# I. CONTENTS

## I. FROM THE DIRECTOR

CAMS fulfills its mission to promote and sustain research in the mathematical sciences at NJIT largely through the creation and maintenance of essential infrastructure. This infrastructure includes support for preparation and submission of research papers and proposals, the CAMS/Math Seminar Series, the CAMS/Math Computation Laboratory, the CAMS Reading Room, the CAMS Reports, and the CAMS Summer Research Program. Thanks to the efforts of CAMS membership, infrastructure development continued at a rapid pace in 1995. An NSF SCREMS award, with a match from NJIT, has provided for a significant upgrade of our computational capabilities including the creation for a full-time systems administrator for the CAMS/Math Computational Laboratory. Undergraduate students, supported by NSF REU supplements, participated in the CAMS Summer Research Program for the first time. This positive experience with undergraduate research prompted submission of a proposal (funded in 1996) to the NSF ILI program for expanding our computational laboratory to allow all mathematics

majors to use these facilities for their senior projects. The best evidence of the effectiveness of CAMS in building infrastructure is the research accomplishments of the CAMS membership documented in this report.

Many challenges remain: improving and enlarging research facilities including common space, offices for visitors and research assistants, integrating both graduate and undergraduate students into research projects, creating a support environment for consulting efforts and interdisciplinary collaborations, creating and strengthening ties to industry both to improve faculty research work and to assist the Mathematics Department in the implementation of an "industrial strength" Ph.D. program, improving support for publication and editorial activities. The talent, energy, and dedication of the CAMS membership gives us great confidence that these challenges will be met in the years to come.

The accomplishments of CAMS are built on the efforts and support of many individuals. CAMS is deeply indebted to President Saul Fenster whose vision has created an environment in which the aspirations of CAMS are espoused and appreciated. CAMS is also deeply indebted to Provost Gary Thomas for his pivotal role in realizing this vision and in particular for his unflagging assistance and support. And finally, CAMS is very appreciative of the deep commitment of Gregory Kriegsmann, Chairman and Foundation Chair of Applied Mathematics, whose generous supply of resources, advice, and energy have been instrumental in our ongoing success.

Jonathan Luke-CAMS Acting Director (Spring 95)

Daljit S. Ahluwalia-CAMS Director

## II. MISSION AND ACTIVITIES

The Center for Applied Mathematics and Statistics (CAMS) was established in 1986 to promote research in the mathematical sciences at the New Jersey Institute of Technology. Members of the Department of Mathematics naturally form the core of CAMS membership, but the importance of mathematics for science and technology has made CAMS an interdisciplinary organization. The formal structure of CAMS consists of the Director, the Committee on Research Facilities. But the essential nature of the organization is that of a voluntary

association of individual researchers joined in a collegial collaboration to enhance mathematical work at NJIT.

CAMS undertakes a wide range of activities in pursuing its mission. Since cutting edge research requires that its members be in steady contact with international scientific and engineering communities, CAMS brings researchers from academia, industry, and government to NJIT and other institutions by organizing inter-disciplinary workshops and by bringing together researchers whose strengths are complementary and whose goals are common. In some cases, CAMS secures the appointment of Research Professors to formalize this relationship so that grants can be jointly pursued.

CAMS activities also include support for the submission of research proposals which is done through dissemination of information, organization of group efforts, and administrative assistance to proposers. Senior members of CAMS commit a significant amount of time and effort in providing guidance and advice to young researchers in their efforts to obtain funding. Finally, CAMS fosters and encourages research among its members by arranging the acquisition of necessary resources.

In the future, CAMS hopes and expects to maintain its high standards of professionalism and scholarship and plans to extend its activities to include fostering student research and developing long-term relationships with industry.

## MEMBERSHIP AND VISITORS

**Department of Mathematics**

Ahluwalia, Daljit S. - **Director** (IPA at NSF Spring 95)

Andrushkiw, Roman

Bechtold, John

Bhattacharjee, Manish (Sabbatical, Fall 95)

Blackmore, Denis

Booty, Michael

Bukiet, Bruce

Collins, Russell - (Special Lecturer, Spring 95)

Dhar, Sunil

Dios, Rose

Goldberg, Vladislav - (Sabbatical, Fall 95)

Hile, Cheryl

Huang, Xun-Cheng

Kriegsmann, Gregory

Lacker, Michael

Luke, Jonathan - (**Acting Director** Spring 95

Sabbatical, Fall 95) Michalopoulou, Zoi Heleni (Research Asst. Professor Spring 95)

Milojevic, Petronije

Papageorgiou, Demetrios - **Associate Director** (Fall 95)

Perez, Manuel

Porter, Michael

Ray, Bonnie

Rosar, Madeleine - (Visiting Assistant Professor)

Siegel, Michael

Sran, Kewal

Stickler, David

Tavantzis, John

Tilley, Burt

Wagner, Barbara

## Department of Mechanical & Industrial Engineering

Rosato, Anthony

Dave, Rajesh

## Department of Civil & Environmental Engineering

Meegoda, Namunu

## CAMS Research Professors & Post Doc

Chaudhry, Hans

Erneux, Thomas

Booker, Stuart (Post-Doctoral Fellow)

## Long-Term Visitors

Orellana, Oscar Universidad Federico Santa Maria

Valparasiso, Chile

Jones, Douglas S. The University of Dundee

Scotland, United Kingdom

## Short-Term Visitors

Nachbin, Andre Instituto de Matematica Pura

Aplicade (IMPA)

Rio de Janeiro, Brazil

Scandrett, Clyde Naval Post Graduate School

Monterey, California

Silberglitt, Richard FM Technologies, Inc.

