C A M S

Center for Applied Mathematics and Statistics

ANNUAL REPORT

1997-1998

NJIT
New Jersey Institute of Technology

CONTENTS

I. FROM THE DIRECTOR

The Center for Applied Mathematics and Statistics aspires to foster the highest standards for research in the mathematical sciences. Hence, it is inevitable that our expectations increase each year. Last year's remarkable accomplishments become this year's minimum requirements. Our ambitions demand that we embrace these dynamic standards.

Nonetheless, we must recognize that we can advance only to the extent that we develop and maintain our basic research infrastructure. The CAMS committees, whose activities are documented in sections XI. and XII., are responsible for much of our local infrastructure. Their exemplary efforts deserve our gratitude and support. CAMS, an NJIT research center, is mindful of its debt to the university which has nurtured and developed its capabilities. We best express our appreciation by aspiring to NJIT's vision of scientific excellence, through collaborative efforts with other NJIT researchers and with careful stewardship of university resources.

Our solid infrastructure continues to yield visible accomplishments. Our success in research funding is reflected in the NSF ranking of the Mathematical Sciences Department at NJIT among the top such departments in the country. The increasing number of CAMS members serving as editors includes the appointment of Gregory Kriegsmann to the prestigious post of Editor-in-Chief of the SIAM Journal on Applied Mathematics. The Statistical Consulting Laboratory, which began accepting projects in March, is already serving three clients both from NJIT and from off campus. We have embarked upon new collaborations with the Department of Preventive Medicine and Community Health at UMDNJ and the Biology Department at Rutgers Newark. These ventures provide biomathematics and biostatistics in CAMS with the firm contact with current applications that is essential to the healthy development of disciplines in the mathematical sciences.

As a research center in an institution of higher education, CAMS considers student success in research to be an important goal. This year marks just the fourth year of the doctoral program in the mathematical sciences. Hence, it is with considerable pride that we note the appointment of our first doctoral student, John Pelesko, to a von Karman Instructorship at the California Institute of Technology. The growing number of graduate students authoring journal papers and making conference presentations provides further evidence of graduate student success in research. At the undergraduate level, the establishment of the NSF Capstone Laboratory and the efforts of advisors have resulted in successes including awards for projects and presentations, placement in desirable programs and internships, and an honorable mention for the first NJIT team to participate in the SIAM modelling contest.

Of course, there is much that needs to be done. Despite some progress in the past year, the lack of adequate research facilities is still a critical problem that burdens our efforts to develop an environment of scientific excellence. The research environment that our ambitions require includes graduate student and faculty offices in close proximity and an adequate amount of appropriately configured common space. The extension of this vision into undergraduate research also requires appropriate facilities including an upgrade of the size and capabilities of the Capstone Laboratory. Beyond facilities, we must act vigorously and persistently to impress our intellectual and scientific values on the minds of our students. Moreover, we must sustain our efforts in the rapidly developing areas of biomathematics, biostatistics and statistical consulting to assure their healthy maturation. We must continue to deepen our infrastructure and research capabilities to allow us to grow into important new areas such as financial mathematics. The dedication and energy of CAMS members sustains our faith that CAMS will meet these substantial challenges.

The accomplishments of CAMS are built on the efforts and support of many individuals. CAMS is grateful to President Saul Fenster for his vision that has created an environment where the aspirations of CAMS are espoused and appreciated. CAMS is also indebted to Provost Gary Thomas for his pivotal role in realizing this vision and in particular for his unflagging assistance and support. The Research Office has provided assistance with external funding of research projects. John Poate, since his arrival at NJIT as Dean for the College of Science and Liberal Arts in January of 1997, has encouraged CAMS through his support of scientific research. And finally CAMS is very appreciative of the deep commitment of Gregory A. Kriegsmann, Foundation Chair of Applied Mathematics, whose generous supply of resources, advice, and energy have been instrumental in our ongoing success.

Daljit S. Ahluwalia-Director   Jonathan Luke-Associate 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 Mathematical Sciences 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, Associate Director, the committees on research, seminars, computation, publications, and statistical consulting. But the essential nature of the organization is that of a voluntary association of individual researchers of many disciplines joined in a collegial collaboration to enhance mathematical work at NJIT.

CAMS undertakes a wide range of activities in pursuing its mission. CAMS brings researchers from academia, industry, and government to NJIT and other institutions by organizing interdisciplinary 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 provides its members with laboratory support by maintaining the CAMS/Math Computational Laboratory, the NSF Capstone Laboratory, and the Statistical Consulting Laboratory. CAMS activities also include support for the submission of research proposals, which is done through dissemination of 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.

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.

III. MEMBERSHIP AND VISITORS

Department of Mathematical Sciences

Ahluwalia, Daljit S.	Kriegsmann, Gregory
Andrushkiw, Roman	Lacker, Michael
Bechtold, John	Lott-Crumpler, Dawn
Bhattacharjee, Manish	Luke, Jonathan
Blackmore, Denis	Michalopoulou, Zoi-Heleni
Booth, Victoria	Milojevic, Petronije
Booty, Michael	Papageorgiou, Demetrios
Bose, Amit	Perez, Manuel
Bukiet, Bruce	Porter, Michael
Crato, Nuno	Ray, Bonnie
Dhar, Sunil	Siegel, Michael
Dios, Rose	Sran, Kewal
Goldberg, Vladislav	Stickler, David
Hile, Cheryl	Tilley, Burt
	Tavantzis, John

Department of Mechanical Engineering

Aubry, Nadine	Rosato, Anthony
Dave, Rajesh	

Department of Civil & Environmental Engineering

Meegoda, Namunu

Department of Computer and Information Science

Recce, Michael

CAMS Research Professors

Chaudhry, Hans	Findley, Thomas
Erneux, Thomas	

Visiting Research Professors

Jesus, Sergio	Reisen, Valderio Anselmo

Long and Short-Term Visitors

Vargas, Arturo	Universidad Nacional Autonomo de Mexico, Mexico
Garcia–Reimbert, Catherine	Universidad Nacional Autonomo de Mexico, Mexico
Studer, Leo M.	University of Fribourg, Switzerland
Petropolous, Peter	Southern Methodist University, Texas
Palm, Guenther	University of Ulm, Germany
Feher, Lambert	Forschungszentrum Karlsruhe – ITP, Germany
Pelesko, John	California Institute of Technology, California
Gerstoft, Peter	Scripps Institution of Oceanography, California
Vinogradova, E.D.	Scotland Department of Mathematics, University of Dundee, UK
Chopra , D.V.	Wichita State University, Kansas
Nachbin, Andre	Instituto De Matematica Pura E Aplicada (Impa), Brazil

IV. SEMINARS

THE CAMS/MATH SEMINAR SERIES

Julian Cole: Professor and Margaret Darrin Chair of Mathematics, Rensselaer Polytechnic Institute
Asymptotic Problems In Aerodynamics

Zvi Rusak: Department of Mechanical Engineering , Aeronautical Engineering and Mechanics, Rensselaer Polytechnic Institute
Axisymmetric Vortex Breakdown-Theoretical, Numerical And Experimental Studies

