHERE, *VARIATIONS, *WIND, *NUMERICAL ANALYSIS, *EDDY CURRENTS, *GRADIENTS, *PROPAGATION, *PLASMAS(PHYSICS), *SEASONS.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2310BS, Upper, Sinks.

ABSTRACT: (U) Some interpersonal verbs, such as admire and amaze, describe an action or property of one person (the reactor) that is necessarily a response to an action or property of another (the initiator). We hypothesized that these verbs make the initiator relatively more accessible in a comprehender's discourse model, and that this change in relative accessibility would aid identification of the referent of a pronoun in a subsequent because clause. We predicted that, as a result, subjects would be faster to recognize a character's name after a because clause that uses a pronoun that refers to that character than after one that refers to the other character. Four experiments confirmed this prediction. Three further experiments demonstrated the importance of the verb's causal structure and of the presence of the connective because to this result.

DESCRIPTORS: (U) *IDENTIFICATION, *LINGUISTICS, *SOCIAL PSYCHOLOGY, *CHARACTER RECOGNITION, *MODELS, *PREDICTIONS, *RESPONSE, *STRUCTURES.

IDENTIFIERS: (U) PEG1102F, WUAFOSR2313A4.

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FLORIDA STATE UNIV TALLAHASSEE GEOPHYSICAL FLUID DYNAMICS INST

JOINT INST FOR LAB ASTROPHYSICS BOULDER CO

(U) Studies of Baroclinic Flow.

(U) Thermal Energy Reactions of OH(-) + C12, Br2: Rate Coefficients, Product Branching Fractions, and OH Product Vibrational Populations,

DESCRIPTIVE NOTE: Final rept. 1 Oct 89-30 Sep 92,

OCT 92

30P

92 20P

PERSONAL AUTHORS: Pfeffer, Richard L.

PERSONAL AUTHORS: Knutsen, Karen; Bierbaum, Veronica M.; Leone, Stephen R.

CONTRACT NO. AFOSR-90-0009

CONTRACT NO. AFOSR-89-0073

PROJECT NO. 2310

PROJECT NO. 2303

TASK NO. CS

TASK NO. BL

MONITOR: AFOSR, XC

MONITOR: AFOSR, XC

TR-92-1020, AFOSR

TR-92-0994, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) During the three years of this grant, nine papers were published or accepted for publication in peer-reviewed journals. They covered the following topics: (1) potential vorticity dynamics, (2) baroclinic instability in the presence of forcing, (3) baroclinic wave structure and transitions, (4) the role of mountains in the evolution of mid-latitude synoptic disturbances, (5) complex principle component analysis, and (6) numerical techniques versus nonlinear analytic methods.

DESCRIPTORS: (U) *VORTICES, *GEOPOTENTIAL, *WIND, *OCEAN WAVES, *TOPOGRAPHY, INSTABILITY, LATITUDE, MOUNTAINS, STRUCTURES, TRANSITIONS, HEIGHT, ATMOSPHERIC MOTION, GRAVITY WAVES, DISSIPATION, BOUNDARY LAYER FLOW, OSCILLATION, SHALLOW WATER, CHAOS, NOISE, COMPUTER GRAPHICS, COMPUTER PROGRAMS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2310CS, Vorticity, Baroclinic waves, Ekman layer, Wind wave interactions.

Availability: Pub. in Jnl. of Mass Spectrometry and Ion Processes, V17 p537-555 1992. Available only to DTIC users. No copies furnished by NTIS.

ABSTRACT: (U) This paper describes the measurement of the rate coefficients and branching fractions for the OH(-) + C12 and OH(-) + Br2 reactions using tandem flowing afterglow-SIFT (selected ion flow tube) apparatus. The rate coefficients show that the reactions are extremely efficient, and the branching fractions show that charge transfer is the major product channel. These experiments also confirm the formation of both the HOCl(-) and HOBr(-) products and allow limits to be placed upon the electron affinities of HOCl and HOBr. The measurement of the OH charge transfer vibrational populations is performed on a flowing afterglow apparatus which has been modified for laser-induced fluorescence detection. Though the high efficiency of the charge transfer channels for these reactions suggests a long-lived intermediate, the OH vibrational populations show that the OH bond is not distorted during the charge transfer process.

DESCRIPTORS: (U) *HYDROXIDES, *IONS, *CHLORINE, *BROMINE, *THERMAL PROPERTIES, *ENERGY, *CHEMICAL REACTIONS, REPRINTS, ATOMS, COEFFICIENTS, POPULATION, VIBRATION, RATES, ANIONS, KINETICS, AFTERGLOWS, FLOW, COLLISIONS,

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MOLECULES, CHARGE TRANSFER, ELECTRIC CHARGE, CHANNELS,
MEASUREMENT, LASER INDUCED FLUORESCENCE, DETECTION,
CHEMICAL BONDS, LENGTH, ELECTRONS.

IDENTIFIERS: (U) PE81102F, WUAFOSR230381, Products,
Mechanisms, Langevin, Franck-Condon, Branching fractions,
SIFT(Selected Ion Flow Tube).

AD-A259 899 12/4

SOCIETY FOR INDUSTRIAL AND APPLIED MATHEMATICS
PHILADELPHIA PA

(U) SIAM Conference of Optimization Theory and
Applications (4th) Held in Chicago, Illinois on May 11-
13, 1992.

DESCRIPTIVE NOTE: Final rept. 1 Sep 91-31 Aug 92.

AUG 92 110P

PERSONAL AUTHORS: Block, I. E.

CONTRACT NO. AFOSR-91-0307

PROJECT NO: 2304

TASK NO. A1

MONITOR: AFOSR, XC
TR-92-0978, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A SIAM Conference on Optimization was held
on May 11-13, 1992 in Chicago. Over three hundred papers
were presented at the 75 sessions.

DESCRIPTORS: (U) *OPTIMIZATION, *SYMPOSIA, GLOBAL,
CHEMICAL ENGINEERING, PROBLEM SOLVING, REPORTS, SOFTWARE
ENGINEERING, ALGORITHMS, PARAMETERS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A1, Molecular
chemistry, Data fitting.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 74117L

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GEORGIA UNIV ATHENS DEPT OF CHEMISTRY

ATOMIC ORBITALS, RESONANCE, METALS, IONS, NUCLEI, AXES,
MOLECULAR PROPERTIES, NOZZLES, ELECTRONICS,
PHOTODISSOCIATION.(U) PhotoInduced Reaction in Collinear Aligned Mg-CO2
Complexes.

DESCRIPTIVE NOTE: Journal article.

IDENTIFIERS: (U) PEB1102F, WUAFOSR2303A3, Collinear, Ab
initio calculations.

92 5P

PERSONAL AUTHORS: Yeh, C. S.; Willey, K. F.; Robbins, D.
L.; Duncan, M. A.

CONTRACT NO. AFOSR-91-0001

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XC
TR-92-0892, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Physical Chemistry, V86
p7833 1992. Available only to DTIC users. No copies
furnished by NTIS.

ABSTRACT: (U) Mg(+)-CO2 ion-molecule complexes are
produced in a pulsed nozzle molecular beam cluster source.
Spectroscopic studies, in coordination with ab initio
calculations, confirm that these complexes are linear and
that the bonding is primarily electrostatic (ion-
quadrupole forces). Excited state energies and the
symmetries of the orbitals involved are well
characterized. Photoexcitation of these complexes near
the (2)S yields (2)P atomic resonance line results in
both simple cleavage of the electrostatic bond and a
metal ion insertion reaction, producing the products Mg(+)
+ CO2 and MgO(+) + CO, respectively. The reactive channel
is sharply wavelength dependent, and occurs only in an
excited state which has the Mg(+) p orbital aligned on
the internuclear axis. (Author)

DESCRIPTORS: (U) *MAGNESIUM, *CHEMICAL REACTIONS,
*CATIONS, REPRINTS, CARBON DIOXIDE, COMPLEX IONS, LINEAR
SYSTEMS, ION MOLECULE INTERACTIONS, ALIGNMENT, PULSES,
MOLECULAR BEAMS, CLUSTERING, SOURCES, SPECTROSCOPY,
ELECTROSTATICS, CHEMICAL BONDS, EXCITATION, SYMMETRY,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4I17L

AD-A259 598 CONTINUED

TEXAS UNIV AT AUSTIN ELECTRONICS RESEARCH CENTER

(U) Joint Services Electronics Program. Basic Research in Electronics (JSEP).

IDENTIFIERS: (U) WUAFOSR2305AS, PE81102F, Solids structures.

DESCRIPTIVE NOTE: Final rept. 1 Apr 89-30 Jun 92.

AUG 92 29P

PERSONAL AUTHORS: Powers, Edward J.

REPORT NO. TR-48

CONTRACT NO. F49620-89-C-0044

PROJECT NO. 2308

TASK NO. AS

MONITOR: AFOSR, XF
TR-92-1013, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This final report summarizes research carried out by nine faculty and approximately eighteen graduate students at The University of Texas at Austin under the auspices of the Joint Services Electronics Program. This research program consists of five research units in solid-state electronics, two in electromagnetics, and two in information electronics. Solid-state electronics includes work in growth of III-V compounds by MBE, epitaxial growth of III-V semiconductor surfaces, charge transport in novel device-structures and materials, femtosecond processes in III-V semiconductors, and heterostructure device development. Information electronics includes multisensor signal processing, and nonlinear estimation and stochastic adaptive control. Research in electromagnetics involves millimeter wave active guided wave structures, and nonlinear wave phenomena....Solid-state electronics, information electronics, Electromagnetics.

DESCRIPTORS: (U) *ELECTRONICS, *RESEARCH MANAGEMENT, UNIVERSITIES, CONTROL, EPITAXIAL GROWTH, GRADUATES, MATERIALS, MILLIMETER WAVES, MULTISENSORS, PROCESSING, SEMICONDUCTORS, SIGNAL PROCESSING, SIGNALS, SOLID STATE ELECTRONICS, STUDENTS, SURFACES, TEXAS, TRANSPORT, WORK.

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WRIGHT STATE UNIV DAYTON OH DEPT OF PSYCHOLOGY

(U) Perception/Action: An Holistic Approach.

DESCRIPTIVE NOTE: Final rept. 15 Dec 90-29 Aug 92.

OCT 92 46P

PERSONAL AUTHORS: Flach, John M.