Fairfax, Virginia

Schuenemeyer, John University of Delaware

Newark, Delaware

## IV. SEMINARS AND WORKSHOPS

## A. THE CAMS/MATH SEMINAR SERIES

**Dale Lifson**

AT&T, Basking Ridge, NJ

*The Role of Quantitative Analysis in the Success of*

*AT&T Consumer Communications Services*

**Abraham Kadish**

Los Alamos National Laboratory, New Mexico

*Modelling the Effects of Mechanical Hysteresis on*

*Seismic Signal Propagation*

**Ernest L. Baker**

Energetics and Warheads Division, US Army, Armament

Research, Development & Engineering Center, Picatinny

Arsenal

*Modeling and Optimization of High Explosive Systems*

**Seth D. Potter**

Applied Science Program, New York University, NY

*Wireless Power Transmission for Terrestrial and Space*

*Applications*

**Han Zhu**

Research Associates, Inc., Tyndall AFB, Florida

*Engineering Applications of the Integral Equation*

*Method*

**Rodolfo Rosales**

Department of Mathematics, MIT, Cambridge, MA

*Standing Waves in Resonant Nonlinear Acoustics*

**Walter Willinger**

Picatinny Arsenal, NJ

*When Traffic Measurements Defy Tradional Traffic Models*

*(and vice versa): Traffic Modeling for High-Speed*

*Networks*

**Ralph Kleinman**

Department of Mathematics, University of Delaware, Newark,

DE

*Modified Gradient Methods in Imaging and Inverse*

*Scattering*

**Tom Marzetta**

Nichols Research Corporation

*Three-Dimensional Digital Filters for Motion Detection*

*in Image Sequences*

**Thomas L. Jackson**

ICASE, NASA Langley Research Center, Hampton, VA

*Shock-Turbulence Interactions and the Initial-value*

*Problem for Shear Flows*

**Jeffrey G. Blaschak**

USAF Armstrong Laboratory, Brooks Air Force Base, Texas

*Electromagnetic Wave Propagation in Dispersive Material*

**James F. Lynch**

Department of Ocean Engineering, Woods Hole Oceanographic

Institute, Woods Hole, MA

*Scattering of Sound from Internal Gravity Waves in*

*Shallow water-some Beginning Efforts at Understanding*

**John Starkenberg**

US Army Research Laboratory, Aberdeen Proving Ground, MD

*Modeling Shock Inititation of Heterogeneous Solid High*

*Explosives*

**Lloyd N. Trefethen**

Department of Computer Science, Cornell University, NY

*Computing Eigenmodes of Isospectral Drums*

**Richard Meyer**

Department of Mathematics, University of Wisconsin, WI

*Mathematics of Physical Modeling*

**Stuart Antman**

Department of Mathematics, University of Maryland, College

Park, MD

*Real and Fake PDE's of Nonlinear Visoelasticity:*

*Asymptotics of Light Bodies*

**William E. Olmstead**

Department of Mathematics, Northwestern University,

Evanston, IL

*Shear Localization Phenomena-An Overview*

**Richard Silberglitt**

FM Technologies, Fairfax, VA

**Microwave Processing and Joining of Ceramic Materials**

## Amitabha Bose

Department of Mathematics, Boston University, MA

*Applications of Geometric Singular Perturbation Theory*

*to Neurophysiology*

## Douglas A. Huntley

Institute for Mathematics and its Applications, University

of Minnesota, MN

*The Migration of a Liquid Droplet on a Non-uniformly*

*Heated Surface*

## Michael Siegel

Department of Mathematics, Ohio State University, Ohio

*The Dynamics of Complex Singularities in Hele-Shaw Flow*

## Burt Tilley

Department of Engineering Sciences & Applied Mathematics,

Northwestern University, IL

*Stability of Two-Layer Fluid Flows in Inclined Channels*

## Vittorio Castelli

IBM T.J. Watson Research Center

*Progressive Classification of Satellite Images in a*

*Wavelet Framework*

## Margaret Cheney

Department of Mathematical Sciences, Rensselaer Polytechnic

Institute, Troy, NY

*Inverse Problems for a Perturbed Dissipative Half-Space*

**Ian Fischer**

Department of Mechanical Engineering, NJIT., Newark, NJ

*Modern Applications of Quaternions*

**Lisa Fauci**

Department of Mathematics, Tulane University and Courant

Institute

*Computational Modeling of Swimming Organisms*

**Peter Petropoulos**

Department of Mathematics, SMU, Dallas, TX

*The Computation of Linear Dispersive Electromagnetic*

*Waves*

**Douglas S. Jones**

Department of Mathematical Sciences, University of Dundee,

Scotland, UK

*Scattering by a Cone*

**Louise Obergefell**

Wright-Patterson Air Force Base, Dayton, OH

*Human Biodynamics Modeling*

**Qiang Zhang**

Department of Applied Mathematics & Statistics, SUNY at

Stony Brook, NY

*Quantitative Theory of Fluid Mixing Induced by Random*

*Fields*

**David E. Tyler**

Department of Statistics, Rutgers University, New

Brunswick, NJ

*Robust Statistics and Computer Vision*

**Joseph B. Keller**

Stanford University, Stanford, CA

*Mathematics of Games and Sports*

**J. Douglas Carroll**

Graduate School of Management, Rutgers University, Newark,

NJ

*Multidimensional Scaling of Similarity, Dissimilarity,*

*and Preference Data*

**Smadar Karni**

Courant Institute, New York University, NY

*Algorithms for Compressible Interface Motion*

**Michael Miksis**

Department of Engineering Sciences & Applied Mathematics,

Northwestern University, Evanston, IL

*The Dynamics of Free and Confined Thin Liquid Films*

**Jun Hu**

Department of Mathematics, Rutgers University, Newark, NJ

*Renormalization, Rigidity, and Universality in*

*Bifurcation Theory*

## B. CAMS WORKSHOP IN MATERIALS SCIENCE PROBLEMS AT NJIT

The purpose of this workshop is to bring together researchers from NJIT working on materials science problems with particular emphasis on chemical vapor deposition (CVD). This will be an opportunity for exploring the possibility of modeling and analyzing such problems currently being investigated by groups in different departments at NJIT.