Nadine Aubry: Department of Mechanical Engineering, New Jersey Institute of Technology
Hierarchical Order In Wall-Bounded Shear Turbulence

Esteban Tabak: Courant Institute of Mathematical Sciences, New York University
Diffraction Of Weak Shock Waves

Oscar Bruno: Department of Applied Mathematics, California Institute of Technology
Misfit Strains In Polycrystals

Alejandra Folguera and John G.Harris: Department of Theoretical and Applied Mechanics, University of Illinois at Urbana Champaign
Coupled Elastic Surface Waves In Slowly Varying Waveguides

Michael Lacker: Department of Mathematical Sciences, New Jersey Institute of Technology
Mathematical Models Of Human Motion: From Theory To Clinical Applications

Thomas Hagstrom: Department of Mathematics, University of New Mexico and Courant Institute of Mathematical Sciences, New York University
Exact And High-Order Boundary Conditions In The Time Domain

Lawrence Tatum: City University of NewYork (Baruch College)
Recent Research In Control Chart Techniques

Mark Glauser: Air Force Office of Scientific Research and Clarkson University
Turbulence And Internal Flows At The Air Force Office Of Scientific Research (AFOSR)

Malgorzata Klosek: Department of Mathematical Sciences, University of Wisconsin, Milwaukee
Transport Theory: Diffusion Processes, Half-Range Expansions, And Boundary Conditions

Mark S. Handcock: The Pennsylvania State University
Spatial-Temporal Modeling Of Meteorological Fields With Application To Climate Change

Michael Frankel: Indiana University-Purdue University
Complex Dynamics Of Thermal Instability In Sharp Interface Models Of Solid Combustion

Christopher Jones: Brown University
Stability Problems For Pulses In Nonlinear Optical Media

Guenther Palm: University of Ulm, Germany
A Law Of Large Numbers' For Neural Activity-Does It Depend On The Neural Model?

Tim Schulze: Courant Institute of Mathematical Sciences, New York University
Convection In A Mushy Layer For Directional Solidification Of A Binary Mixture

Ramit Mehr: Department of Molecular Biology, Princeton University
Modeling B Cell Repertoire Shift

Yuri Buyerich: University of California Santa Barbara
Rheology Of Turbulent Riser Flow

Lambert Feher: Forschungszentrum Karlsruhe-ITP
Industrial Materials Processing: Materials Processing Dynamics

Jin Cao: Bell Laboratories, Lucent Technologies
Excursion Sets Of Random Fields With Applications To Human Brain Mapping

Lambert Feher: Forschungszentrum Karlsruhe-ITP
Industrial Materials Processing: Electromagnetics And Applicator Design

Pam Cook: Department of Mathematical Sciences, University of Delaware
Flow Near The Speed Of Sound: Axisymmetric Jets And The Monge Ampere Equation

Marianthi Markatou: Columbia University
Robust Estimation In Mixture Models: Concepts, Methodology And Applications

B.J. Matkowsky: Department of Applied Mathematics and Engineering Sciences, Northwestern University
Instabilities, Fingering & The Saffman-Taylor Problem In Filtration Combustion

Scott Stewart: University of Illinois
On the Evolution of Cellular Detonation

Andreas Acrivos: Levich Institute, City University of New York
Shear Induced Particle Diffusion Andits Effect On The Rheology Of Concentrated Suspensions

Sallie Keller-McNulty: Kansas State University
Database Systems And Data Disclosure Limitation

Dimitry Golovaty: University of Akron
Structural Instabilities In Confined Liquid Crystals

A. Anandarajah: Department of Civil Engineering, Johns Hopkins University
Mechanics And Physics Of Clean And Contaminated Clays

Yury Grabovsky: University of Utah
Exact Relations For Effective Tensors Of Composites: Necessary Conditions And Sufficient Conditions

Peter G. Petropoulos: Department of Mathematics, Southern Methodist University
Reflectionless Sponge Layers As Abcs For The Numerical Solution Of Maxwell's Equations In Rectangular, Cylindrical, And Spherical Coordinates

Robert Melville: Bell Laboratories
Harmonic Balance Simulation Of Large Non-Linear Systems With Applications

Vince Primus: MIT Lincoln Laboratory
Passive Acoustic Classification In A Shallow Water Waveguide Using Mode Scintillation

Peter Gerstoft: Marine Physical Laboratory, Scripps Institute of Oceanography
Tropospheric Electromagnetic Tomography: Refractivity Estimation Using Genetic Algorithms

Farzan Nadim: Volen Center, Brandeis University
How Neuronal And Synaptic Components Give Rise To Network Output

Larry Greller & Frank Tobin: Bioinformatics – Mathematical Biology, Smithkline Beecham
Applied Mathematics In Pharmaceutical R&D: Mathematical Life In The Trenches

Sylvain Cappell: Courant Institute of Mathematical Sciences, New York University
Lattice Sums And Geometry

Margaret Wright: Lucent Technologies
Interior Point Revolution In Constrained Optimization

D.V. Chopra: Wichita State University
On The Existence Of Matrices With Two Elements And With A Combinatorial Structure

Andre Nachbin: Instituto De Matematica Pura E Aplicada (Impa), Brazil
Water Waves: Linear Potential Theory Results Validated With A Hydrostatic Navier-Stokes Model

E.D. Vinogradova: Department of Mathematics, University of Dundee, UK
Electric Dipole Excitation Of A Hollow Spheroidal Cylinder

V. EXTERNALLY FUNDED RESEARCH

A.   Continuing Projects

1. *Capstone Courses in Applied Mathematics and Statistics*

   National Science Foundation: July 1996 - June 1999

   > Daljit S. Ahluwalia
   > Bruce Bukiet
   > Bonnie Ray

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

   National Science Foundation: July 1995 – June 1998

   > John Bechtold

3. *Applications of Sweep Differential Equations to Automated Manufacturing*

   National Science Foundation: September 1995-August 1998

   > Denis Blackmore
   > Ming Leu, Mechanical and Industrial Engineering

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

   National Science Foundation: July 1994 – December 1997

   > Michael Booty

5. *Front Tracking for Explosive Initiation*

   Battelle/US Army: January 1997 – September 1997

   > Bruce Bukiet

6. *A Student-Designed Experiment to Analyze Particles Collected During a NASA Balloon Flight*

   National Aeronautics and Space Administration: June 1997 - December 1999

   > Bruce Bukiet

7. *Mathematical Sciences: Asymptotic and Singular Perturbation Methods for Bifurcation Problems with Applications*