REPORT NO. WSU-FR-861805

CONTRACT NO. AFOSR-91-1051

PROJECT NO. 2313

TASK NO. CS

MONITOR: AFOSR, XC
TR-92-1019, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) A general systems approach is taken to studying the emergent properties of the human perception/action system. Two task domains, the control of locomotion and the recognition of objects, are used to study human performance. The locomotion task involves the control of altitude. Experiments are described that will manipulate the type of texture, the speed of forward motion, and altitude. A general hypothesis is presented that performance in the altitude control task is a function of the signal-to-noise ratio within the flow field--where signal refers to optical activity resulting from change of altitude and noise refers to optical activity resulting from other sources. An analysis of the flow geometry is presented to illustrate how the motion of the observer and the position of texture elements combine to determine the optical information available to the observer. The object recognition task involves the discrimination of 3-dimensional wire-frame forms using the information available in dynamic occlusion. A key manipulation within this task was the mode of observation. Observers were either active (they could manipulate the object using a joystick to produce dynamic occlusion) or they were passive (they could observe the motions produced by the active observer, but they could not act on the display to produce dynamic occlusions). Three

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experiments are presented. The most important result was that no differences were found as a function of mode. In all three experiments passive observers performed at least as well as active observers. Perception of self-motion, Passive vs active observers, Altitude control, Object recognition, Dynamic occlusion.

DESCRIPTORS: (U) *LOCOMOTION, *PERCEPTION, *PERFORMANCE(HUMAN), *RECOGNITION, *SIGNAL TO NOISE RATIO, *FLIGHT MANEUVERS, ALTITUDE, COMPUTERS, CONTROL, DISCRIMINATION, DYNAMICS, FLOW, FLOW FIELDS, GEOMETRY, MOTION, NOISE, OBSERVERS, SYSTEMS APPROACH, TEXTURE, VELOCITY.

IDENTIFIERS: (U) Perception of self motion, Altitude control, Object recognition, Dynamic occlusion, Forward motion speed.

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FLORIDA UNIV GAINESVILLE DEPT OF PSYCHOLOGY

(U) Auditory Pattern Memory: Mechanisms of Temporal Pattern Discrimination by Human Observers.

IDENTIFIERS: (U) PE61102F, WUAFOSR2313AS, Signal detection theory, Temporal pattern perception, Rhythm meter discrimination, Sequence discrimination, Group signal detection Temporal pattern discrimination.

DESCRIPTIVE NOTE: Annual technical rept. 1 Oct 81-30 Sep 82.

OCT 92 31P

PERSONAL AUTHORS: Sorkin, Robert D.

REPORT NO. AFOSR-91-0085

PROJECT NO. 2313

TASK NO. AS

MONITOR: AFOSR, XC
TR-92-0988, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Several studies of temporal pattern perception were conducted using tasks where the listener discriminated whether two tonal sequences formed the same temporal pattern or which of two patterns was more rhythmic. In different conditions, the stimulus patterns were delayed, time expanded or compressed, presented at different frequencies and to different ears, or constructed of sub-patterns having different temporal correlations. Mathematical models of performance were employed to describe performance in these tasks. Further work was accomplished extending signal detection theory to the performance of statistically ideal and (certain) non-ideal groups. Other experiments were conducted on the processing of visual display elements as a function of element reliability and perceptual structure.... Auditory perception, Sequence discrimination, Temporal pattern perception, Rhythm/Meter discrimination, Group signal detection.

DESCRIPTORS: (U) *AUDITORY PERCEPTION, *PATTERNS, *TIME, *PERFORMANCE(HUMAN), *HEARING, DETECTION, DISCRIMINATION, FREQUENCY, MATHEMATICAL MODELS, PROCESSING, RELIABILITY, SEQUENCES, SIGNALS, THEORY, WORK, SEQUENCE SWITCHES, MEMORY(PSYCHOLOGY), AUDIO TONES.

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VIRGINIA POLYTECHNIC INST AND STATE UNIV BLACKSBURG UNIV
CENTER FOR ENVIRON- MENTAL/HAZARDOUS MATERIALS STUDIES

(U) Measuring Variation in Ecosystem Sensitivity to Stress.

DESCRIPTIVE NOTE: Annual technical rept. Sep 91-Oct 92.

OCT 92 35P

DESCRIPTORS: (U) *ECOSYSTEMS, *STREAMS,
*STRESS(PHYSIOLOGY), *STRESS TESTING, CHEMICALS, CHLORINE,
DIFFUSERS, DIFFUSION, FLASKS, GRADIENTS, LABORATORY TESTS,
MICROORGANISMS, SUBSTRATES, SULFURIC ACID, TEST AND
EVALUATION, TISSUE CULTURE.

IDENTIFIERS: (U) PES1102F, WJAFOSR2312A5, Field studies.

PERSONAL AUTHORS: Cairns, John, Jr.; McCormick, Paul V.;
Smith, Eric P.

CONTRACT NO. AFOSR-91-0379

PROJECT NO. 2312

TASK NO. A5

MONITOR: AFOSR, XC
TR-92-1003, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objectives of this study were to develop a method for measuring biological responses to stress in situ and to use this method to evaluate the extent to which stream ecosystems vary their sensitivity to anthropogenic stress. Chemical-diffusing substrates were constructed from tissue culture flasks and ceramic tiles, which provided a surface that was suitable for the growth of stream microorganisms and porous to most chemicals. Static laboratory tests showed that many common classes of chemicals diffused through these substrates in a highly predictable manner. A laboratory stream study provided further evidence for repeatable diffusion rates and allowed for the standardization of a sampling protocol for characterizing microbial community responses to stress. Two field studies were conducted using the diffusers to evaluate interecosystem variation in stream microbial responses to experimental gradients of sulfuric acid and chlorine. Data analyses from these experiments are ongoing, but indicate that predictable responses to such gradients can be obtained in situ and analyzed using conventional statistical techniques. The protocol developed during the first year of this study has broad applications for both basic and applied research in environmental science.

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STATE UNIV OF NEW YORK AT STONY BROOK DEPT OF PSYCHOLOGY

NORTHWESTERN UNIV EVANSTON IL INST FOR THE LEARNING SCIENCES

(U) Signal- and Listener-based Factors in Complex Auditory Perception.

(U) Memory-Based Expert Systems.

DESCRIPTIVE NOTE: Annual rept. 15 Sep 91-14 Sep 92.

DESCRIPTIVE NOTE: Final rept. 1 Sep 89-31 Jan 92.

OCT 92 40P

DEC 92 18P

PERSONAL AUTHORS: Samuel, Arthur G.

PERSONAL AUTHORS: Schank, Roger C.

CONTRACT NO. AFOSR-91-0378

CONTRACT NO. AFOSR-89-0493

PROJECT NO. 2313

PROJECT NO. 2304

TASK NO. A8

TASK NO. A7

MONITOR: AFOSR, XC
TR-92-1031, AFOSRMONITOR: AFOSR, XC
TR-93-0006, AFOSR

UNCLASSIFIED REPORT

UNCLASSIFIED REPORT

ABSTRACT: (U) The research conducted during the first year of funding addressed fundamental issues in the perception and internal representation of speech. Three separate lines of research were designed to clarify the relationship between low-level (phonemic) speech codes and higher-level (lexical) ones. Two of the approaches involved tests of whether the activation of a lexical (word) representation increases the activation of its components (i.e., the phonemes that compose it). One of these lines investigated the extent to which listeners perceptually restore deleted phonemes, while the other examined how rapidly listeners can detect a pre-specified phenomena. The third line of research tested whether the existence of one lexical representation (e.g., 'tent'). Together, the various investigations are intended to clarify the structure and processes of the human speech perceptual system.

DESCRIPTORS: (U) *AUDITORY PERCEPTION, *LEXICOGRAPHY, *PATTERN RECOGNITION, *SPEECH, *WORD RECOGNITION, *PSYCHOACOUSTICS, ACTIVATION, APPROACH, INTERNAL, LOW LEVEL, PERCEPTION, PHONEMES, SIGNALS, TEST AND EVALUATION.

IDENTIFIERS: (U) WUAFOSR2313A6, PE61102F.

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ABSTRACT: (U) The goals of this project have been to carry out research aimed at implementing and applying case-based reasoning, or CBR (Riesbeck and Schank, 1989) in a variety of distinct tasks and domains. In particular, the work carried out under this project has focussed on three problems: (1) The development of a robust memory-based parsing technology (Direct Memory Access Parsing, or DMAP), (2) The development of case-based systems for creatively approaching complex problems in social and political domains, and (3) The application of case-based reasoning in educational settings.

DESCRIPTORS: (U) *REASONING, *EXPERT SYSTEMS, ACCESS, MEMORY DEVICES.

IDENTIFIERS: (U) PE61102F, WUAFOSR2304A7, *Case based reasoning, DMAP(Direct Memory Access Parsing).

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

AD-A259 372 9/1 20/14

CALIFORNIA UNIV SANTA BARBARA DEPT OF ELECTRICAL AND
COMPUTER ENGINEERING(U) Distributed Nonlinear Devices for Millimeter-Wave and
Picosecond Pulse Generation.

DESCRIPTIVE NOTE: Final rept. 15 May 89-14 May 92.

92 18P

PERSONAL AUTHORS: Rodwell, Mark

CONTRACT NO. AFOSR-89-0384

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR, XC
TR-83-0004, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The program goal was to demonstrate monolithic Schottky diode GaAs circuits for efficient generation of harmonics of microwave drive signals and for efficient generation of picosecond impulses. The method is nonlinear wave propagation on monolithic GaAs nonlinear transmission lines (NLTLs). Through generation of shock waves NLTLs, we had previously demonstrated generation of picosecond step-functions Modified version of the NLTL can be used for picosecond pulse generation and frequency multiplication.

DESCRIPTORS: (U) *DIODES, *MILLIMETER WAVES, CIRCUITS, DRIVES, FREQUENCY, GALLIUM ARSENIDES, HARMONICS, MICROWAVES, PULSES, SHOCK WAVES, SIGNALS, TRANSMISSION LINES, WAVE PROPAGATION, SCHOTTKY BARRIER DEVICES, NONLINEAR SYSTEMS.

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AD-A259 363 9/5 20/6.1

UNIVERSITY OF CENTRAL FLORIDA ORLANDO CENTER FOR
RESEARCH IN ELECTRO-OPTICS AND LASERS

(U) Nonlinear Fiber Optics.

DESCRIPTIVE NOTE: Final technical rept. 1 Nov 90-1 Nov 92.