James Grow, Chemical Engineering & Environmental Sciences

Roland Levy, Physics

Norman Loney, Chemical Engineering & Environmental Sciences

Trevor Tyson, Physics

## C. NJIT & COURANT INSTITUTE/MATERIALS SCIENCE RESEARCH WORKSHOP

Under the auspice of CAMS, members of the Courant Institute, Physics Department (NJIT), and CAMS collaborated to explore joint research interests.

# D. NJIT & RUTGERS/NEWARK JOINT MATHEMATICAL SCIENCES COLLOQUIUM

## Philip Holmes

Princeton University, Department of Mechanical and Aerospace

Engineering and Program in Applied and Computational Mathematics

*Low Dimensional Models of Turbulence*

## CAMS 1995 SUMMER RESEARCH PROGRAM FOR STUDENTS

The CAMS Summer Research Program for students provides administrative
support for faculty working with students on research projects during
the summer. This support includes the organization of the CAMS
Graduate Research seminar where faculty and students present their
research projects or other topics of interest. In 1995 undergraduate
students were included in the summer research program.

## A. PARTICIPANTS

### Graduate Student Project Advisor

John Pelesko Gregory A. Kriegsmann

Shailesh Naire Bruce Bukiet

John Gilchrist Demetrios Papageorgiou

Helen Martynov Michael Porter

Xulun Jiang Michael Lacker

Piewen Hou Jonathan Luke

Zili Huang John Bechtold

Juan Gomez Michael Booty

Matthew Charlap Cheryl Hile

Yanping Wang Demetrios Papageorgiou

**Undergraduate Student Project Advisor**

Erik Gordon Demetrios Papageorgiou

Jennifer Garofalo Demetrios Papageorgiou

Robin Tanenbaum Michael Booty

**B. CAMS GRADUATE RESEARCH SEMINAR**

**Organizer: Bruce Bukiet**

**Demetrios Papageorgiou**

*Some Mathematical Problems in Fluid Dynamics*

**Zoi-Heleni Michalopolou**

*Source Localization for the Gulf of Mexico Experiment*

**Bruce Bukiet**

*A Characteristic Based Numerical Method with Tracking for*

*Nonlinear Wave Equations*

**John Pelesko**

*Microwave Heating of Low Loss Ceramics Through the use of a Lossy Susceptor: A One-dimensional Model*

**Shailesh Naire**

*Simulation of Jet Combustion with Swirl and Detailed Chemistry*

**John Gilchrist**

*Microwave Heating of a Fluid Layer*

**Helen Martynov**

*Inversion of Underwater Acoustic Fields Using Global Optimization Techniques*

**Xulun Jiang**

*2D Multi-Pendulum Tree Model and Its Application To Human Movement*

**Peiwen Hou**

*Numerical Computation of Stokes Flow Containing Rigid Plates*

**Zili Huang**

*Flame Response in Oscillating Stagnation Point Flow*

**Juan Gomez**

*Droplet Combustion*

**Matthew Charlap**

*A Comparison of Numerical Techniques for Solving the GNLS Equation*

**Yanping Wang**

*Control of Velocity and Wake Formation by Manipulation of Bulk Surfactant Concentration*

**C. UNDERGRADUATE STUDENT RESEARCH PROJECT**

**Erik Gordon**

*Dynamics of Multi-Fluid Flow and Interfaces*

**Jennifer Garofalo**

*Dynamics of Multi-Fluid Flow and Interfaces*

**Robin Tanenbaum**

*The Modulation of Flames of Various Types in a Premixed*

*Reactive Atmosphere*

**VI. EXTERNALLY FUNDED RESEARCH**

**A. NEW PROJECTS (Beginning in 1995)**

1. *Applications of Sweep Differential Equations to Automated*

*Manufacturing*

National Science Foundation: September 1995-August 1998

Denis Blackmore

Ming Leu

2. *Mathematical Modelling and Dynamics of Premixed Flames as*

*Hydrodynamic Discontinuities*

National Science Foundation: July 1995-June 1998

John Bechtold

3. *Mathematical Studies of Wave Propagation*

National Science Foundation: June 1995-November 1996

Cheryl Hile

4. *Development of Model-based Matched-filter Processing for*

*Time-dispersive Ocean Channels*

Canadian Department of National Defense (DREA):