   National Science Foundation: August 1996 – July 1999

   > Thomas Erneux

8. *Mathematical Sciences: Microwave Processing Of Ceramic Materials*

National Science Foundation: July 1996 – June 1999

    Gregory A. Kriegsmann

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

  Department of Energy: February 1997 – January 2000

    Gregory A. Kriegsmann

10. *Scattering By Large and Complex Structures*

    Air Force Office of Scientific Research: February 1996 – January 2001

    Gregory A. Kriegsmann
    Jonathan Luke
    Cheryl Hile

11. *Mathematical Sciences Computing Research Environments*

    National Science Foundation: July 1995 – July 1998

    Jonathan Luke
    Gregory A. Kriegsmann
    Bruce Bukiet
    John Bechtold
    Zoi-Heleni Michalopoulou

12. *Broadband Inversion in Shallow Water*

    Office of Naval Research: February 1997 – October 1998

    Michael Porter

13. *Mathematical Sciences: Bayesian and NonParametric Analysis with Environmental and Economic Applications Methods for Time Series*

    National Science Foundation: July 1996 – June 2000

    Bonnie Ray

B. New Projects

1. *A Dendritic Origin of Bistability of Motoneuron Firing Patterns*

   National Science Foundation: September 1997 - August 1999

     Victoria Booth

2. *Reactive Models for Front-Tracking Simulations*

   Battelle/US Army: April 1998-December 1998

     Bruce Bukiet

3. *Mathematical Model of Walking*

   Schweizerisher Nationalfonds zur Forderung der Wessenschaftlichen Forschung (Swiss National Science Foundation)
   October 1997-November 1998

     Michael Lacker
     Leo Studer

4. *Ocean Acoustics And Signal Processing*

   Office of Naval Research: June 1997 – September 2000

      Zoi Michalopoulou

5. *Surface Tension Driven Flows*

   National Science Foundation: July 1997 – June 2000

     Demetrius Papageorgiou

6. *Adaptive Processing in a 3-D Environment*

   NUWCD: September 1997 – August 1998

     Michael Porter

7. *Surfactant Effects in Viscous Fingering*

   National Science Foundation: July 1997 – June 2000

     Michael Siegel

VI. PROPOSED RESEARCH

1. *Mathematical Models of Premixed Flames*

    National Science Foundation

    John Bechtold

2. *The Effect of Non-local and Global Interactions in Systems of Singularly Perturbed Equations*

    National Science Foundation

    Amit Bose

3. *Models Generating Persistence*

    National Science Foundation

    Nuno Crato

4. *A Controlled Study of Supervised Physical and Behavioral Treatment for Patients with Fibromyalgia*

    Kessler Medical Rehabilitation Research and Education Corporation

    Nuno Crato

5. *Portuguese Small Pelagic Fishes and Climate Change Program: Comparative Retrospective Analysis (PO-SPACC)*

    Portuguese Institute for Fisheries and Sea Research

    Nuno Crato

6. *Computational Electromagnetic Methods in Nonlinear Optics and Microwave Material Processing*

    National Science Foundation

    Cheryl Hile

7. *Conformal Theory of Lightlike Hypersurfaces*

    National Science Foundation

    Vladislav Goldberg

8. *Rehabilitation Outcomes in Amputees: A Model Approach*

    Kessler Institute for Rehabilitation, UMDNJ

    Michael Lacker

9. *Stroke Enhancing Training for the Wheelchair Racer*

   National Institutes of Health

      Michael Lacker

10. *Computation of High Gradient Phenomena in Solid Mechanics*

    National Science Foundation

       Dawn Lott-Crumpler

11. *Scientific Computing Research Environment for Mathematical Sciences*

    National Science Foundation

       Jonathan Luke
       Dawn Lott-Crumpler
       Demetrius Papageorgiou
       Zoi Heleni Michalopoulou

12. *Marine Mammal Detection for Environmental Compliance*

    United Research Corporation (SBIR)

       Zoi Heleni Michalopoulou

13. *Solvability of Nonlinear Operator Equations and Applications to Elliptic and Hyperbolic Equations*

    National Science Foundation

       Petronije Milojevic

14. *Numerical Modeling and Analysis of Electromagnetic Wave Propagation and Scattering*

    Air Force Office of Scientific Research

       Peter Petropoulos

15. *A Model for Iris and Optic Disc Deformations*

    National Science Foundation

       David Stickler

16. *Evolution of Shear-Driven Fluid Layers*

    National Science Foundation

       Burt Tilley

VII.   COLLABORATIVE RESEARCH

A. Externally Funded Projects

1. *Sustainable Green Manufacturing; Project R2-8: Green Gun Barrel and Tantalum Risk Assessment*

    Department Of Defense (NJIT participation administered through HSRC): July 1997- September 1998

        Manish Bhattacharjee
        Lisa Axe, Chemical Engineering
        Trevor Tyson, Physics

2. *Particle Processing Research*

    NJCST: September 1995-August 1998

        Denis Blackmore
        Rajesh Dave
        Anthony Rosato

3. *Studies in Thermal Oxidation of Common Polymers*

    Proctor & Gamble: February 1998-February 1999

        Michael Booty
        Joseph Bozelli, Chemical Engineering

4. *Development Of A Plastics Combustion Database With Relevance To Municipal Incineration*

    American Plastics Council: September 1997-September 1998

        Michael Booty
        Joseph Bozzelli, Chemical Engineering
        Richard Magee, Mechanical Engineering

5. *Pre-College Experimental Math*

    Victoria Foundation: January 1997-December 1998

        Rose Dios
        Howard Kimmel, Pre-College Program

6. *Particulate Technology in Manufacturing Processess*

    National Science Foundation: June 1994-June 1998

        Jonathan Luke
        Robert Pfeffer, Chemical Engineering
        Ian Fisher, Mechanical Engineering
        Anthony Rosato

B. Other Collaborative Projects

1. Fundamental Flame Studies

      John Bechtold
      C.K. Law, Princeton University
      M. Matalon, Northwestern University

2. Mathematical and Computational Neural Science

      Amit Bose
      Victoria Booth
      Michael Recce, Computer and Information Science

3. Unit Roots and Forecasting

      Nuno Crato
      Pedro de Lima, Johns Hopkins University

4. Time Series Activity Modeling of People with the Chronic Fatigue Syndrome

      Nuno Crato
      Ben Natelson, UMDNJ
      Ann Sisto, VA Hospital

5. Bayesian Estimation of Space-Time Models

      Bonnie Ray
      Balaji Ravishanker, University of Connecticut

6. Nonlinear Methods for Streamflow Forecasting

      Bonnie Ray
      Upmanu Lall, Utah State University

VIII.   CONSULTING

1. *Numerical Simulation Of A Flow Past A Rearview Car Mirror*

    AlliedSignal Inc.

        Nadine Aubry

2. *Design And Testing Of HVAC Fans*

    AlliedSignal Inc.