DEC 92 18P

PERSONAL AUTHORS: Stegeman, George

CONTRACT NO. AFOSR-91-088

PROJECT NO. 2301

TASK NO. A1

MONITOR: AFOSR, XC
TR-83-0005, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Nonlinear interactions in fibers, primarily for applications to all-optical switching devices, have been investigated. (1) The theory of all-optical switching with gain in erbium-doped dual core fibers has been developed. (2) Several and various experiments were performed in nonlinear fiber rocking filters. (3) A femtosecond infrared (1650 nm) source has been built. (4) An APM color center laser (300 fsec - 1 psec pulse width) has been constructed (5) A new mechanism for soliton compression has been demonstrated. (6) A dual frequency, cw color center laser has been constructed. (7) The periodic evolution into dark solitons of a pulsed two color source has been demonstrated. (8) Photoinduced gratings in Ge doped sol-gel films have been demonstrated. (9) Nonlinear fiber-optic experiments in tapered fibers have been attempted. Nonlinear fiber optics, All-optical switching, Nonlinear properties of fibers and glasses, Switching with gain, Erbium doped dual core fibers, Soliton switching, Soliton interactions.

DESCRIPTORS: (U) *NONLINEAR OPTICS, *FIBER OPTICS, *OPTICAL SWITCHING, COLOR CENTERS, COMPRESSION, ERBIUM, GLASS, DOPING, FIBERS, FILMS, FILTERS, FREQUENCY, GAIN, INTERACTIONS, LASERS, OPTICS, SOLITONS, SWITCHING.

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IDENTIFIERS: (U) WJAFOSR2301A1, Sol gel.

PENNSYLVANIA UNIV PHILADELPHIA

(U) The Overall Response of Composite Materials Undergoing Large Deformations.

DESCRIPTIVE NOTE: Final rept. 1 Feb 91-31 Aug 92,

OCT 92 262P

PERSONAL AUTHORS: Castaneda, Pedro Ponte

CONTRACT NO. AFOSR-91-0161

MONITOR: AFOSR, XC
TR-93-0002, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This research deals with the theoretical prediction of the effective behavior of nonlinear composite materials undergoing large deformations. In particular, applications are envisaged to the high temperature creeping behavior of metal/metal, metal/ceramic composites, and also of porous materials. Both isotropic and anisotropic configurations are considered including the technologically important case of fiber-reinforced composites, and the fundamentally important case of polycrystalline aggregates. The approach is based on new variational principles developed recently by the author (under AFOSR sponsorship), which allow the estimation of the overall behavior of a given nonlinear composite in terms of the effective properties of a suitably optimized linear comparison composite (with the same microstructure). The key advantage of the method is that it allows direct application of the extensive literature on linear composite materials, in the form of estimates and rigorous bounds, to obtain corresponding results for nonlinear composites. Additionally, the procedure is remarkably simple to implement, and the final results are usually expressed in terms of finite-optimization problems, which can be readily solved with modest computational effort. Recent progress include the application of the method to the determination of extremal yield surfaces for anisotropic rigid/plastic systems, and to the computation of estimates for the effective yield stress of polycrystalline aggregates.

DESCRIPTORS: (U) *COMPOSITE MATERIALS, *DEFORMATION,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

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APPROACH, COMPARISON, COMPUTATIONS, CONFIGURATIONS, DETERMINATION, ESTIMATES, FIBER REINFORCED COMPOSITES, FIBERS, MATERIALS, METALS, MICROSTRUCTURE, OPTIMIZATION, PLASTICS, POLYCRYSTALLINE, POROUS MATERIALS, PREDICTIONS, SURFACES, VARIATIONAL PRINCIPLES, YIELD, HIGH TEMPERATURE, CREEP STRENGTH, CERAMIC MATRIX COMPOSITES, ANISOTROPY, NONLINEAR SYSTEMS, LEGENDRE FUNCTIONS.

AD-A259 272 20/9

STANFORD UNIV CA DEPT OF MECHANICAL ENGINEERING

(U) Fundamental Processes in Partially Ionized Plasmas.

DESCRIPTIVE NOTE: Final rept. 1 Jul 88-30 Sep 92.

NOV 92 81P

PERSONAL AUTHORS: Kruger, Charles H.; Laux, Christophe

CONTRACT NO. AFOSR-88-0264

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR, XC
TR-93-0007, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This report describes research results on Fundamental Processes in Partially Ionized Plasmas obtained in the High Temperature Gasdynamics Laboratory at Stanford University. This research has emphasized studies of plasma properties and associated diagnostics. The present report discusses, in the first part, optical diagnostics in air plasmas and, in the second part, measurements of the radiative emission of such plasmas. These experimental results have unveiled severe deficiencies in existing computer codes such as the widely used NASA code NEQAIR. Several modeling improvements are therefore proposed and included into NEQAIR. As a result, the enhanced version of the code is capable of predicting the radiative emission of air plasmas with better than 20% accuracy, as opposed to only orders of magnitude with the original version. Finally, the report presents first measurements of the radiative source strength of air for temperatures in the range between 5000 and 7500K. To our knowledge, these are the first measurements of this important property in this temperature range. Excellent agreement is again obtained with the predictions of the enhanced NEQAIR code.... Plasmas, Radiation diagnostics, Radiation modeling.

DESCRIPTORS: (U) *PLASMA DIAGNOSTICS; AIR, PLASMAS(PHYSICS), EMISSION, HIGH TEMPERATURE, LABORATORIES, MEASUREMENT, PREDICTIONS, RADIATION.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

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AD-A259 271 11/4 20/11

IDENTIFIERS: (U) Radiation modelling, PEG1102F,
WJAFOSR2101A7.

STANFORD UNIV CA DEPT OF AERONAUTICS AND ASTRONAUTICS

(U) Damage Mechanics of Cross-Ply Laminates Resulting from
Transverse Concentrated Loads.

DESCRIPTIVE NOTE: Final rept. 1 Oct 89-30 Sept 92,

SEP 92 184P

PERSONAL AUTHORS: Liu, Sheng; Chang, Fu-Kuo

CONTRACT NO. AFOSR-89-0554

MONITOR: AFOSR, XC
TR-93-0001, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) An investigation was performed to study damage development in fiber-reinforced laminated composites induced by transverse concentrated loads. The major focus of the study was to understand fundamentally the damage mechanics in terms of matrix cracking and delamination growth, and the interaction between them resulting from a transverse concentrated load. The study was focused on cross-ply laminates only, and the load was introduced quasistatically through a cylindrical or spherical indenter. Accordingly, the research was divided into two stages, (1) damage induced by a cylindrical indenter and (2) damage induced by a spherical indenter. Analytical models consisting of a contact analysis and a failure analysis were developed for analyzing the damage initiation and growth induced by both loading conditions. Experiments were also performed to generate data needed for the models and to verify the proposed analyses. The predictions based on the models agreed very well with the data.... Laminated composites, Delamination growth, Transverse concentrated loading.

DESCRIPTORS: (U) *DAMAGE, *LAMINATES, *MECHANICS,
*TRANSVERSE, DELAMINATION, FAILURE, FIBERS, INTERACTIONS,
MODELS, PREDICTIONS, LOADS(FORCES), CRACKING(FRACTURING),
STATICS, CYLINDRICAL BODIES, SPHERES.

IDENTIFIERS: (U) *Cross ply, Concentrated loads,
Quasistatics, Indenters, Contact.

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NEW YORK UNIV NY COURANT INST OF MATHEMATICAL SCIENCES

acoustic field by the recent formulation of the on surface conditions taking into account the acoustic effect.

(U) Perturbation Problems in Fluid Dynamics.

DESCRIPTIVE NOTE: Final rept. 15 Oct 89-14 Oct 92.

NOV 92 15P

DESCRIPTORS: (U) *FLUID DYNAMICS, *PERTURBATIONS, ACOUSTIC FIELDS, ACOUSTICS, APPLIED MECHANICS, BOUNDARIES, BUBBLES, CORES, DENSITY, DIFFUSION, DROPS, DYNAMICS, EQUATIONS, FILAMENTS, FORMULATIONS, INTERACTIONS, LECTURES, LIMITATIONS, LIQUIDS, MECHANICS, MOTION, MULTIPHASE FLOW, NUMBERS, OSCILLATION, PANELS, SHEETS, SHOCK WAVES, STRUCTURES, SURFACE PROPERTIES, SURVEYS, VARIATIONS, VOLUME.

PERSONAL AUTHORS: Ting, Lu

REPORT NO. CIMS-92-11-08

CONTRACT NO. AFOSR-90-0022

PROJECT NO. 2304

TASK NO. BS

MONITOR: AFOSR, XC

TR-92-0980, XC

IDENTIFIERS: (U) Viscous Vortical Flows, Shock Wave Interaction, Free Boundary problems, Multiphase Flows, Structural/Acoustic Interaction. PEG1102F, WJAFOSR23048S.

UNCLASSIFIED REPORT

ABSTRACT: (U) Perturbation methods and numerical methods were employed to study five problem areas. (1) For viscous vortical flows, a complete account of the asymptotic analyses, numerical studies and their physical meaning was presented in Springer-Verlag Lecture Notes in 1991. An extension of the asymptotic analysis for the motion and diffusion of a slender vortex filament to allow for the variation of the core structure along the filament was accomplished in 1992. This extension was needed for the study of the vortex breakdown problem. (2) For shock wave interactions, the locations and the types of singularities in the interaction of semilinear waves in three- and higher dimensional space were identified. (3) For wave propagations in a bubbly liquid, a survey of the linear and nonlinear theories and their limitations was presented in an article in Advances in Applied Mechanics in 1991. A system of effective equations uniformly valid at small gas volume fraction and large bubble number density was derived in 1992. (4) For free boundary problems, solutions simulating the breaking up or merging of symmetric slender jets or thin sheets were obtained in 1990. The solution for drop formation after the breaking was formulated recently. (5) In the analysis of structural/acoustic interactions, the solution for the panel oscillation was uncoupled from that for the

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MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF CHEMISTRY

(U) Ultraviolet-Optical Double-Resonance Study of the Predissociated C sub 1 Ag State of Acetylene.

92 20P

PERSONAL AUTHORS: Lundberg, James K.; Chen, Yongqin; Pique, Jean-Paul; Field, Robert W.