October 1995-October 1998

Michael Porter

Zoi Heleni Michalopolou

6. *Statistical Analysis of NJIT I/M Study*

Hazardous Substance Management Research Center: June, 1995 -

June, 1996

Bonnie Ray

Manish Bhattacharjee

Sunil Dhar

7. *Mathematical Sciences Computing Research Environments*

National Science Foundation (SCREMS): July, 1995 -

July, 1997

Jonathan Luke

Gregory A. Kriegsmann

Madeleine Rosar

John Bechtold

Bruce Bukiet

Zoi Heleni Michalopoulou

8. *Marine Mammal Localization*

National Science Foundation: August 1995-July 1996

Zoi Heleni Michalopoulou

9. Consulting Services

Poulos Technical Services, Inc.: September 1995

Bruce Bukiet

## B. Continuing Funded Projects (Beginning before 1995)

1. *Applied Mathematical Problems in Microwave Processing of Ceramic Materials*

Department of Energy: June 1994-May 1997

Gregory A. Kriegsmann

2. *The Modulation of Flames of Various Types in a Premixed Preactive Atmosphere*

National Science Foundation: July 1994-June 1997

Michael Booty

3. *Data Driven Modeling and Forecasting of Nonlinear Time Series Systems*

National Science Foundation: July 1994-January 1996

Bonnie Ray

4. *Mathematical Sciences Computing Research Environments*

National Science Foundation: August 1994-July 1995

Jonathan Luke

Michael Booty

Cheryl Hile

Michael Lacker

Andre Nachbin

5. *Dynamics of Multi-Fluid Flows and Interfaces*

National Science Foundation: June 1994-May 1996

Demetrios Papageorgiou

6. *Mathematical Sciences Computing Research Environments*

National Science Foundation: September 1993-February

1995

Daljit Ahluwalia

Rose Dios

Bonnie Ray

Sunil Dhar

Manish Bhattacharjee

7. *Mathematical Problems in Modern Electromagnetics*

Air Force Office of Scientific Research: July 1994-June 1997

Gregory A. Kriegsmann

Cheryl Hile

Jonathan Luke

8. *Asymptotic and Singular Methods for Bifurcation Problems*

*with Applications*

National Science Foundation: June 1993-May 1996

Thomas Erneux

9. *Microwave Processing of Ceramic Materials*

National Science Foundation: July, 1993-January 1996

Gregory A. Kriegsmann

Barbara Wagner

**C: Non-CAMS FUNDED PROJECTS WITH CAMS PARTICIPATION**

1. *Mathematical Aspects of Hypersonic Boundary Layers and Jets*

Air Force Office of Scientific Research: April 1993-June 1995

Demetrios Papageorgiou

2. *Incineration of Plastics and Cellulose in the Presence of Chlorine Species*

Proctor and Gamble Company: March 1994-March 1997

Joseph Bozzelli Dept. of Chemistry & Chemical Eng

Lev Krasnoperov Dept. of Chemistry & Chemical Eng

Michael Booty Dept. of Mathematics

3. *Plastics Combustion Data*

American Plastics Council: May 1995-May 1997

Richard Magee HSMRC

Joseph Bozzelli Dept. of Chemical Engineering

Michael Booty Dept. of Mathematics

4. *Particulate Technology in Manufacturing Processes*

National Science Foundation: June 1994-December 1996

Robert Pfeffer Dept. of Chemical Engineering

Rajesh Dave Dept. of Mechanical Engineering

Anthony Rosato Dept. of Mechanical Engineering

Ian Fischer Dept. of Mechanical Engineering

Jonathan Luke Dept. of Mathematics

5. *The Use of Surfactants in the Remobiliation of Bubbles*

*in Thermocapillary Migration*

National Aeronautics & Space Administration: August 1994-

September 1996

Demetrios Papageorgiou Dept. of Mathematics

Charles Maldarelli City College, New York

6. *Equity and Efficiency Issues*

NCTIP: May 1995-August 1995

John Tavantzis Dept. of Mathematics

Lou Pignataro Dept. of Transportation

7. *Representation and Analysis of Swept Volumes with*

*Tolerances*

Office of Naval Research: September 1992-October 1995

Denis Blackmore Dept. of Mathematics

Ming Leu Dept. of Manufacturing

Frank Shih Computer & Information Services

8. *Reduction of Age Associated Vascular Stiffness*

National Institute of Health: July 1994-June 1996

Hans Chaudhry

9. *A Model Approach to Task Intervention: An Exploratory*

*Study of Human Gait*

Kessler Institute for Rehabilitation: March 1994-March 1996

Michael Lacker

10.*In Site Bioremediation of Organic Compounds: Coupling*

*of Mass-Transfer and Biodegradation*

Sub-Contract with Chemical Engineering: June 1995-May 1996

Gordon Lewandowski

Demetrios Papageorgiou

Madeleine Rosar

## VII. Proposed Research

1. *Development of Qualitative Theory of Multivalued Infinite*

*Dimensional Systems with Applications to Control Problems*

National Science Foundation/National Research Council

Roman Andrushkiw

2. *The Investigation of Nonlinear Phenomena in Dissipative Systems and their Mathematical Modeling*

National Science Foundation/National Research Council

Roman Andrushkiw

3. *New Differential Methods for Automation and Computation Geometry*

Army Research Office

Denis Blackmore

4. *Application of Web Geometry to Differential Equations and Physical Structures*

National Research Council

Vladislav Goldberg

5. *Four-dimensional Conformal Structures and Their Applications to General Relativity*

National Science Foundation

Vladislav Goldberg

6. *Scattering by Large and Complex Structures*

Subcontract with the University of Arizona:

Air Force Office of Scientific Research (MURI)

Gregory A. Kriegsmann

Cheryl Hile

Jonathan Luke

7. *Fluid Flow in Elastic Tubes*

National Science Foundation

Madeleine Rosar

8. *Asymptotic and Singular Perturbation Methods for Bifurcation*

*Problems with Application*

National Science Foundation

Thomas Erneux

9. *Scattering by Large and Complex Structures*

Subcontract with University of Delaware

Air Force Office of Scientific Research (MURI)