        Nadine Aubry

3. *Research In Computational Fluid Dynamics*

    Automatic Switch Company

        Nadine Aubry

4. *Four-Dimensional Confomal Structures and their Applications to General Relativity*

    Catholic University of Leuven, Belgium

        Vladislav Goldberg

5. *Utilization of a Mathematical Model of Gait Dynamics in the Design of an Efficient Outcome Investigation for Patients with Joint Replacement Surgery*

    National Institute of Disability Rehabilitation Research

        Michael Lacker

6. *A Model Approach to Task Intervention: An Exploratory Study of Human Gait*

    Kessler Foundation

        Michael Lacker

7. *Assessment of Gait in the Health Elderly: Model Correlation of Stability and Mechanical Energy Efficiency with Clinical Measures*

    St. Josephs Medical Center

        Michael Lacker

8. *Developing and Testing Probabilistic Forecast Models of Drought in the US*

    National Science Foundation/ESHT Lamont Doherty Earth Observatory, Columbia University

        Bonnie Ray

IX. PUBLICATIONS, PRESENTATIONS AND CAMS REPORTS

A. PUBLICATIONS

Roman Andruskiw

Higher Symmetries of the Wave Equation with Scalar and Vector Potentials, (with A.G. Nikitin), Proceedings of the Second International Conference on Symmetry in Nonlinear Mathematical Physics, Vol. 2, pp 321-327, 1997.

Nonlinear Algorithm of Pattern Recognition for Computer Aided Diagnosis of Breast Cancer, (with Y.I. Petunin, D.A. Kljushin), Nonlinear Analysis, Vol. 30, pp 5431-5436, 1997.

Nadine Aubry

Hierarchical, Self-Sustained Energy Cascade To Small Scales In Wall-Bounded Shear Turbulence, In: Self-Sustaining Mechanisms Of Wall Turbulence, (edited by R. L. Panton), Computational Mechanics Publications, Fluid Mechanics Series, Chapter 12, (1997).

 On The Symmetry Breaking Instability Leading To Vortex Shedding, (with S. Tang), *Phys. Fluids,* Vol. 9, pp. 2550-2561, (1997).

Numerical Simulation, Modeling And Control Of The Impulsively Started Flow Past A Circular Cylinder, (with S. Tang), Proceedings of the 13th AIAA Computational Fluid Dynamics Conference, pp. 832-833, 1997.

Instability Of Pole Solutions For Planar Propagating Flames In Sufficiently Large Domains, (with M. Rahibe, G.I. Sivashinsky) Combustion Theory and Modeling, Vol. 2, pp. 19-41, 1998.

Controlling Vortex Shedding By Means Of Numerical Simulations, (with S. Tang) Proceedings of the 1998 ASME Fluids, Engineering Division, (CD Rom), 1998.

A Low Dimensional Model For The Symmetry Breaking Instability Leading To Vortex Shedding, (with Tang, S) Proceedings of the 1998 ASME Fluids Engineering Division,Washington, D.C., (CD Rom), June 21-25, 1998.

Dynamics And Scaling Of Wall-Bounded Shear Turbulence Through The Proper Orthogonal Decomposition, , Proceedings of the 29th AIAA Fluid, Dynamics Conference, Paper AIAA 98-2996, 1998.

John Bechtold

On the Response of Rotating Spherical Premixed Flames, (with J. Qian, and C.K. Law), Combustion and Flame, Vol. 110, pp. 78, 1997.

Microwave-Iinduced Combustion: A One-Dimensional Model, , (with G.A. Kriegsmann, and M.R. Booty), Combustion Theory and Modeling, Vol. 2, pp. 57-80, 1998.

Manish C. Bhattacharjee

Test for a Property of Aging under Renewals: Rationality and General Asymptotics, (with P.K. Sen), Frontiers in Probability and Statistics, Mukherjee, Basu and Sinha (eds), pp. 328-340, 1998.

Probability and Its Applications: Proceedings of the 3rd ISTPA Conference, (with S.K. Basu), Oxford University Press, 1997.

Residual Lifetime at Great Age, (with S.K. Basu), National Institute of Management, Calcutta, India, CSA Bulletin, Vol. 47, pp. 141-152, 1997.

Denis Blackmore

A New Fractal Model For Anisotropic Surfaces, (with G. Zhou), Int. J. Mach. Tools Manufact, Vol. 38, pp. 551-557, 1998.

Fractal Analysis Of Height Distributions Of Anisotropic Rough Surfaces, (with G. Zhou) Fractals Vol. 6, pp. 43-58, 1998.

The Integrability Of Lie-Invariant Geometric Objects Generated By Ideals In The Grassmann Algebra, (with Y. Prykarpatsky & R. Samulyak), J. Nonlin Math. Phys., Vol. 5, pp. 54-67, 1998.

The Finite-Dimensional Moser Type Reduction Of Modified Boussinesq And Super Kdv Hamiltonian Systems, (with A. Prykarpatsky and O. Hentosh), Part 1, J. Nonlin. Math. Phys., Vol. 4 , pp. 455-469, 1997.

The Sweep-Envelope Differential Equation Algorithm And Its Application To NC Machining Verification, (with M.C. Leu & L.P. Wang), Computer-Aided Design, Vol. 29, pp. 629-637, 1997.

A Verification Program For 5-Axis NC Machining With General APT Tools, (with M.C. Leu and L.P. Wang), Annals of CIRP, Vol. 46, pp. 419-424, 1997.

A New Method For Generating Swept Volume, Proc. 1998 NSF Design & Manufacturing Grantees Conference, pp. 102, 1997.

Victoria Booth

A Compartmental Model of Vertebrate Motoneurons for Ca^{2+}- Dependent Spiking and Plateau Potentials Under Pharmacological Treatment, (with J. Rinzel, and O. Kiehn), Journal of Neurophysiology, Vol. 78, pp. 3371-3385, 1997.

Near- Threshold Bursting is Delayed by a Slow Passage Near a Limit Point, (with T.W. Carr, and T. Erneux), SIAM Journal of Applied Mathematics, Vol. 57, pp. 1406-1420, 1997.

Michael Booty

Microwave-Induced Combustion: A One-Dimensional Model, (with G.A. Kriegsmann, and J.K. Bechtold), Combustion Theory and Modeling, Vol. 2, pp. 57-80, 1998.

Amit Bose

Dynamics of Two Mutually Coupled Slow Inhibitory Neurons, (with D. Terman, and N. Kopell), Physica D, Vol. 117, pp. 241-275, 1998.

Hans R. Chaudhry

Residual Stresses in Oscillating Thoracic Arteries Reduce Circumferential Stresses and Stress Radients, (with B. Bukiet, A. Davis, A. B. Ritter and T. Findley) Journal of Biomechanics, Vol.30, No.1, pp. 57-62,1997.

Evaluation of Residual Stress in Rabbit Skin and Relevant Material Constants, (with B. Bukiet, T. Findley, and A. B. Ritter), Journal Of Theoretical Biology, Vol. 192, pp. 191, 1998.

Nuno Crato

On The Detection and Estimation of Long-Memory in Stochastic Volatility, (with J. Breidt and P. de Lima), Journal of Econometrics, Vol. 83, pp. 325-348, 1998.

Heavy Tailed Probability Distributions in Combinatorial Search, (with C.P. Gomes and B. Selman), Gert Smolka (Ed.) Principles and Practice of Constraint Programming, Lecture Notes in Computer Science 1330, Springer, pp. 121-135, 1997.