CONTRACT NO. AFOSR-88-0082, AFOSR-91-0079

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XC
TR-92-0872, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Molecular Spectroscopy, v156 p104-122, 1992. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Ultraviolet-Optical Double-Resonance (UODR) spectra were recorded via individually selected rotation-vibration intermediate levels in the A(1)A sub u state of acetylene. These spectra reveal a previously unobserved predissociated electronic state, the pi(alpha g)2 yields pi(alpha u)2 doubly excited C' (1)A sub g state. Owing to the changes in the H-C-C bond angle from 120 deg to 103 deg, and in the C-C bond-order from 2 in the A(1)A sub u state to 1 in the C' 1A sub g state, long progressions in the C-C stretch (V2) and the trans-bending (V3) vibrations and their combinations are observed. Although the C' (1)A sub g state is predissociated, the rotational simplification provided by UODR permits complete resolution of rotational structure in the lowest energy vibrational level. The principal observations for the HCCH and DCCD isotopomers include: T(o) = 82 294(4) and 82 237(2) cm-1, V2 = 884 (10) and 822 (10) cm-1, V3 = 1303 (20) and 935 (10) cm-1, A = 7.90 (7) and 4.85 (5) cm-1, B = 0.880(7) and 0.773(5) cm-1, C = 0.792(7) and 0.641(5) cm-1 respectively. From the rotational constants the geometry of this (1)A sub g state is deduced to be rcc = 1.85 (2)A, rCH = 1.14(3) A, and theta HCC = 103(4) deg.

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DESCRIPTORS: (U) *ACETYLENES, *RESONANCE, *OPTICS, *ULTRAVIOLET SPECTRA, ANGLES, BENDING, CONSTANTS, ELECTRONIC STATES, ELECTRONICS, ENERGY, GEOMETRY, MOLECULAR SPECTROSCOPY, OBSERVATION, REPRINTS, RESOLUTION, ROTATION, SIMPLIFICATION, SPECTRA, SPECTROSCOPY, STRUCTURES, VIBRATION, DISSOCIATION, EXCITATION, HYDROGEN, CARBON, CHEMICAL BONDS.

IDENTIFIERS: (U) PE81102F, WUAFOSR2303B1, Double resonance, Predissociated, Vibronic progression, Walsh diagrams.

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ARIZONA UNIV TUCSON

Advanced, Alkaline, Sol-gel pathways, Clusters, Aerogels, Xerogels.

(U) Ultrastructure Processing of Advanced Materials.

DESCRIPTIVE NOTE: Final rept. 15 Feb 89-14 Aug 92.

NOV 92 750P

PERSONAL AUTHORS: Uhlmann, Donald R.

CONTRACT NO. AFOSR-88-0236

PROJECT NO. 2303

TASK NO. A3

MONITOR: AFOSR, XC
TR-92-0877, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This book contains the proceedings of the Fourth International Conference on Ultrastructure Processing of Ceramics, Glasses and Composites, held February 20 - 24, 1988, in Tucson, Arizona. The conference was sponsored by the Department of Materials Science and Engineering, College of Engineering and Mines, University of Arizona, and supported by the Directorate of Chemical and Atmospheric Sciences of the Air Force Office of Scientific Research (AFOSR). More than 250 scientists and engineers from University industry, and government laboratories attended and included participants from the United States, Great Britain, Japan, France, Italy, Germany, Canada, Brazil, and Spain. Forty-two papers were presented orally, and an additional seventy-three papers were presented at a poster session.

DESCRIPTORS: (U) *MATERIALS, *PROCESSING, *STRUCTURES, AIR, AIR FORCE, ARIZONA, ATMOSPHERICS, BRAZIL, CANADA, CHEMICALS, ENGINEERING, ENGINEERS, FRANCE, GERMANY, GREAT BRITAIN, INDUSTRIES, INTERNATIONAL, ITALY, JAPAN, LABORATORIES, SCIENTISTS, SPAIN, UNITED STATES, UNIVERSITIES, SYMPOSIA, CERAMIC MATERIALS, GLASS, COMPOSITE MATERIALS, CONDENSATION, RESORCINOL, FORMALDEHYDE, POLYMERS, CROSSLINKING(CHEMISTRY), HEAT TREATMENT, HIGH TEMPERATURE.

IDENTIFIERS: (U) PEB1102F, WJAFOSR2303A3, Ultrastructure,

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TEXAS CHRISTIAN UNIV FORT WORTH

HARVARD UNIV CAMBRIDGE MA DEPT OF CHEMISTRY

(U) Dynamics of Polyatomic Molecules in Porous Silica.

(U) Field-Induced Surface Modification on the Atomic Scale by Scanning Tunneling Microscopy.

92 7P

DESCRIPTIVE NOTE: Journal article.

PERSONAL AUTHORS: Brodka, A.; Zerda, T. W.

SEP 92 4P

CONTRACT NO. AFOSR-90-0185

PERSONAL AUTHORS: Huang, Jin-Lin; Sung, Yung-Eun; Lieber, Charles M.

TASK NO. RS

CONTRACT NO. AFOSR-90-0029

MONITOR: AFOSR, XC
TR-92-0929, AFOSR

PROJECT NO. 2303

UNCLASSIFIED REPORT

TASK NO. A2

MONITOR: AFOSR, XC
TR-92-0939, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Material Research Society Symposium Proceedings, v278 p81-86 1992. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) The liquid-solid phase transition of cyclohexane in small pores of sol-gel glass is studied by computer simulation. A cavity model is obtained by placing silica clusters at the corners of a cubic box. A molecule inside the cavity is approximated by an assembly of six Lennard-Jones potentials. Translational and rotational motions of C₆H₁₂ are studied in the temperature range from 190 K to 333 K. Supercooling is observed and the freezing temperature is depressed in comparison to the bulk phase.

DESCRIPTORS: (U) *CYCLOHEXANES, *POLYATOMIC MOLECULES, *SILICATES, ASSEMBLY, BOXES, CAVITIES, COMPARISON, COMPUTERS, DYNAMICS, FREEZING, GELS, GLASS, LIQUIDS, MATERIALS, MODELS, MOLECULES, MOTION, PHASE, PHASE TRANSFORMATIONS, REPRINTS, SIMULATION, SOLID PHASES, SOLIDS, SUPERCOOLING, TEMPERATURE, TRANSITIONS, POROSITY, SILICA GLASS, SILICA GELS, ROTATION, GEOMETRY.

IDENTIFIERS: (U) Molecular dynamics, Computer simulations, Cyclohexane, Restricted geometries, Sol-gel glass, *Porous silica, Cubic, Small pores, Translational motion, PE81103D, WJAFOSR3484RS.

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Availability: Pub. in Applied Physics Letters, v61 n13 p1528-1530, 28 Sep 92. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Scanning tunneling microscopy has been used to study the modification of tin diselenide (SnSe₂) and molybdenum disulfide (MoS₂) surfaces in ultrahigh vacuum. We have shown that there are positive bias voltage pulse thresholds that must be exceeded to remove material from the surfaces of SnSe₂ and MoS₂. The voltage threshold for modification of SnSe₂ (+1.4 V) is significantly smaller in magnitude than the threshold for modification of MoS₂ (+3.5 V). These threshold results and tip-sample distance dependence data suggest that modification occurs by field evaporation. Additionally, near threshold pulses create stable atomic size defects that can be erased by high voltage scanning.

DESCRIPTORS: (U) *MICROSCOPY, *MODIFICATION, *SCANNING, *SURFACES, *TUNNELING, *ATOMIC PROPERTIES, BIAS, EVAPORATION, HIGH VOLTAGE, MATERIALS, MOLYBDENUM, PHYSICS, PULSES, SCALE, TIN, ULTRAHIGH VACUUM, VACUUM, VOLTAGE, REPRINTS, SINGLE CRYSTALS, CHALCOGENS, METALS, SELENIDES, SULFIDES.

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AD-A258 727 12/1 9/1

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A2, *Field induced,
Narrower scale, Thresholds.

MARYLAND UNIV BALTIMORE DEPT OF MATHEMATICS

(U) Higher Order Crossings.

DESCRIPTIVE NOTE: Final rept. 1 Oct 88-30 Sep 92,

SEP 92 10P

PERSONAL AUTHORS: Kedem, Benjamin

CONTRACT NO. AFOSR-89-0049

PROJECT NO. 2304

TASK NO. A5

MONITOR: AFOSR, XC
TR-92-0853, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In the research on higher order crossings (HOC) they have solved some of the mathematical/statistical problems associated with a certain contraction mapping method for frequency detection and estimation in the presence of noise. They can now tell how to shrink the filters bandwidth to achieve almost sure convergence of the HOC sequence. The sample first order autocorrelation in filtered data is called a higher order correlation, or HOC again. Given the close association between the two types of HOC, these two types of HOC are in fact equivalent under some conditions the nonlinear least squares precision using $O(N)$ computational complexity, but without any matrix inversion and/or other complicated calculations.

DESCRIPTORS: (U) *CONTRACTION, *CROSSINGS, *BANDPASS FILTERS, *SHRINKAGE, AUTOCORRELATION, BANDWIDTH, CONVERGENCE, CORRELATION, DETECTION, FILTERS, FREQUENCY, INVERSION, MAPPING, NOISE, ORGANIZATIONS, PRECISION, SEQUENCES, PROBLEM SOLVING, LEAST SQUARES METHOD.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A5.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4I17L

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CORNELL UNIV ITHACA NY

(U) Adsorbate-Promoted Mass flow on the Gold (1 1 1)
Surface Observed by Scanning Tunneling Microscopy,

AUG 92 8P

PERSONAL AUTHORS: Peale, D. R.; Cooper, B. H.

CONTRACT NO. AFOSR-88-0069

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR, XC
TR-92-0840, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of the Vacuum Society
Technology A, v10 n4 p2210-2215 Jul/Aug 92. Available to
DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) Using time-lapse sequences of scanning
tunneling microscopy images, we have studied the room
temperature mass flow from nanoscale nonequilibrium gold
structures formed on the gold surface. Isolated clusters
of adatoms (islands) and vacancies (pits) formed in air
decay in size according to the power law scaling r varies
as $(t \text{ sub } 0 - t)(n)$, where $n = 1/2$, r is the cluster
radius, t is the observation time, and $t \text{ sub } 0$ is the
time at which the cluster vanishes. This behavior is
consistent with a model used to describe nucleation and
growth in which the mass flow is driven by the curvature
of the step edges, and is limited by the generation of
adatoms (vacancies) at the edges of the islands (pits).
In contrast, we have found no significant mass flow at
room temperature for similar structures formed on clean
samples under high, and ultrahigh vacuum (UHV) conditions.
However, mass flow can be induced on these surfaces by
admitting certain gases into the vacuum which adsorb on
the surface. The adsorbate-induced mass flow is
consistent with a model in which the adsorbates promote
the creation of adatoms and vacancies at step edges.
Using time-lapse image sequences, we compare the mass
flow observed under ambient, UHV, and adsorbate-
contaminated conditions, and discuss the role of the

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adsorbates in promoting the mass flow process at room
temperature.