Gregory A. Kriegsmann

Cheryl Hile

Jonathan Luke

10. *Microwave Processing of Ceramic Materials*

National Science Foundation

Gregory A. Kriegsmann

11. *Bayesian and Nonparametric Methods for Time Series Analysis with Environmental Applications*

National Science Foundation

Bonnie Ray

12. *Mathematical Studies of Wave Propagation*

National Science Foundation

Cheryl Hile

13. *Capstone Courses and Projects in Applied Mathematics and Statistics*

National Science Foundation

Daljit S. Ahluwalia

Bonnie Ray

Bruce Bukiet

# VIII. FACILITIES

## A. CAMS/MATH COMPUTATION LABORATORY

**Committee on Computation:**

Michael Porter, Chairperson

Zoi Heleni Michalopoulou

Michael Siegel

**Laboratory Assistant:**

Evangelos Tsimis

The CAMS computer laboratory has steadily grown in the last year with the addition of two new Silicon Graphics workstations. Significant additions to our high-end computational server (an SGI R8000) include a new 4 gigabyte hard drive along with a writeable magneto-optical CDROM drive and main memory was expanded to 128 mbytes. Also 3 Silicon Graphics workstations were purchased for new faculty. These machines have been fully integrated into the network and are running all the software and compiler programs, either locally or by accessing the servers. A number of users have expressed interest in facilities for computer production of videos. Sophisticated software for such work (Wavefront/Composer) was also installed in the computer laboratory.

## B. CAMS READING ROOM

## Committee on Research Facilities:

## Bonnie Ray

The CAMS Reading Room, located in Cullimore 607, continues to serve as a depository for research texts, journals, preprints and reprints of articles by CAMS members, software manuals, and finding information. Several new books and software manuals were added to the Reading Room collection during the year.

Throughout the fall and spring semesters, bimonthly CAMS teas were held in the reading room to provide CAMS members with a place to research ideas in an informal setting.

CAMS Reading Room information is available via the World Wide Web at http://chaos. njit.edu/CAMS/cams. html.

## IX. PUBLICATIONS AND PRESENTATIONS

## A. PUBLICATIONS

## Roman Andrushkiw

*On the Spectral Theory of Operator Pencils in a Hilbert Spaced*, Journal Nonlinear Mathematical Physics, Vol. 2, No. 3-4, pp. 356-366, 1995

## John Bechtold

*Counterflow Diffusion Flames with Unsteady Strain Rates*, (with H.G. Im and C.K. Law), Combustion Science Technology

Vol. 106, pp 345-361, 1995

*On the Response of Spherical Premixed Flames under Rotation* (with J. Quian and C.K. Law), Proceedings of Eastern States Section of the Combustion Institute, Worcester, MA, 1995

*Counterflow Diffusion Flames with Unsteady Strain Rates* (with H.G. Im and C.K. Law), Proceedings of the 33rd Aerospace Sciences Meeting and Exhibit, Reno, NV paper no. AIAA 95-0128, 1995

## Manish Bhattacharjee

*On the Kolmorogov-Smirnov Type tests for NB(W) UE Alternatives Under Some Censoring Schemes*,(with P.C.. Sen),

Invited paper in the refereed volume, Analysis of Censored Data, H.L. Koul and J.V. Deshpande (eds.), Institute of Mathematical Statistics, Lecture Notes - Monographs Series, Vol. 27, pp. 25-38, 1995

## Denis Blackmore

*Fractal Geometry Modeling with Applications in Surface Characterization and Wear Prediction*, (with G. Zhou and M. C. Leu), Institute Journal Machine Tools and Manufacturing, Vol. 35 pp. 203-209, 1995

*Integrable Discrete Dynamics and Fibonacci Sequences*,(with J. Kappraff) ZAMM, pp. 402-406, 1995

*Implementation of SDE Method to Represent Cutter Swept Volumes in 5-Axis NC Milling*, Proceedings ICIM'95, pp. 212-220, 1995

## Stuart Booker

*Calculation of the Characteristic Impedance of TEM Horn Antennas*

*using Conformal Mapping Techniques*, (with A.P. Lambert, and P.D. Smith), IEEE Transactions on Antennas and Propagation, Vol. AP-43, No. 1, pp. 47-53, 1995.

*Time-Domain Integral Equation Approach to the Broadband Calibration of Dihedral Reflectors*, with (P.D. Smith and S.R. Cloude), 3emes Journees Internationales de la Polarimetrie Radar (JIPR, 3rd International Workshop on Radar Polarimetry), Vol. 1, pp 153-164, 1995

*Transient Antenna Design Parameters for Optimizing Radiated Pulse, High Power Microwaves (HPM)*, (with A.P. Lambert, and P.D. Smith), AGARD CP 564, NATO, pp 8.1-8.12, 1995

*Validation of Transient V-cut Antenna Simulation*, (with A.P. Lambert and P.D. Smith), Proceeding of the 9th International Conference on Antennas and Propagation, ICAP 95, IEEE CP 407, IEE, pp 1.459-1.462, 1995

*A Numerical Calculation of Transient Antenna Impedance Exploiting a Near-Field Integration Approach*, (with A.P. Lambert and P.D. Smith), Proceedings of the 1995 International Symposium on Electromagnetic Theory, URSI,

pp 355-357, 1995

*A Calculation of Surface Impedance Effects on Transient Antenna Radiation*, (with A.P. Lambert and P.D. Smith), Proceedings of the 1995 International Symposium on Electromagnetic Theory, URSI, pp 480-482, 1995

*Time-Domain Integral Equation Approach to the Broadband Calibration of Dihedral Reflectors*, (with P.D. Smith and

S.R. Cloude), PIERS - Progress in Electromagnetics Research Symposium, Proceedings, p 1034, 1995

## Michael Booty

*Analysis and Optimization of Chlorocarbon Incineration Through the Use of a Detailed Reaction Mechanism*, (with W.