On the Power of Underdifferencing and Overdifferencing Tests Against Nearly Nonstationary Alternatives, Communications in Statistics, Simulation and Computation, Vol 26, No. 4, pp. 1431-1446, 1997.

Modeling the Persistent Volatility of Asset Returns, (with J.F. Breidt and P.J.F. Lima), Proceedings of the IEEE/IAFE Conference on Computational Intelligence for Financial Engineering (CIFE'97), IEEE, pp. 266-272, 1998.

Sunil Dhar

Data Analysis with Discrete Analog of Freund's Model, Journal Applied Statistical Science, Vol. 7, p. 16, 1998.

Vladislav V. Goldberg

Conformal and Grassmann Structures, (with M.A. Akivis), Differential Geometry, Appl. 8, Vol. 2, pp. 177-203, 1998.

On Geometry of Hypersurfaces of Pseudoinformal Spaces of Lorentzian Signature, (with M.A. Akivis), J. Geom. Phys., 26, Vol. 1-2, pp. 112-126, 1998.

Singular Points of Lightlike Hypersurfaces of the De Sitter Space, (with M.A. Akivis), Publ. Inst. Math (Beograd), Vol. 63, pp. 77, 1998.

Review of the book "Lightlike Submanifolds of Semi-Riemannian Manifolds and Applications" by K.L. Duggal and A. Bejancu, (Kluwer Academic Publishers, 1996), Zenralblatt Fur Mathematik, Vol. 848, # 53001, 1997.

Review of the book "Exploring Curvature" by J. Casey (Vieweg & Sohn, 1996), Mathematical Reviews 98c:53001, 1998.

Review of the book "Dual Theory of Framed Manifolds" by A.V. Stolyarov (State Pedagogical Institute of Chuvashia, 1994), Mathematical Reviews, 98c:53017, 1998.

Gregory A. Kriegsmann

A Hybrid Numerical Method for Loaded Highly Resonant Single Mode Cavities, (with C. Hile), Journal of Computational Physics, Vol. 142, pp. 506-520, 1997.

Microwave Heating of a Ceramic Laminate, (with J. Pelesko), Journal of Engineering Mathematics, Vol. 32, pp. 1-18, 1997.

Hot Spot Formation in Microwave Heated Ceramic Fibers, IMA Journal of Applied Mathematics, Vol. 59, pp. 123-148, 1997.

Stability of Microwave Heated Fluid Layers, (with J. Gilchrist and D.T. Papageorgiou), IMA Journal of Applied Mathematics, Vol. 59, pp. 73-89, 1997.

Microwave-Induced Combustion: A One-Dimensional Model, (with M.R. Booty, and J.K. Bechtold), Combustion Theory and Modeling, Vol. 2, pp. 57-80, 1998.

Michael Lacker

Mechanical Energy Efficiency of a Wheelchair Racing Stroke, (with S. Chenk, W. Roman, R. Narcessian, J. Redling, S. A. Sisto, M. Gerdes), Gait & Posture, Vol. 7, No. 2, pp. 152, 1998.

Dawn Lott-Crumpler

The Quasilinear Wave Equation Governing Antiplane Axisymmetric Shearing: A Numerical Approach, (with S. S. Antman and W. G. Szymczak) Proceedings of the Fourth International Conference on Mathematical and Numerical Aspects of Wave Propagation, Society for Industrial and Applied Mathematics, pp. 446 – 448, 1998.

Z. H. Michalopoulou

Active Target Detection in the Ocean: Optimizing Performance and Cost, Proceedings of the 135th Meeting of the Acoustical Society of America, (CD Rom), June 1998.

Broadband Array Processing for Underwater Source Localization, Proceedings of Naval Technology Conference for the 21st Century, Hellenic Naval Academy, pp. 253-257, June 1998.

P. S. Milojevic

On The Number Of Solutions Of Nonlinear Equations, Facta Universitatis, 1998.

Demetrios Papageorgiou

On the Modulational Instability of 0(1) Amplitude Waves in Supersonic Boundary Layers, (with P. Hall), SIAM Journal of Applied Math, Vol. 57, No. 4, pp. 929-958, 1997.

Stability of a Microwave Heated Fluid Layer, (with J. Gilchrist and G.A. Kriegsmann), IMA Journal of Applied Mathematics, Vol. 60, pp. 73-89, 1998.

Michael Porter

Acoustic Models As The Inner Loop: Inverse Problems In Ocean AcousticS, Proceedings of the Third International Conference on Theoretical and Computational Acoustics, Eds. D. Lee and M.H. Schultz, World Scientific, 1997.

Environmental Matched And Adaptive Technology, (with J.P. Ianniello), Proceedings of the 1997 Technical Workshop on Submarine Acoustic Superiority, 1997.

INTIMATE 96 Data Report, Service Hydrographique et Océanographique de la Marine TR, No. 27, Brest, France, 1997.

Exploiting Reliable Features Of The Ocean Channel Response, (with S. Jesus, Y. Stéphan and X. Démoulin, E. Coelho), In: Shallow-water Acoustics, eds. R.H. Zhang and J.X. Zhou, China Ocean Press, 1997.

INTIMATE96: A Shallow Water Tomography Experiment Devoted To The Study Of Internal Tides, (with X. Démoulin, Y. Stéphan, S. Jesus, E. Coelho), In: Shallow-water Acoustics, eds. R.H. Zhang and J.X. Zhou, China Ocean Press, 1997.

3-D Modeling Of The Santa Lucia Experiment, Proceedings of the 16th International Congress on Acoustics and the 135th Meeting of the Acoustical Society of America, Eds. Patricia Kuhl and Lawrence Crum, pp. 2091-2092, 1998.

Shallow-Water Tracking In The Sea Of Nazaré, (with Y. Stéphan, S. Jesus, E. Coelho, and X. Démoulin), Proceedings of the 1998 International Symposium on Undersea Technology, IEEE Catalog Number 98EX101, pp. 29-34, 1998.

Bonnie Ray

Bandwidth Selection for Kernel Regression with Long-Range Dependent Errors, (with R. Tsay), Biometrika, Vol. 84, pp. 791-802, 1997.

Identifying Permanent and Temporary Components in Daily and Monthly Japanese Stock Prices, (with J. Jarrett and S. Chen), Financial Engineering in Japanese Markets, Vol. 4, No. 3, pp. 243-256, 1997.

Bayesian Estimation Methods for Mulitvariate Long-Range Dependent Processes, (with N. Ravishanker), Australian Journal of Statistics, Vol. 39, pp. 295-311, 1997.

Modeling Long-Term Dependence, Nonlinearity, And Periodic Phenomena In Sea Surface Temperatures Using TSMARS, (with P. Lewis), Journal of the American Statistical Association, Vol. 92, pp 881-893, 1997.

Burt Tilley

On Symmetric Long Wave Patterns in Two-Fluid Flows, (with S.H. Davis), Physica D, Vol. 108, pp. 291-314, 1997.