DESCRIPTORS: (U) *ADSORBATES, *GOLD, *MASS FLOW,
*MICROSCOPY, *SCANNING, *SURFACES, *TUNNELING, ADATOMS,
AIR, CONTRAST, CURVATURE, DECAY, EDGES, FLOW, IMAGES,
ISLANDS, MASS, MODELS, NUCLEATION, OBSERVATION, POWER,
ROOM TEMPERATURE, SEQUENCES, STRUCTURES, TEMPERATURE,
TIME, ULTRAHIGH VACUUM, VACUUM, REPRINTS, FILMS, PULSES,
GRAIN STRUCTURES(METALLURGY).

IDENTIFIERS: (U) PE81102F, WUAFOSR2303A2, Nanoscale
nonequilibrium, Clusters, Islands, Vacancies(Pits), Power
law scaling, Step edges.

UNCLASSIFIED

DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

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MINNESOTA UNIV MINNEAPOLIS DEPT OF GEOLOGY AND
GEOPHYSICS

(U) Regional Surface Waves from Mesabi Range Mine Blasts
(Northern Minnesota).
IDENTIFIERS: (U) PE61102F, WUAFOSR2309A2, *Explosive
Effects.

DESCRIPTIVE NOTE: Final rept. 1 Aug 85-31 Jul 88.

OCT 91 225P

PERSONAL AUTHORS: Laudon, Carolan; Schult, Frederick

CONTRACT NO. AFOSR-85-0310

PROJECT NO. 2309

TASK NO. A2

MONITOR: AFOSR, XC
TR-92-0848, AFUSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The surface waves from mine blasts recorded on the Central Minnesota Seismic Array were analyzed for propagation characteristics and velocities. The seismic array was a six station vertical array with a diameter of 28 kilometers. It was located in east central Minnesota and was emplaced in 1978 to monitor local seismicity. It routinely recorded mine blasts which occurred in the Mesabi Range of northern Minnesota, about 200 kilometers from the array. The surface wave train is complex, with at least two distinguishable phases consistently present. The overall wave train is characteristic of the Lg phase, but the dominant surface wave arrival is interpreted as Rg. The Rg phase, also referred to as R1, and a later surface wave arrival (R2) were analyzed to determine the effects of regional and local geology on the surface wave velocities and raypaths. Most of the data were analyzed through the use of two signal processing techniques, multiple filter analysis and cross-correlation.

DESCRIPTORS: (U) *GEOLOGY, *UNDERGROUND EXPLOSIONS, *SEISMIC WAVES, BLAST, CROSS CORRELATION, FILTER ANALYSIS, MINNESOTA, MONITORS, PHASE, SEISMIC ARRAYS, SIGNAL PROCESSING, SIGNALS, STATIONS, SURFACE WAVES, SEISMIC VELOCITY, WAVE PROPAGATION.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

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MEDICAL RESEARCH COUNCIL LONDON (UNITED KINGDOM)

High G Correlations.

(U) The Central Executive Component of Working Memory.

DESCRIPTIVE NOTE: Annual rept. 1 Sep 91-31 Aug 92.

OCT 92 21P

PERSONAL AUTHORS: Baddeley, A.; Duncan, J.; Emslie, H.

CONTRACT NO. AFOSR-90-0343

PROJECT NO. 2313

TASK NO. A4

MONITOR: AFOSR, XC
TR-92-0948, EDARD

UNCLASSIFIED REPORT

ABSTRACT: (U) Our approach to the central executive (CE) involves combined studies of dual task interference, frontal lobe function and general intelligence or Spearman's g. In this reporting period we have focused on dual task interference, in particular using variants of Baddeley's (1986) random generation task, thought to load the CE because of its continual requirement for novel, non-stereotyped responding. Results suggest three main conclusions. First, the CE is modality-independent, in contrast to the peripheral slave systems of working memory. Second, there is a link between CE requirements and frontal lobe functions, indicated by substantial interference between random generation and a conventional frontal task, word fluency. Third, there is some tendency for tasks with high g correlations also to show the greatest interference with random generation. Taken together, these results support the convergence of methods from experimental cognitive psychology, neuropsychology and differential psychology, to define a common CE system.

DESCRIPTORS: (U) *COGNITION, *INTELLIGENCE(HUMANS), *REASONING, *CEREBRAL CORTEX, *JUDGEMENT(PSYCHOLOGY), CORRELATION, FUNCTIONS, PSYCHOLOGY.

IDENTIFIERS: (U) Working memory, Central executive, Frontal lobes, Intelligence, PEG102F, WJAFOSR2313A4.

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RHODE ISLAND UNIV KINGSTON

and wave attenuation..... Granular media, Dynamic contact load, Wave propagation, Dynamic photoelasticity, Distinct element method, Finite element method, Explosive loading, Strain gages, Wave velocity, Magnitude of the dynamic contact stresses, Wave propagation velocities.

(U) Wave Propagation and Dynamic Load Transfer due to Explosive Loading in Heterogeneous Granular Media with Microstructure.

DESCRIPTIVE NOTE: Final rept. 15 Aug 89-'5 Aug 92.

DESCRIPTORS: (U) *EXPLOSIVES, *PROJECTILES, ATTENTION, ATTENUATION, DYNAMICS GAGES, GAS GUNS, GUNS, INTERSTITIAL, MATERIALS, MEDIA, MICROSTRUCTURE, MOISTURE, PARTICLES, PHOTOELASTICITY, PROPAGATION, PULSES, SHAPE, STRAIN GAGES, STRESSES, TRANSFER, VELOCITY, WAVE PROPAGATION.

SEP 92 231P

PERSONAL AUTHORS: Shukla, A.; Sodd, M. H.

REPORT NO. WE-92-01

IDENTIFIERS: (U) PE61102F, WUAFOSR2302C1, *Granular materials.

CONTRACT NO. F49620-88-C-0081

PROJECT NO. 2302

TASK NO. C1

MONITOR: AFOSR, XC
TR-92-0883, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) An experimental and numerical investigation has been conducted to study wave propagation and load transfer due to dynamic loading in granular materials. Systematic as well as random aggregates of particles of different material properties as well as shapes were used to simulate the granular media. These assemblies were loaded either with explosives or projectiles driven by a gas gun to generate short duration pulses. The resulting dynamic phenomenon was experimentally studied by using the optical technique of photoelasticity and dynamic strain gage equipment. Of particular attention was the effect of local microstructure on the wave propagation process. The effect of the loading pulse wavelength as well as the material heterogeneity on the wave propagation phenomenon was evaluated. The effect of the particle shape and size on the load transfer process was also studied. Initial experiments were also conducted to investigate the effect of prestress as well as interstitial moisture on the wave propagation process. The experimental results elucidated the basic mechanisms of load transfer, provided the duration and magnitude of the dynamic contact stresses, wave propagation velocities, envelope of load transfer

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OTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4I17L

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AD-A258 699 CONTINUED

STANFORD UNIV CA DEPT OF COMPUTER SCIENCE

LANGUAGE, NUMBERS, SELECTION, SPECIALIZATION, SPEECH,
STANDARDS, STRUCTURES, THEORY, TIME, SEMANTICS,
ALGORITHMS.

(U) Nonmonotonic Temporal Reasoning.

DESCRIPTIVE NOTE: Final rept. 15 Apr 89-14 Apr 92.

IDENTIFIERS: (U) *Agent oriented programming.

MAR 92 5P

PERSONAL AUTHORS: Shoham, Yoav

CONTRACT NO. AFOSR-89-0326

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR, XC
TR-92-0326, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) In research carried out to this date under this grant they investigated a number of issues, semantical and algorithmic, in the design of agents in a multi-agent environment. The issues that were investigated included the structure of agents' (which they called 'mental state'), the flow of control of agents' activities over time, a particular programming language geared towards controlling agents, and a number of subsidiary computational problems. The researchers have developed a computational framework called agent oriented programming. AOP can be viewed as a specialization of object oriented programming (OOP). The state of an agent consists of components called beliefs, choices, capabilities, commitments, and possibly others; for this reason the state of an agent is called its mental state. The mental state of agents is captured formally in an extension of standard epistemic logics: beside temporalizing the knowledge and belief operators, AOP introduces operators for commitment, choice and capability. Agents are controlled by agent programs which include primitives for communicating with other agents. In the spirit of speech-act theory, each communication primitives is of a certain type: Informing, requesting, offering, and so on....

DESCRIPTORS: (U) *PROGRAMMING LANGUAGES, *REASONING,
COMPUTER PROGRAMMING, CONTROL, ENVIRONMENTS, FLOW, GRANTS,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

AD-A258 686 12/8

STANFORD UNIV CA DEPT OF COMPUTER SCIENCE

(U) Anytime Declarativism.

DESCRIPTIVE NOTE: Final technical rept. 1 Nov 90-30 Apr 92.

OCT 92 5P

PERSONAL AUTHORS: Ginsberg, Matthew L.; Nilsson, Nils J.

CONTRACT NO. AFOSR-90-0363

MONITOR: AFOSR, XC
TR-92-1023, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) The objectives of this grant is to formalize the notion of anytime inference. This work consisted of an extension to Ginsberg's work on multivalued logics, since this earlier work allows arbitrarily finely grained responses to declarative queries. They will also develop a procedure that responds to a declarative query in an anytime fashion, in that it returns the correct answer in the large runtime limit but only approximate answers in shorter times. Both uniform and nonuniform convergence will be addressed.

DESCRIPTORS: (U) *COMPUTER LOGIC, CONVERGENCE, GRANTS, NONUNIFORM, RESPONSE, WORK, ALGORITHMS, REAL TIME.

AD-A258 697 12/5 12/9

CHICAGO UNIV IL

(U) Case-Based Reasoning for Real-Time Problem Solving.

DESCRIPTIVE NOTE: Final rept. 1 Jan 91-30 Jun 92.