Ho, R.S. Magee, and J.W. Bozzelli), Industrial and Engineering

Chemistry Research, Vol. 34 (12), pp 4185-4192, 1995

*Simulation of a Three-stage Chlorocarbon Incinerator Through the Use of a Detailed Reaction Mechanism: Chlorine to Hydrogen Mole Ratios Below 0.15*, (with J.W. Bozzelli, W. Ho, and R.S. Magee), Environmental Science and Technology, Vol. 29 (12), pp 3059-3063, 1995

## Bruce Bukiet

*Understanding Curved Detonation Waves, Proceeding of the 10th International Detonation Symposium*, ONR-33395-12, pp 19-26, 1995

## Thomas Erneux

*Minimal Equations for Antiphase Dynamics in Multimode Lasers*, (with P. Mandel) The American Physical Society-Physical Review & Letters) Vol. 52, No. 3, pp 4137-4144, 1995

*Understanding Propagation Failure as a Slow Capture Near a Limit Point*, (with V. Booth), SIAM Journal on Applied Mathematics, Vol. 55 No. 5, 1995

## Vladislav Goldberg

*Three Dimensional Submanifolds Carrying a Net of Asymptotic Lines*, (with M.A. Akivis), Webs and Quasigroups, Tver State University, Tver, pp 20-31, 1995

*Conformal and Grassmann Structures*, (with M.A. Akivis), Abstracts of papers presented to the American Mathematical Society, (International Joint USA-Israel Mathematics Meeting, Vol. 16 No. 16 p 576

*Integral Geometry of Tensor Fields* (Review of Book) by V.A. Sharafutdinov, "Nauka", Novosibirsk, 1993 Zentralblatt fur Mathematik, Vol. 795 233 pages, #53070, 1995

*Analytic Quasigroups and Geometry* (Review of Book) by L.V. Sabinin, University Druzhby Narodov, Moscow, 1991, 112 pp. Mathematical Reviews, Vol. 95d, #53013, April 1995

*Differential Geometry of Curves and Surfaces* (Review of Book) by A. Gray, CRC Press, Boca Raton etc. 1993, xviii+644 pp Mathematical

Reviews Vol. 95g, 95g:53002 July 1995

## Gregory A. Kriegsmann

*Control Region Approximation of Scattering by Two Dimensional Periodic Structures*, (with B.J. McCartin), Journal of Electromagnetic Waves and Applications, Vol. 9, No. 5, 1995

*Microwave Heating of Carbon Coated Ceramic Fibers: A Mathematical Model*, (with B.A. Wagner), IMA Journal Applied Mathematics, Vol. 55, 1995

*Mathematical Models in Microwave Heating: Bistability and Thermal Runaway, Microwaves: Theory and Applications in*

*Materials Processing III*, eds, Clark, Folz, Oda & Silberglitt. Ceramic Transactions, Vol. 59, The American

Ceramic Society, pp 269-277, 1995

## Zoi Heleni Michalopoulou

*Performance Evaluation of Multilayer Perceptrons in Signal Detection and Classification*, (with L.W. Nolte and D. Alexandrou), IEEE Transactions on Neural Networks, Vol. 6, No. 2, pp 381-386, 1995

*Application of Neural and Statistical Classifiers to the Problem of Seafloor Characterization*, IEEE Journal of Oceanic Engineering, Vol. 20, No. 3, pp 190-197, 1995

## Petronije Milojevic

*On the Dimension and the Index of the Solution Set of Nonlinear Equations*, Transactions American Mathematical Society, Vol. 347 (3) pp 835-856, 1995

*Solvability of Strongly Nonlinear Operator Equations and Applications*, (in Russian), Translation to English Differential Equations, Vol. 31 (3), pp 502-516, 1995

## Demetrios Papageorgiou

*Nonlinear Stability of Oscillatory Core-annular Flow: A Generalized Kuramoto-Sivashinsky Equation with Time-Periodic*

*Coefficient*, (with A.V. Coward, D.T. Smyrlis), Z Angew Math Phys, Vol. 46, pp 1-39, 1995

*Analytical Description of the Breakup of Liquid Jets, Journal of Fluid Mechanics*, Vol. 301, pp 109-132

*On the Breakup of Viscous Liquid Threads*, Phys. Fluids, Vol. 7 (7), pp 1529-1544, 1995

## Michael Porter

*Progress in Computational Acoustics*, A.B. Lecture, Proceedings of the Institute of Acoustics Vol. 17, 1995

*Model Validation for Direct and Inverse Problems*, Full Field Inversion Methods, ed. O. Diachok, A. Caiti, P. Gerstoft and

H. Schmidt, Kluwer Academic Press, Dordrecht, 1995

*Three-dimensional Sound Propagation in an Ocean Overlying and Elastic Bottom*, (with G.J. Orris, M.D. Collins, G.B. Deane) Full Field Inversion Methods, ed. O. Diachok, A. Caiti, P. Gerstoft and H. Schmidt, Kluwer Academic, Dordrecht, 1995