Oblique Two-Fluid Stagnation Point Flow, (with P.D. Weidman), Euro. J. Mech B/Fluids, Vol. 17, pp. 205-217, Issue 2, 1998.

B. PRESENTATIONS

Roman Andruskiw

July 1997: Second International Conference on Symmetry in Nonlinear Mathematical Physics, Kyiv, Ukraine
Higher Symmetries of the Wave Equation with Scalar and Vector Potentials

August 1997: International Conference on Applied Mathematics and Statistics in Medical Sciences, Ankara, Turkey
Retrospective Determination of Prognostic Significance of Cytogenic and Morphological Factors and Confidence Limits in the Linear Regression Model for Survival Time of Patients Suffering from Malignant Melanoma

August 1997: Asymptotic and Qualitative Methods in the Theory of Nonlinear Oscillations, Kyiv, Ukraine
A Bracketting Method for Approximating the Eigenvalues of a Class of Differential Operator Pencils

John Bechtold

July 1997: SIAM Annual Meeting, Stanford, CA
Flame Propagation in Unsteady Flows

October 1997: Eastern States Section of The Combustion Institute, Hartford, CT
A Premixed Flame in Oscillating Stagnation Point Flow: Hydrodynamic Effects

November 1997: The American Physical Society Division of Fluid Dynamics, San Francisco, CA
A Premixed Flame in Oscillating Stagnation Point Flow

Manish Bhattacharjee

December 1997: 3rd International Triennial Calcutta Symposium on Probability and Statistics, Calcutta, India
A Framework for Modeling and Analysis of Repairable Systems via Dynamic Programming

December 1997: International Conference On Recent Advances in Statistics and Probabilty, Calcutta, India
Stochastic Equivalence under Convex and Laplace Orderings

Denis Blackmore

January 1998: The 1998 NSF Design & Manufacturing Grantees Conf., Monterrey, Mexico
The Sweep-Envelope Differential Equation

July 1997: SIAM Annual Meeting, Stanford University, CA
Characterization of Versal Deformations of the Dirac Differential Operator

July 1997: SIAM Annual Meeting, Stanford University, CA
Using Singularity Theory to Compute Swept Volumes

Victoria Booth

April 1998: The Alice B. Dickinson Lecture, Smith College, Northampton, MA
Mathematical Modeling of Electrical Firing Patterns of Neurons

May 1998: The 4th Annual Coalition for National Science Funding Exhibition and Reception for Members of Congress and Their Staffs, Washington, DC
A Dendritic Origin of Bistability of Motoneuron Firing Patterns

May 1998: Mathematical Research Branch, NIH, Bethesda, MD
Using Genetic Algorithms to Optimize Parameters in Neural Models

Michael Booty

July 1997: The Fifth International Congress on Toxic Combustion By-Products, Dayton, OH
Incineration Chemistry and By-Product Studies on Cellulose and Polystyrene Using a Bench-Scale Reactor System

July 1997: The Fifth International Congress on Toxic Combustion By-Products, Dayton, OH
Incineration Chemistry of NaCI in Solid Waste Matrices Under Municipal Incineration Conditions

July 1997: Sponsors Technical Meeting, Proctor and Gamble Company, Cincinnati, OH
Incineration Chemistry and By-Product Studies of Cellulose and Polystyrene Using a Bench Scale Reactor System

Amit Bose

December 1997: Rutgers University, Newark, NJ
Modeling Oscillatory Dynamics in Networks of Neurons

February 1998: University of Massachusettes, Amherst, MA
Modeling Oscillatory Dynamics in Networks of Neurons

May 1998: Recent Advances in the Stability of Nonlinear Waves, Little Compton, RI
Non-local Equations for Microwave Heating Applications

Hans Chaudhry

May 1998: The 13th Canadian Symposium on Fluid Dynamics (CSFD), Vancouver, Canada
Role of Residual Stresses on Blood Flow in Arteries: Non linear Elastic Aspects of the Arterial Wall

Nuno Crato

March 1998: The 6th Annual Meeting of the Society for Nonlinear Dynamics and Econometrics, New York University, NY
On the Power of Underdifferencing and Overdifferencing Tests Against Nonstationary Alternatives

June 1998: The 1998 International Symposium on Forecasting, Edinburgh, UK
Unit-root Testing, Model Selection and Forecasting

June 1998: Second Arrabida Time Series Workshop, Arrabida, Portugal
Forecasting of Linear Time Series Models

Sunil Dhar

August 1997: Operations Research Group, AT&T Labs, Holmdel, NJ
Certain Models with Applications of Some Estimators

November 1997: Rutgers University, Piscataway, NJ
The Binary Sequence of Order k and its Applications

Vladislav Goldberg

July 1997: Geometry Seminar at Catholic University of Leuven, Leuven, Belgium
Theory of Almost Grassmann Structures

July 1997: Colloquium of the Mathematics Department, Free University, Brussels, Belgium
Confomal Theory of Lightlike Hypersurfaces

November 1997: Colloquium of the Mathematics Department, Lehigh University, Bethlehem, PA
A Conformal Rigidity for Hypersurfaces of a Conformal Space

Cheryl Hile

June 1997: SIAM Wave Propagation Conference, Colorado School of Mines, CO
A Hybrid Numerical Method for Loaded Highly Resonant Single Mode Cavities

Jay Kappraff

June 1998: The 2nd International Conference on Mathematics and Design, San Sebastian, Spain
A Taxonomy of Ancient Geometry Based on the Hidden Pavements of the Laurentian Library

June 1998: Nexus '98, Mantua, Italy
Hidden Pavements of the Laurentian Library

Gregory A. Kriegsmann

July 1997: P.I.E.R.S., Boston, MA*, Hot Spot Formations in Microwave Heated Fibers*

July 1997: IUTAM Symposium on Computations in Infinite Domains, Boulder, Colorado,
Scattering from Large Resonant Structures

October 1997: Department of Mathematics, University of Leeds, Leeds, UK
Stabilization of Hot Spots in Microwave Heated Ceramic Fibers

October 1997: Department of Mathematics, University of Manchester, Manchester, UK
Scattering from Large Resonant Structures

October 1997: Department of Mathematics, Univeristy of Keele, Keele, UK
Scattering from Large Resonant Structures Microwave Heating of Materials: A Mathematical and Physical Overview

November 1997: Department of Mathematics, University of Dundee, Dundee, UK
Scattering from Large Resonant Structures

November 1997: ICMS, Edinburgh, UK
Scattering from Large Resonant Structures
Microwave Heating of Materials: A Mathematical and Physical Overview

November 1997: Department of Mathematics, Univeristy of Strathclyde, Glasgow, UK
Growth and Stabilization of Hot Spots in Microwave Heated Ceramic Fibers

December 1997: Department of Engineering Sciences and Applied Mathematics, Northwestern University, Evanston, IL
Growth and Stabilization of Hot Spots in Microwave Heated Ceramic Fibers

December 1997: Department of Mathematics, Arizona State University, Tempe, AZ
Microwave Heating of Materials: A Mathematical Overview

January 1998: AFOSR Electromagnetics Workshop, Brooks Air Force Base, San Antonio, TX
Scattering by Large Slowly Changing Cavities

March 1998: Department of Mathematics, Arizona State University, Tempe, AZ
Microwave Heating of Materials: A Mathematical Overview

April 1998: Workshop on Mathematical Aspects of Materials Science Modeling, Gatlinburg, TN
Modeling, Analysis, and Numerical Issues in Microwave Heating of Materials.