OCT 92 30P

PERSONAL AUTHORS: Hammond, Kristian; Owens, Christopher; Martin, Charles

CONTRACT NO. AFOSR-91-0112

PROJECT NO. 2304

TASK NO. A7

MONITOR: AFOSR, XC
TR-92-1022, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) This document summarizes the University of Chicago Artificial Intelligence Laboratory's work on applying case-based methods to intelligent real-time problem solving. An approach to problem solving involving the storage, retrieval, adaptation, and re-use of successful strategies is outlined. The report describes work on an overall control architecture, on methodological issues in the development of representation vocabularies, and on memory organization for efficient storage and retrieval of cases. Work on six projects is described including work on robot planning, the dynamic repair of transportation schedules, multi-agent cooperative planning, case-based design, and active perception. The result of this work is a model of instability of a dynamic, real-time environment by making use of known plans stored in memory.... Artificial intelligence, Real-time problem solving, Case-based reasoning, Memory organization.

DESCRIPTORS: (U) *ARTIFICIAL INTELLIGENCE, *PROBLEM SOLVING, *REAL TIME, ADAPTATION, APPROACH, ARCHITECTURE, CONTROL, DYNAMICS, ENVIRONMENTS, INSTABILITY, INTELLIGENCE, MODELS, ORGANIZATIONS, PERCEPTION, PLANNING, REASONING, REPAIR, ROBOTS, STORAGE, STRATEGY, TIME, TRANSPORTATION, UNIVERSITIES, VOCABULARY.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

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AD-A258 696 7/3 6/11 6/3

IDENTIFIERS: (U) WJAFDSR2304A7, PEB1102F, Case based method.

MICHIGAN STATE UNIV EAST LANSING DEPT OF PEDIATRICS/
HUMAN DEVELOPMENT

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

DESCRIPTIVE NOTE: Annual technical rept. (Final) 1 Mar 89-
30 Apr 92.

APR 92 16P

PERSONAL AUTHORS: Trosko, James E.; Madhukar, Burra V.

CONTRACT NO. AFOSR-89-0325

PROJECT NO. 2312

TASK NO. AS

MONITOR: AFOSR, XC
TR-92-1026, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) During this past grant period (3/1/89 - 4/30/92), progress was made on all specific aims proposed to examine how non-genotoxic or non-mutagenic chemicals cause various diseases. The experiments were designed to examine how these teratogenic, tumor promoting, neurotoxic and reproductive toxicants modulated gap junctional intercellular communication at either the transcriptional, translational or posttranslational levels. Cells (a) with mutated regulation of gap junction function; (b) transfected with various oncogenes; (c) treated with known effectors of various second message signaling roles; and (d) transfected with sense and anti-sense gap junction genes were studied with laser-imaging technology and newly produced antibodies to gap junctions in order to study the regulation of cell-cell communication. With assays in place, new molecular biology tools and the Meridian ACAS-570 image analyzing technology, new studies to understand 'epigenetic toxicology' are currently underway.... Gap junctions, Cell communication, Tumor promoter, Oncogenes, Teratogens, Neurotoxins, Protein kinase C, Chemical toxicity.

DESCRIPTORS: (U) *CHEMICALS, *MOLECULAR BIOLOGY,
*TOXICOLOGY, *INHIBITION, ANTIBODIES, BIOLOGY, CELLS,

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

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DISEASES, FUNCTIONS, GENES, GRANTS, JUNCTIONS, LASERS, NEOPLASMS, NEUROTOXINS, PHOSPHORUS TRANSFERASES, PROTEINS, REGULATIONS, TOOLS, TOXICITY, MUTAGENS, REPRODUCTIVE SYSTEM, IMAGES, TERATOGENIC COMPOUNDS.

GEORGIA INST OF TECH ATLANTA

(U) On the Theory of Turbulent Dynamics.

DESCRIPTIVE NOTE: Final rept. 1 Mar 90-30 Sep 92,

SEP 92 35P

PERSONAL AUTHORS: Fox, Ronald F.

CONTRACT NO. AFOSR-90-0158

PROJECT NO. 2304

TASK NO. A4

MONITOR: AFOSR, XF
TR-92-1028, AFOSR

UNCLASSIFIED REPORT

IDENTIFIERS: (U) PEG1102F, WJAFOSR2312AS, *Gap junctions, *Intercellular communications, Cell communications, Oncogenes, Teratogens, Transcriptional levels, Translational level, Affectors, Transfected, Antisense, Meridian ACAS-870, Epigenetic.

ABSTRACT: (U) Acceptance of the discovery of amplification of intrinsic fluctuations by chaotic dynamics has been slow. They have been able to identify several of the mental blocks experienced by others and have successfully clarified their position for some of these people. But it has been a slow process. The principal problem has been that some earlier researchers saw amplification of intrinsic fluctuations in their own work but failed to recognize its significance. These include Robert Graham and B. Huberman. The two conceptual insights they have missed are: (1) such amplification invalidates the contraction of the description from the mesoscopic level to the macroscopic level; and (2) the centrality of the Jacobi matrix in the theory since it connects the magnitude (and sign) of the largest Liapunov exponent with the growth of the fluctuations. The first oversight by others follows from their failure to embed the phenomenon in the context of levels of description. Rather, in their work, they have simply added fluctuations to macroscopic equations and investigated what happens. The second oversight results from not suspecting a connection in the first place.

DESCRIPTORS: (U) *DYNAMICS, *CHAOS, *TURBULENCE, AMPLIFICATION, CONTRACTION, EQUATIONS, FAILURE, THEORY, WORK, JOSEPHSON JUNCTIONS, YAG LASERS, PROBABILITY DISTRIBUTION FUNCTIONS, TURBULENT FLOW, NOISE, STOCHASTIC

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4I17L

AD-A258 695 CONTINUED

PROCESSES.

IDENTIFIERS: (U) PE81102F, WUAFOSR2304A4, Attractors, Fluctuations, Jacobi matrix, Liapunov exponent, Rossler attractor.

AD-A258 694 20/2 7/4 12/4

RUTGERS - THE STATE UNIV NEW BRUNSWICK NJ DEPT OF MATHEMATICS

(U) Geometry of Energy Minimizing Surfaces.

DESCRIPTIVE NOTE: Final rept. 1 Oct 90-31 Jan 92.

JAN 92 8P

PERSONAL AUTHORS: Taylor, Jean E.

CONTRACT NO. AFOSR-91-0010

PROJECT NO. 6912

TASK NO. OR

MONITOR: AFOSR, XC
TR-92-1029, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) During this period of support they have continued long-term program of investigating the shapes of surfaces in mathematical models for crystals (including polycrystalline materials), both in equilibrium and in growth. The accomplishments included the completion of seven papers, all of which have either appeared in print or are in press, and working on five more, three of which have since been finished and accepted for publication. Also completed one videotape that will soon be published. Four papers that had previously been written appeared in print during the period of this grant. In addition, one AMA Special Session was organized and one week long workshop at The Geometry Center, and initiated and edited the proceedings of both (the second after this grant expired). These proceedings are highly innovative in that they include videotapes. The PI gave a large number of invited talks at a variety of meetings....

DESCRIPTORS: (U) *GEOMETRY, *SURFACES, *ENERGY, ADDITION, CRYSTALS, MATERIALS, MATHEMATICAL MODELS, MODELS, NUMBERS, POLYCRYSTALLINE, SHAPE, WORKSHOPS, INTERFACES, ENERGY, SURFACE TENSION, GRAIN BOUNDARIES, SOLIDS.

IDENTIFIERS: (U) WUAFOSR89120R, PE81102F, Minimizing. Equilibrium, Growth.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

AD-A258 893

7/4 20/10 20/5

AD-A258 893 CONTINUED

STEVENS INST OF TECH HOBOKEN NJ DEPT OF CHEMISTRY AND
CHEMICAL ENGINEERING

(U) Theoretical and STM Studies of the Electronic
Structure of Metal/Semiconductor/Hydrogen Systems.

DESCRIPTIVE NOTE: Final rept. 1 Feb 91-14 Aug 92.

NOV 92 76P

PERSONAL AUTHORS: Ermler, Walter C.

REPORT NO. 9-27081

CONTRACT NO. AFOSR-91-0164

PROJECT NO. 2301

TASK NO. A7

MONITOR: AFOSR, XC
TR-92-1024, AFOSR

UNCLASSIFIED REPORT

DESCRIPTORS: (U) *ELECTRONICS, *MICROSCOPY, *QUANTUM
CHEMISTRY, *SCANNING, *STRUCTURES, *TUNNELING, *METALS,
*SEMICONDUCTORS, *HYDROGEN, ATOMS, CHEMISTRY,
CONFIGURATIONS, CONVOLUTION, CORES, CORRELATION, DENSITY,
ELECTRONS, ENERGY, GOLD, GRAPHITE, IMAGES, INCLUSIONS,
LAYERS, MODELS, ORBITS, PERIODIC VARIATIONS, POLARIZATION,
POTENTIAL ENERGY, RESOLUTION, SURFACES, THEORY, VALENCE,
DEFECT ANALYSIS, SUBSTRATES, BERYLLIUM, LITHIUM,
RELATIVISTIC ELECTRONS, SPIN STATES, ATOMIC PROPERTIES.

IDENTIFIERS: (U) PE81102F, WUAFOSR2301A7, STM(Scanning
Tunneling Microscopy), Atomic clusters, Ab initio
calculations, Sols, Facets, Steps, Contaminated tips,
Spin-orbit, Rydberg states.

ABSTRACT: (U) The structure of atomic clusters is
investigated using methods of ab initio quantum chemistry
in conjunction with scanning tunneling microscopy (STM).
Gold sols are imaged via STM and their sizes
characterized. Atomic resolution reveals facets, steps,
and reconstructed surfaces of the sols. STM images of
graphite surfaces are characterized by two mechanisms: a
twisted top layer configuration and a graphite-flake
contaminated tip. A crystalline tip model reproduces
anomalous long range periodicity, attributed to defect-
mediated tip-substrate convolution. Ab initio calculations
of electronic states of a 135 atom Be cluster show bulk
behavior for many properties centered at the middle of
the cluster. The density of states agrees well with band
theory models. Full spin-orbit CI calculations of the
electronic spectrum and potential energy curves of LiBe,
including Rydberg states, are definitive and accurate. A
procedure for the incorporation of core/valence
polarization effects in all-valence electron calculations
is presented for use with relativistic effective core
potentials. The method allows the treatment of large
clusters at the ab initio level including procedures for
the inclusion of electron correlation....