## Madeleine Rosar

*Modelling of In-Situ Bioremediation: Coupling of Non-equilibrium Sortion and Growth Inhibition*, (with G.A. Lewandowski, and D.K. Mandal), Annual Meeting of the American Institute of Chemical Engineers, 1995

## Michael Siegel

*A Well-posed Numerical Method to Track Isolated Conformal Map Singularities in Hele-Shaw Flow*, (with G. Baker, and S. Tanveer), Journal of Computational Physics, Vol. 120, 348

*A Study of Singularity Formation in the Kelvin-Helmholtz*

*Instability with Surface Tension*, SIAM Journal on Applied

Mathematics, Vol. 55, No. 1

*Singularities and Interfacial Patterns in Hele-Shaw Flow*

(with G. Baker, and S. Tanveer), Proceedings of the Fifth

International Conference on Hyperbolic Problems, 1995

**Burt Tilley**

*Linear Stability Theory of Two-layer Flow in an Inclined Channel*,
(with S.H. Davis), Phys. Fluids, Vol. 6 pp 3906-3922, 1995

**B. PRESENTATIONS**

**John Bechtold**

October 1995: SIAM Annual Meeting, Charlotte, NC

*Microwave-Induced Ignition of Ceramics*

**Manish Bhattacharjee**

January 1995: Third Triennial Symposium on Probability and

Statistics, Calcutta University, India

*Tests for a Property of Aging Under Renewals: Rationality and General
Asymptotics*

January 1995: Indian Statistical Institute, New Delhi, India

*Models of Aging Under Repair and Repair Efficiency*

November 1995: Indian Statistical Institute, New Delhi,

India

*Sharp Bounds on Renewal Process Shock Models and Applications*

November 1995: National Symposium on Science and Technology

Interface with Productivity, Quality and Reliability, Calcutta, India

*Some Emerging Trends in Modeling and Analysis of Repairable Systems,
an Overview*

June 1995: Bell Labs/AT&T, Somerset, NJ

*Modeling Customer Outages and Impact of Some Protection Measures in a
Public Electric Utility Distribution System*

## Denis Blackmore

July, 1995: ICIAM '95, Hamburg, Germany

*Integrable Discrete Dynamics and Fibonacci Sequences*

November, 1995: 4th SIAM Conference on Geometric Design,

Nashville, TN

*A New Algorithm for Computing Swept Volume*

## Stuart Booker

May, 1995: URSI International Symposium on Electromagnetic Theory,
St. Petersburg, Russia

*A Numerical Calculation of Transient Antenna Impedance Exploiting a
Near-Field Integration Approach*

May, 1995 URSI International Symposium on Electromagnetic

Theory, St. Petersburg, Russia

*A Calculation of Surface Impedance Effects on Transient Antenna
Radiation*

May, 1995 Seminar, Department of Mathematical Sciences, University of Delaware, Newark, DE

*A Numerical Integral Equation Approach to Transient Antenna Impedance*

July, 1995 PIERS '95 Progress in Electromagnetics Research Symposium, University of Washington, Seattle, WA

*Time-Domain Integral Equation Approach to the Broadband Calibration of Dihedral Reflectors*

November, 1995 IEEE New Mexico Chapter Seminar, Kirkland AFB, Albuquerque, NM

*An Integral Equation Approach to Transient Antenna Design*

November, 1995: Seminar, Department of Mathematics, University of New Mexico, Albuquerque, NM

*An Integral Equation Approach to Transient Antenna Design*

**Michael Booty**

March, 1995: Northwestern University, Department of Engineering Science & Applied Mathematics, Evanston, IL

*Time-dependent Deflagrations*

October, 1995: 27th SIAM National Meeting, Charlotte, NC

*Time-dependent Deflagrations*

October, 1995: 27th SIAM National Meeting, Charlotte, NC

*Microwave-induced Ignition of Ceramics*

October, 1995: Eastern States Section of the Combustion Institite, Fall Meeting, Worcester, Vermont

*Pyrolysis & Oxidation of Cellulose and Styrene: An Experimental Study of Reaction Products*

November, 1995: 48th Meeting of the Fluid Dynamics Section of the American Physical Society, Irving, CA

*Time-dependent Deflagrations*

**Sunil Dhar**

August, 1995: ASA 155th Annual Meeting, Orlando, Florida

*Randomized Response Model Using a Binary Sequence*

**Vladislav Goldberg**

May, 1995: 1st Joint Meeting of the American Mathematical Society and the Israel Mathematical Union

*Conformal and Grassmann Structures*

June, 1995: University of Bordeaux, Bordeaux, France

*Web Geometry: Its Past, Present and Future*

June, 1995: LEcole Polytechnique, Palaiseau, France

*Conformal and Almost Grassmann Structures*

June, 1995: University Paul Sabatier, Toulouse, France

*Grassmann and Algebraie Webs*

**Cheryl Hile**

October, 1995: AFOSR Nonlinear Optics Workshop, University of Arizona, Tuscon, AZ

*Comparisons of Maxwell's Equations with an Extended Nonlinear Schrodinger Equation*

**Gregory A. Kriegsmann**

January, 1995: Air Force School of Aerospace Medicine, Brooks AFB, San Antonio, TX

*Hybrid Methods in E&M Scattering and Propagation: Cavity*

*Problems*

February, 1995: Department of Energy Workshop. Albuquerque, NM

*Mathematical Problems in Microwave Processing*

March, 1995: American Physical Society, San Jose, CA

*Microwave Heating of Ceramics: Bistability and Thermal Runaway*

May, 1995: Society for Advancement of Material and Process Engineers, Bridgewater, NJ