June 1998: Fourth International Conference on Mathematical and Numerical Aspects of Wave Propagation, Golden, CO
Scattering from Large Resonant Structures

Dawn Lott-Crumpler

March 1998: University of Delaware, DE
Numerical Methods for the Quasilinear Wave Equation

June 1998: Fourth International Conference on Mathematics and Numerical Aspects of Wave Propagation, Society for Industrial and Applied Mathematics, Golden, CO
The Quasilinear Wave Equation Governing Antiplane Axisymmetric Shearing: A Numerical Approach

Jonathan H.C. Luke

July 1997: SIAM 45th Anniversary Meeting, Stanford, CA
A Finite-Difference Method for Highly Dispersive Linear Waves

June 1998: Fourth International Conference on Mathematical and Numerical Aspects of Wave Propagation, Golden, CO
 A Finite Difference Method for Dispersive Linear Waves: Inhomogeneities and Interfaces

Zoi-Heleni Michalopoulou

October 1997: IEEE Workshop on Underwater Signal Processing, Universisty of Rhode Island, RI
Matched Field Processing for Multi-Tonal Source Localization

December 1997: 134th Meeting of the Acoustical Society of America, San Diego, CA
Matched Field Processing for Multi-Tonal Source Localization

June 1998: 135th Meeting of the Acoustical Society of America, Seattle, WA
Active Target Detection in the Ocean: Optimizing Performance and Cost

June 1998: Naval Technology for the 21st Century, Hellenic Naval Academy, Greece
Broadband Array Processing for Underwater Source Localization

Michael Porter

March 1998: Boston University, Boston, MA
Shallow Water Tomography

March 1998: Office of Naval Research, London, UK
Summary Of The Joint French-Portuguese-U.S. INTIMATE Experiment Program

March 1998: INTIMATE 98 Meeting, Brest, France
Results of INTIMATE 96

April 1998: 1998 International Symposium on Undersea Technology, Tokyo, Japan
Shallow-Water Tracking In The Sea Of Nazaré

June 1998: 135th Meeting of the Acoustical Society of America, Seattle, WA
3-D Modeling Of The Santa Lucia Experiment

Bonnie Ray

July 1997: IMS Meeting, Park City, UT
Estimation of Common Long-Range Dependent Components in a Vector Time Series

February 1998: Seminar Series, Penn State University, PA
Estimation of Common Long-Range Dependent Components in a Vector Time Series

February 1998: Seminar Series, University of Pittsburgh, PA
Estimation of Common Long-Range Dependent Components in a Vector Time Series

April 1998: Workshop in High Frequency Data in Finance- II, Zurich, Switzerland
Common Long-Range Dependence in Daily Stock Volatilities

Michael Siegel

July 1997: SIAM Annual Meeting, Stanford University, Stanford, CA
The Effects of Surfactants on Time-Evolving Bubbles in Stokes Flow

November 1997: American Institute of Chemical Engineers Annual Meeting, Los Angeles, CA
Surfactant Effects in Steady, Bursting, and Cusping Bubbles

December 1997: Colloquium, Department of Mechanical Engineering, NJIT
Surfactant Effects in Steady, Bursting, and Cusping Bubbles

May 1998: Nineteenth Annual Meeting of the Canadian Applied Mathematics Society, Vancouver, British Columbia, Canada
The Role of Residual Stresses in Arterial Blood Flow

Burt Tilley

November 1997: American Institute of Chemical Engineers Annual Meeting, Los Angeles, CA
On the Nonlinear Evolution of Holmboe Waves in Two-Layer Shear Flows

November 1997: American Physical Society-Division of Fluid Dynamics Annual Meeting, San Francisco, CA
On the Nonlinear Evolution of Holmboe Waves in Two-Layer Shear Flows

C. CAMS REPORTS

97/98-1 **Jonathan H.C. Luke**
 A Finite Difference Method For Dispersive Linear Waves With Applications To Simulating Microwave Pulses In Water

97/98-2 **Vladislav V. Goldberg**
 Special Classes Of Curvilinear 4-Webs With Equal Curvature Forms Of Its 3-Subwebs

97/98-3 **Maks A. Akivis and Vladislav V. Goldberg**
 On Geometry Of Hypersurfaces Of A Pseudoconformal Space Of Lorentzian Signature

97/98-4 **Shaojie Tang and Nadine Aubry**
 On The Suppression And Alteration Of Vortex Shedding

97/98-5 **Cheryl V. Hile and Bonnie K. Ray**
 A Capstone Course In Applied Mathematics And Statistics

97/98-6 **Cheryl V. Hile, Jonathan H.C. Luke, and Erik G. Gordon**
 Error Analysis Of Finite-Difference Time-Domain Methods For Pulse Propagation In Debye Materials

97/98-7 **Michael R. Booty, John K. Bechtold, and Gregory A. Kriegsmann**
 Microwave Induced Combustion: A One-Dimensional Model

97/98-8 **Michael Siegel**
 Influence Of Surfactant On Rounded And Pointed Bubbles In 2-D Stokes Flow

97/98-9 **Yiorgos S. Smyrlis and Demetrius T. Papageorgiou**
 On The Effects Of Generalized Dispersion On Dissipative Dynamical Systems

97/98-10 **Andrew H. Dando, Phillip Hall, and Demetrius T. Papageorgiou**
 The Modulational Stability Of Taylor Vortices In A Curved Channel

97/98-11 **Phillip Hall and Demetrius.T. Papageorgiou**
 The Onset Of Chaos In A Class Of Exact Navier Stokes Solutions

97/98-12 **Manish C. Bhattacharjee**
 Dynamic Programming, Renewal Functions, And Perfect Vs. Minimal Repair Comparisons

97/98-13 **Maks A. Akivis and Vladislav V. Goldberg**
 The Darboux Mapping Of Canal Hypersurfaces

97/98-14 **Hans R. Chaudhry, Bruce Bukiet, Michael Siegel, Thomas Findley, Arthur B. Ritter, and Nejat Guzelsu**
 Revision Of: Optimal Patterns For Suturing Wounds

97/98-15 **Maks A. Akivis and Vladislav V. Goldberg**
 Semiintegrable Almost Grassmann Structures

97/98-16 **Amitabha Bose and Gregory A. Kriegsmann**
 Stability Of Localized Structures In Non-Local Reaction Diffusion Equations

97/98-17 **Yanping Wang, Demetrius T. Papageorgiou, and Charles Maldarelli**
 Increased Mobility Of A Surfactant Retarded Bubble At High Bulk Concentrations

97/98-18 **Daljit S. Ahluwalia, Joseph B. Keller, and Charles Knessl**
 Advection-Diffusion Around A Curved Obstacle

97/98-19 **Petronije S. Milojevic**
 On The Number Of Solutions Of Nonlinear Equations

X. CAMS RESEARCH PROGRAM FOR STUDENTS

A. Ph.Ds AWARDED

John Pelesko
Diffusive and Wavelike Phenomena in Thermal Processing of Materials, (Gregory A. Kriegsmann, Advisor)

John Gilchrist
Microwave Heating at Fluid/Solid Layers: A Study of Hydrodynamic Stability and Melting Front Propagation, (Demetrius Papageorgiou, Advisor)

B. AWARDS

Matthew Santaiti, Matthew Detlet and Brandy Rapatski (Undergradute Students)
Honorable Mention, 14th Annual Mathematical Contest in Modeling, February 1998.