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AD-A258 882 12/8 8/1

AD-A258 880 9/3

PITTSBURGH UNIV PA

TECHNION - ISRAEL INST OF TECH HAIFA

(U) Coincident Pulse Techniques for Hybrid Electronic Optical Computer Systems.

(U) The Lasing Mechanism of the Orbitron: A Millimeter-Wave Maser Based on a Glow Discharge.

DESCRIPTIVE NOTE: Final rept. Jul 88-Jul 92,

DESCRIPTIVE NOTE: Final rept. 1 Sep 88-30 Apr 92,

AUG 92 124P

OCT 92 31P

PERSONAL AUTHORS: Chiarulli, Donald M.; Meihem, Rami G.; Levitan, Steven P.

PERSONAL AUTHORS: Felsteiner, Joshua

CONTRACT NO. AFOSR-88-0488

CONTRACT NO. AFOSR-88-0343

PROJECT NO. 2308

PROJECT NO. 2301

TASK NO. 81

TASK NO. D1

MONITOR: AFOSR, XC
TR-92-1025, AFOSR

MONITOR: AFOSR, XC
TR-93-01, AFOSR

UNCLASSIFIED REPORT

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ABSTRACT: (U) This research is an investigation of the application of coincident pulse techniques to multiprocessor interconnection networks. The research focuses on three main areas: an examination of the applicability of coincident pulse techniques and required hardware to multiprocessor applications, an investigation of the limits of scalability, and an exploration of various interconnection structures which can be created using these techniques.... Electro/optical systems, Optical computing.

DESCRIPTORS: (U) *MULTIPROCESSORS, *CIRCUIT INTERCONNECTIONS, *COMPUTER NETWORKS, NETWORKS, PULSES, STRUCTURES, OPTICAL PROCESSING, ELECTROOPTICS, PROTOTYPES.

IDENTIFIERS: (U) WJAFOSR230581, PE61102F.

ABSTRACT: (U) In this work it was found that the Orbitron microwave generation follows a much stronger generation of RF oscillations close to the ion plasma frequency. This phenomenon is associated with instability of the cathode sheath which causes modulation of the discharge current of almost 100%. These intense RF oscillations are accompanied by short-microwave spikes, each emitted at the same phase of the RF period. The microwave radiation has a wide spectrum above the electron plasma frequency. This radiation appears to be due to the transformation of electrostatic plasma waves which were measured inside the plasma and are assumed to be driven by the beam-plasma instability. Both RF and microwave generation do not depend on the anode shape, area, or position. Microwave and RF generation, Glow discharge.

DESCRIPTORS: (U) *GLOW DISCHARGES, *MASERS, *MILLIMETER WAVES, ANODES, CATHODES, ELECTRONS, ELECTROSTATICS, FREQUENCY, INSTABILITY, IONS, MICROWAVES, MODULATION, OSCILLATION, PHASE, PLASMA WAVES, RADIATION, SHAPE, SPIKES, TRANSFORMATIONS, WORK.

IDENTIFIERS: (U) WJAFOSR2301D1, PE61102F, *Orbitrons.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

AD-A258 883 9/5

AD-A258 883 CONTINUED

OPTICAL SOCIETY OF AMERICA WASHINGTON DC

IDENTIFIERS: (U) *Hole burning, Photorefractive materials, Picoseconds, Optoelectronics, Wavelengths...

- (U) Organization of the Optical Society of America Photonic Science Topical Meeting Series (1991). Volume 18. Conference Edition: Summaries of papers presented at the Persistent Spectral Hole-Burning: Science and Applications Topical Meeting Held in Monterey, California on 26-28 September 1991.

DESCRIPTIVE NOTE: Final rept. 1 Jan 91-31 Dec 91.

MAY 92 338P

PERSONAL AUTHORS: Quinn, Jarvis W.

CONTRACT NO. AFOSR-91-0176

PROJECT NO. 2308

TASK NO. A1

MONITOR: AFOSR, XF
TR-92-0814, AFOSR

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: For sales information of individual items, See AD-PO08 228 thru AD-PO08 308

ABSTRACT: (U) Attach list of reports supported by Optical Society of America Photorefractive Materials, Effects, and Devices; Integrated Photonics Research; Nonlinear Guided Wave Phenomena; Optical Amplifiers and Their Applications; Optical computing; Picosecond Electronics and Optoelectronics; Quantum Optoelectronics; Photonic Switching; Microphysics of Surfaces; Beam Induced Processes; Soft X-ray Projection Lithography; Short Wavelength Coherent Radiation: Generation and Applications; and Persistent Spectral Hole-Burning: Science and Applications.

DESCRIPTORS: (U) *PHOTONICS, *RADIATION, *SPECTRA, *FREQUENCY, *AMPLIFIERS, COHERENT RADIATION, ELECTRONICS, LITHOGRAPHY, MATERIALS, PHOTONICS, SHORT WAVELENGTHS, SOFT X RAYS, SURFACES, SWITCHING, X RAYS, OPTICS, TRANSITIONS, NONLINEAR OPTICS, WAVES, COMPUTERS, QUANTUM ELECTRONICS, BEAMS(RADIATION).

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

AD-A258 650 21/2 7/3 7/4 AD-A258 650 CONTINUED

GENERAL ELECTRIC CO SCHEMECTADY NY RESEARCH AND DEVELOPMENT CENTER

(U) Measurements and Modeling of a Bluff-body Stabilized Flame.

DESCRIPTIVE NOTE: Journal article.

MAY 92 21P

PERSONAL AUTHORS: Correa Anil Gulati, Sanjay M.

CONTRACT NO. F49620-91-C-0072

PROJECT NO. 2308

TASK NO. BS

MONITOR: AFOSR, XC

TR-92-0915, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Combustion and Flame, v89 n2 p195-213 May 92. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) An axisymmetric bluff body stabilized non-premixed turbulent flame of 27.5% CO/ 32.3% H₂/ 40.2% N₂ in-air was investigated. The recirculation zone stabilized the flame and provided greater strain rates than possible in jet or even piloted-jet flames. Major species, density and temperature were measured using a laser Raman scattering system, which was modified to operate in a chemiluminescent environment. The computational model was based on partial equilibrium in the radical pool, an assumed shape pdf over the two thermochemical variables required, and the k-epsilon turbulence model for closure of the density-weighted averaged Navier Stokes equations. The equations were solved in the elliptic form appropriate to recirculating flow. Enough grid was added to reduce the transverse cell Reynolds numbers to below two, ensuring second-order accurate and stable discretization of convection operators and so eliminating artificial diffusion. Mean properties such as density were obtained at each node by convolution with the joint pdf over the two thermochemical scalars. The k-epsilon turbulence model

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gave too rapid an initial decay. Agreement was encouraging on mixture fraction mean and variance, temperature, and species concentration fields. The bluff body provides an intensely turbulent flowfield for interactions with combustion chemistry, and is within the scope of numerical analysis. To improve the turbulence model and to have a formalism which permits three or more scalars as required for hydrocarbon fuels, pdf transport methods should be merged with conventional solvers for the mean hydrodynamics.

DESCRIPTORS: (U) *AXISYMMETRIC, *BODIES, *COMBUSTION, *FLAMES, *STABILITY, AGREEMENTS, AIR, CELLS, CHEMISTRY, CLOSURES, CONVECTION, CONVOLUTION, DECAY, DENSITY, DIFFUSION, ENVIRONMENTS, EQUATIONS, FLOW, FUELS, GRIDS, HYDROCARBONS, HYDRODYNAMICS, INTERACTIONS, JET FLAMES, LASERS, MEAN, MEASUREMENT, MIXTURES, MODELS, NAVIER, STOKES EQUATIONS, NODES, NUMBERS, NUMERICAL ANALYSIS, RATES, RECIRCULATION, REGIONS, REPRINTS, SCATTERING, SHAPE, STRAIN RATE, TEMPERATURE, TRANSPORT, TRANSVERSE, TURBULENCE, VARIABLES, CARBON MONOXIDE, NITROGEN, HYDROGEN, EQUILIBRIUM(GENERAL), THERMOCHEMISTRY, REYNOLDS NUMBER, SCALAR FUNCTIONS.

IDENTIFIERS: (U) Raman, Finite-rate, Chemistry, Non-equilibrium, *Bluff body, Recirculation zone, Chemiluminescence.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

AD-A258 648 20/5 7/3 7/5 11/8.2 CONTINUED

PITTSBURGH UNIV PA DEPT OF CHEMISTRY

(U) Photochemical Activity of Iron Pentacarbonyl on Ag(111)
: Photofragmentation, Quenching and Wavelength-
dependent Effects,

92 18P

PERSONAL AUTHORS: Henderson, M.A.; Ramsier, R.D.; Yates,
J.T., Jr.

CONTRACT NO. AFOSR-89-036

PROJECT NO. 2303

TASK NO. A2

MONITOR: AFOSR, XC
TR-92-0941, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Surface Science, v275 p297-313 1992.
Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) The UV photon induced decomposition of Fe(CO)₅ on Ag(111) was examined with temperature programmed desorption (TPD), Auger electron spectroscopy (AES), and low-energy electron diffraction (LEED). In the absence of UV irradiation, Fe(CO)₅ thermally desorbed from Ag(111) with minimal decomposition. The temperature difference between the monolayer and multilayer states (12 K) suggests that the monolayer was physisorbed. Photodecomposition of adsorbed Fe(CO)₅ with 258 or 365 nm light produced unidentified surface species, presumably Fe sub x (CO) sub y clusters, which thermally decomposed near 330 K in TPD, evolving gas-phase CO and depositing a pure Fe film on the Ag surface. The photochemical properties of monolayer and multilayer Fe(CO)₅ were investigated separately by isolating multilayers of Fe(CO)₅ from the Ag(111) surface with a chemically and photolytically inert buffer layer (n-decane). Photodecomposition near the threshold energy (3.4 eV) was five times as efficient for monolayer Fe(CO)₅ as for multilayer Fe(CO)₅, presumably due to a red-shifted absorption threshold for the monolayer. The photodecomposition cross sections with 4.8 eV light were similar to gas-phase values, suggesting that the excited

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Fe(CO)₅ species were not significantly quenched by the surface. Quenching of energetic Fe sub x (CO) sub y fragments was more pronounced in the monolayer than for Fe(CO)₅ as inferred by the low cross section for Fe sub x CO sub y photodecomposition.