*Microwave Processing of Materials*

May, 1995: American Ceramics Society, Cincinnati, OH

*Microwave Heating of Ceramics: Bistability and Thermal Runaway*

June, 1995 Air Force Office of Scientific Research Workshop

Albuquerque, NM

*Mathematical Problems in Microwave Problems in Microwave Processing*

July, 1995: IMPA Conference on Differential Equations and

Applications, Rio de Janeiro, Brazil

*Mathematical Problems in Microwave Processing*

## Zoi Heleni Michalopoulou

March, 1995: Graduate College of Marine Studies, University of Delaware

*Localizing a Broadband Source in the Ocean*

June, 1995: 129th Meeting of the Acoustical Society of America, Washington, DC

*Fourier and Direct Time-Marching Methods for Transient Signals*

July, 1995: Passive Signal Processing Program Review, Naval Air Development Center, Warminster, PA

*MLTA Broadband Passive Shallow Water Localization*

October, 1995: IEEE Workshop on Underwater Acoustics Signal Processing, University of Rhode Island

*Focalization in the Gulf of Mexico*

October, 1995 IEEE Workshop on Underwater Acoustics Signal

Processing, University of Rhode Island

*Matched Field Processing Applied to the Hudson Canyon Data*

November, 1995: 130th Meeting of the Acoustical Society of America, St. Louis, MO

*Source Localization in the Gulf of Mexico*

## Demetrios Papageorgiou

April, 1995: Symposium on Approximation Theory and Numerical Analysis, University of Cyprus, Nicosia, Cyprus

July, 1995: International Congress on Industrial and Applied Mathematics, Hamburg, Germany

July, 1995: Joint AMS-IMS-SIAM Summer Research Conferences in the Mathematical Sciences: Analysis of Multi-fluid Flows and Interfacial Instabilities, University of Washington

October, 1995: SIAM Annual Meeting, Charlotte, NC

November, 1995: Annual Meeting of the Institute of Chemical Engineers, Miami, FL

## Michael Porter

June, 1995: 129th Meeting of the Acoustical Society of America, Washington, DC

*Fourier and Direct Time-Marching Methods for Transient Signals*

July, 1995: Passive Signal Processing Program Review, Naval Air Development Center, Warminster, PA

MLTA Broadband Passive Shallow Water Localization

August, 1995: International Conference on Theoretical and

Computational Acoustics, Hawaii

*Using Replica Correlograms and Spectrograms for Shallow Water Inverse Problems*

October, 1995 Underwater Acoustics Signal Processing Workshop, University of Rhode Island

*Broadband Matched-field Processing Applied to the Hudson Canyon Data*

October, 1995: Underwater Acoustics Signal Processing Workshop, University of Rhode Island

*Focalization in the Gulf of Mexico Experiment*

November, 1995: 130th Meeting of the Acoustical Society of America, St. Louis, MO

*Source Localization in the Gulf of Mexico*

## Madeleine Rosar

December, 1995: Boundary Method Seminar Series, Courant Institute of

Mathematical Sciences, New York University, NY

*The Immersed Boundary Method and Flow in Collapsible Tubes*

## Michael Siegel

January, 1995: Seminar, Department of Mathematics, University of Manchester, Manchester, England

*The Effects of Complex Singularities on a Evolving Hele-Shaw*

*Interface*

February, 1995: Seminar, Department of Mathematics, Illinois Institute of Technology, Chicago, IL

*The Effects of Complex Singularities on an Evolving Hele-Shaw Interface*

May, 1995: Minisymposium on Complex Singularities, Society for Industrial & Applied Mathematics Dynamical Systems Meeting, Snowbird, UT

*The Effects of Complex Singularities on an Evolving Hele-Shaw Interface*

July, 1995: Fourth Workshop on Partial Differential Equations, Instituto de Matematica Pura e Aplicada, Rio de Janeiro, Brazil

*The Effects of Small Surface Tension in Time Evolving Hele-Shaw Flow*

November, 1995: American Physical Society, Division of Fluid Dynamics, Irving, CA

*The Effects of Small Surface Tension on a Smoothly Evolving Hele-Shaw Interface*

<div align="center">

**X. EXTERNAL ACTIVITIES**

</div>

## Bruce Bukiet

Associate Editor, SIAM Journal on Scientific & Statistical

Computing

## Vladislav Goldberg

Editorial Board, Encyclopedia of Mathematics, Kluwer Academic
Publishers

Biography and List of publications: 1995 Journal Webs and Quasigroups
in recognition of Dr. Goldberg's 60th birthday and 35 years of
scientific activity.

Editor, Journal Webs and Quasigroups, Tver State University, Tver,
Russia

Visiting Member: Mathematisches Forchungsinstitut Oberwolfach (MFO),
Germany

## Gregory A. Kriegsmann

Harlan J. Perlis Award, NJ Institute of Technology

Editorial Board, SIAM Journal on Applied Mathematics

Editorial Board, Journal of Engineering Mathematics

## Michael Lacker

Editorial Board, Journal of Theoretical Biology

## Petronije Milojevic

Editorial Board, Communications on Applied Nonlinear Analysis

## Demetrios Papageorgiou

Co-Chair: 1995 Joint AMS-IMS-SIAM Summer Research Conferences in
Mathematical Sciences: University of Washington.

## Michael Porter

Associate Editor, Journal of the Acoustical Society of America
(Underwater Sound)

## Madeleine Rosar

Sandra Bleistein Award, Courant Institute of Mathematical Sciences,
NYU