DESCRIPTORS: (U) *FRAGMENTS, *IRON, *PHOTOCHEMICAL REACTIONS, *QUENCHING, *CARBONYL COMPOUNDS, *SILVER, ABSORPTION, AUGER ELECTRON SPECTROSCOPY, AUGER ELECTRONS, AUGERS, BUFFERS, CROSS SECTIONS, DECANES, DECOMPOSITION, DESORPTION, DIFFRACTION, ELECTRON DIFFRACTION, ELECTRON SPECTROSCOPY, ELECTRONS, ENERGY, FILMS, IRRADIATION, LAYERS, LIGHT, LOW ENERGY, PHASE, PHOTODECOMPOSITION, PHOTONS, REPRINTS, SPECTROSCOPY, SURFACES, TEMPERATURE, THIN FILMS, VALUE, ULTRAVIOLET EQUIPMENT, CARBON MONOXIDE, GASES, EXCITATION, METALS.

IDENTIFIERS: (U) FE(CO)₅, Ultraviolet, PE81102F, WUAF0SR2303A2, Pentacarbonyls, *Photofragmentation, Wavelength dependent effects, Physisorbed.

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DTIC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. T4117L

AD-A258 648 7/4 20/5 20/3 7/2 AD-A258 648 CONTINUED

ENRKY UNIV ATLANTA GA SCHOOL OF DENTISTRY

(U) Spectroscopy of Charge-Transfer Transitions in Jet-Cooled IBr.

IDENTIFIERS: (U) *Jet cooled, Free jet expansion, Ion-pair states.

JUL 82 7P

PERSONAL AUTHORS: Zheng, Xisouan; Heaven, Michael C.; Tellinghuisen, Joel

CONTRACT NO. F48620-82-J-0073

PROJECT NO. 2303

TASK NO. ES

MONITOR: AFOSR, XC
TR-82-0844, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Chemical Physics Letters, v195 n23 p273-278, 17 Jul 82. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) The A'(2) and A(1) states of IBr were detected in a free-jet expansion of IBr in Ar, where they were prepared by ArF laser irradiation. The $v = 0-5$ progressions of the D'(2)+QA' reverse transition, and the $v = 0$ and 1 progressions of the Beta(1) reverse A(1) transition were observed and recorded for both 127 sub I 78 sub Br and 127 sub I 81 sub Br. Rotationally resolved excitation spectra were recorded for 31 bands of the D' reverse transition A'(2), v' reverse transition $v = 1$ progression, and band heads were measured at low resolution for an additional >220 bands of this system and >100 bands of the Beta A transition. Analyses of these spectra yields improved spectroscopic parameters for previously unobserved regions of all four electronic states, including the first characterization of the lowest v levels in the A' and A states.

DESCRIPTORS: (U) *CHARGE TRANSFER, *SPECTROSCOPY, *TRANSITIONS, *IODINE, *BROMIDES, CHEMICALS, ELECTRONIC STATES, ELECTRONICS, EXCITATION, EXPANSION, IRRADIATION, LASERS, LOW RESOLUTION, PARAMETERS, PHYSICS, REGIONS, REPRINTS, RESOLUTION, SPECTRA, TRANSFER, YIELD, ARGON, ROTATION, COOLING, HALOGENS, ATOMS, IONS, VALENCE.

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MCDONNELL DOUGLAS SPACE SYSTEMS CO HUNTINGTON BEACH CA
DESIGN AND TECHNOLOGY CENTER

(U) Spacecraft Interaction with Ambient and Self-Generated
Plasma/Neutral Environment.

DESCRIPTIVE NOTE: Final rept. 1 Jul 90-31 Aug 92.

AUG 92 104P

PERSONAL AUTHORS: Mogstad, Toril S.

CONTRACT NO. F48620-80-C-0051

MONITOR: AFOSR, XC
TR-92-0957, AFOSR

UNCLASSIFIED REPORT

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

ABSTRACT: (U) This report presents the results of our study of Spacecraft Interaction with Ambient and Self-Generated Plasma/Neutral Environment. Various neutral effluent release scenarios in low Earth orbit were defined and modeled with direct simulation Monte Carlo (DSMC) methods. The simulated environments included H₂ venting from an SDI-type chemical power system, and Space Station Freedom (SSF) mono and bipropellant hydrazine thruster plume distributions at high-voltage solar arrays. After the neutral distributions were characterized, various ionization mechanisms (charge exchange, critical velocity ionization effects, photo-ionization) were included to determine the local plasma production. Neutral and ion continuity equations were solved to obtain the local ion distribution in the vicinity of high-voltage surfaces. It was shown that the thruster effluents can generate self-induced neutral and plasma density distributions several orders of magnitude greater than the natural ambient environment. For a bipropellant MH-N204 thruster firing into the ram, our simulations indicate that the local plasma density may increase as much as four orders of magnitude over the ambient. The effects of these self-induced environments on high-voltage surface arcing were assessed by using a microscopic model of the arcing process developed at MIT. High-voltage surface arcing thresholds, probabilities, and frequencies

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for current and future space platforms were discussed.
DESCRIPTORS: (U) *EFFLUENTS, *INTERACTIONS, *NEUTRAL, *SPACECRAFT, *PLASMA DEVICES, ARRAYS, BI-PROPELLANTS, CHEMICALS, CONTINUITY, DENSITY, DISTRIBUTION, EARTH ORBITS, ENVIRONMENTS, EQUATIONS, EXCHANGE, FREQUENCY, HIGH VOLTAGE, HYDRAZINE, INDUCED ENVIRONMENTS, IONIZATION, IONS, MODELS, ORBITS, PLATES, PLATFORMS, PLUMES, POWER, PRODUCTION, RELEASE, REPRODUCTION, SCENARIOS, SIMULATION, SPACE STATIONS, STATIONS, SURFACES, THRUSTERS, VELOCITY, VENTING, VOLTAGE, MONTE CARLO METHOD, HYDROGEN, PROPELLANTS, SOLAR ACTIVITY, NITROGEN, PROBABILITY, OXYGEN, CARBON DIOXIDE, PERTURBATIONS.

IDENTIFIERS: (U) Ambient environment, SSF(Space Station Freedom), Arcing thresholds.

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AIR FORCE OFFICE OF SCIENTIFIC RESEARCH BOLLING AFB DC

STATIONS, TEST AND EVALUATION.

(U) Crustal Deformation Measurements in the Vicinity of
Vandenberg Air Force Base.

IDENTIFIERS: (U) PEB1102F, Geology, Geological surveys,
WTR(Western Test Range), Vandenberg AFB(California),
Seismology, *Earthquake warning systems.

DESCRIPTIVE NOTE: Annual technical rept. 1 Jan 91-30 Sep
92.

DEC 92 BP

PERSONAL AUTHORS: King, Robert W.

CONTRACT NO. AFOSR-88-0400

PROJECT NO. 2309

TASK NO. A2

MONITOR: AFOSR, XC
TR-92-1030, AFOSR

UNCLASSIFIED REPORT

ABSTRACT: (U) Recent geological and geodetic studies have suggested that the region surrounding Vandenberg AFB is undergoing active crustal deformation, with important implications for both the geodetic stability and the seismogenic potential of the Western Test Range (WTR). Part of the evidence for significant deformation was obtained from GPS measurements which we carried out in cooperation with other university and government scientists beginning in 1988. These measurements have been made annually over a broad region of central and southern California but are of insufficient spatial and temporal density to answer many questions about the seismogenic potential of Vandenberg. In March 1992 we remeasured the relative positions of the Vandenberg network stations occupied in our experiments of February and September 1990, and also established nine new stations to density the network. The Vandenberg PGGA station has been acquiring data almost continuously since 22 May 1992, and provided an important anchor site for measuring far-field displacements from the Landers (MW7.3) and Big Bear (MW6.2) earthquakes of 28 June.

DESCRIPTORS: (U) *EARTHQUAKES, *MEASUREMENT, CALIFORNIA, COOPERATION, DEFORMATION, DENSITY, DISPLACEMENT, FAR FIELD, NETWORKS, REGIONS, SCIENTISTS, SITES, STABILITY,

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JOHNS HOPKINS UNIV BALTIMORE MD DEPT OF CHEMISTRY

(U) Quantum Flux Redistribution during Molecular Photodissociation.

AUG 92 10P

PERSONAL AUTHORS: Manolopoulos, David E.; Alexander, Millard H.

CONTRACT NO. AFOSR-81-0383

PROJECT NO. 2303

TASK NO. B1

MONITOR: AFOSR, XC
TR-82-0842, AFOSR

UNCLASSIFIED REPORT

Availability: Pub. in Jnl. of Chem. Phys., v97 n4 p2527-2538, 15 Aug 92. Available to DTIC users only. No copies furnished by NTIS.

ABSTRACT: (U) A new method proposed recently by Alexander for studying the mechanisms of inelastic collisions is adapted to the study of molecular photodissociation. This adaptation involves the determination of the current density associated with a driven photodissociation wave function at each fixed scattering energy, and yields a picture of how, as a function of the dissociation coordinate, the outgoing photofragment flux rises in the Franck-Condon region on absorption of the photon and how it redistributes between the available internal channels as the photofragments move apart. This picture complements the usual time-dependent picture of photodissociation, allowing one in particular to analyze the mechanism of the photodissociation in detail at each individual excitation laser frequency. A study of flux redistribution in a simple two-state model for the electronically nonadiabatic photodissociation of methyl iodide is presented as a first illustration of the approach.

DESCRIPTORS: (U) *COLLISIONS, *PHOTODISSOCIATION, *MOLECULES, *FLUX(RATE), ABSORPTION, ADAPTATION, APPROACH, CHANNELS, COORDINATES, CURRENT DENSITY, DENSITY,

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DETERMINATION, DISSOCIATION, ENERGY, EXCITATION, MODELS, FREQUENCY, FUNCTIONS, INTERACTIONS, IODIDES, LASERS, PHOTONS, PICTURES, REGIONS, REFLECTIONS, SCATTERING, WAVE FUNCTIONS, YIELD, ELASTIC PROPERTIES, ATOMIC PROPERTIES, ELECTRONICS, METHYL RADICALS.

IDENTIFIERS: (U) Photodissociation. PE81102F, WUAFOSR2303B1, Photofragments *Quantum mechanics, Franck-Condon principle, Methyl iodides, Time independent framework.