John Gilchrist (Graduate Student)
Student Paper Award, 2nd SIAM Student Conference, Florida State University.

John Pelesko (Graduate Student)
Nomination by NJIT for 1998 CGS/University Microfilms International Distinguished Ph.D. Dissertation Award.

Best Paper Award in Ceramic Engineering, Seventh Annual Mini-Tech Conference, 1997.

C. PUBLICATIONS

Zili Huang
Weakly Stretched Premixed Flames in Oscillating Flows, (with J. Bechtold and M. Matalon), Combust. Theory and Modeling, Vol. 2, pp. 115, 1998.

John Pelesko
Microwave Heating of a Ceramic Laminate, (with G.A. Kriegsmann), Journal of Engineering Mathematics, Vol. 32, pp.1-18 1997

John Gilchrist
Stability of a Microwave Heated Fluid Layer, (with G.A. Kriegsmann and D. Papageorgiou), IMA Journal of Applied Mathematics, Vol. 60, pp 73-89, 1998.

Erik G. Gordon
Error Analysis Of Finite-Difference Time-Domain Methods For Pulse Propagation In Debye Materials, (with Cheryl V. Hile, and Jonathan H.C. Luke), CAMS Report 97/98-6

Yanping Wang
Increased Mobility Of A Surfactant Retarded Bubble At High Bulk Concentrations, (with Demetrius T. Papageorgiou and Charles Maldarelli), CAMS Report 97/98-17

D. PRESENTATIONS

John Gilchrist
Kenote Speaker, *Propagation of a Melting Front Induced by Microwave Heating*, 2nd SIAM Student Conference, Florida State University, March 1998

Zili Huang
Premixed Flame Propagation in Oscillating Stagnation Point Flow, 2nd SIAM Student Conference, Florida State University, March 1998

Michael Dancu
Phase Plane And Energy Analysis Of A Journal Bearing, Moravian College Undergraduate Mathematics Conference, February, 1998.

E.   UNDERGRADUATE RESEARCH ACTIVITIES

Michelle DeBonis
Mathematical Modeling Workshop, Rensselaer Polytechnic Institute, June 1998

Supercomputing Program for Undergraduate Research, Cornell University, Summer 1997

Matthew Detlet
Research Experience for Undergraduates (REU) on Telegrapher's Equation with Jonathan Luke, Summer 1997

Mathematical Biology with Victoria Booth, Spring 1998

Matthew Santaiti
Research Experience for Undergraduates (REU) with Michael Siegel at NJIT, research on Deformation of Drops in Strain Flows, Summer 1997

Hoa Tran
Research Experience for Undergraduates (REU) with Gregory A. Kriegsmann at NJIT, research on rectifier circuits, Summer 1997

Brandy Rapatski
Research Experience for Undergraduates (REU) at Northern Arizona University, research on Dynamical Systems, Summer 1997

Shirley Yap
Research Experience for Undergraduates (REU) at Potsdam University, research on Graph Theory, Summer 1997

F.   1997 SUMMER RESEARCH PROGRAM PARTICIPANTS

GRADUATE STUDENT	PROJECT ADVISOR
John Gilchrist	Demetrius Papageorgiou
John Pelesko	Gregory A. Kriegsmann
Yanping Wang	Demetrius Papageorgiou
Zili Huang	John Bechtold
Peiwen Hou	Jonathan Luke
Helen Martynov	Gregory A. Kriegsmann
Stuart Walker	Gregory A. Kriegsmann
Fu Li	Michael Booty
Brian Mullaghy	Gregory A. Kriegsmann
Mathew Charlap	Bruce Bukiet
Jerry Chen	Denis Blackmore
Michelle Picarelli	Eliza Michalopoulou
Eliana Antoniou	John Bechtold
Ma Xiaoqun	Michael Siegel
Liangzhong Chen	Bonnie Ray
Urmi Ghosh-Dastidar	Gregory A. Kriegsmann
Junghang Lee	Michael Booty

Farouk Chistie   Michael Booty
Raymond Addabbo   John Bechtold

XI. CAMS COMMITTEE REPORTS

PUBLICATIONS AND READING ROOM COMMITTEE

Chair: Victoria Booth

The CAMS Reading Room, located in Cullimore 607, continued to be a locus for departmental interaction especially during the CAMS weekly afternoon teas. Each month a different faculty member acted as host for the Tuesday or Wednesday afternoon teas which featured tea, of course, along with cookies, biscuits and occasionally home-baked treats. The teas attracted a cross-section of faculty and CAMS members and facilitated the exchange of a wide spectrum of ideas, pertaining to both research and recreation. The teas also provided a forum for discussion of new projects to be undertaken by CAMS and the Mathematical Sciences Department, including the submission of group grant proposals such as NSF-sponsored SCREMS and VIGRE. The teas were additionally incorporated into the schedules of important visitors, including Mark Glauser from the Air Force Office of Scientific Research and Larry Greller from SmithKline Beecham Pharmaceuticals, to permit introductions and informal interaction with a large number of the faculty.

The collection of the CAMS Reading Room consists of books and journals relevant to the research interests of CAMS members as well as research articles and CAMS technical reports authored by members. Also available for members are hard-copies of announcements for funding opportunities from a variety of agencies. This collection continues to be a valuable resource for members and especially long-term visitors to the department. Late in the Spring semester, the CAMS Reading Room took on the new and unexpected function of providing additional office space for a number of personnel connected with new projects associated with the Mathematical Sciences Department.

This year, in addition to producing this annual report, the CAMS Publications committee turned its attention to the electronic representation of CAMS on the Internet. Thanks to the efforts of the CAMS Computation Committee, the student system assistants and the new systems administrator, the Mathematical Sciences Department and CAMS Web pages were revised and individual web pages for faculty were developed using a common format. Currently, a system for updating and editing the information on the website is being formulated with the systems administrator. Visit CAMS at http://cams.njit.edu.

RESEARCH COMMITTEE REPORT

Chair: Jonathan Luke

In the past year, CAMS members have submitted eighteen individual proposals to outside agencies through CAMS, seven internal proposals for SBR funding, a group proposal to NSF (SCREMS) to update CAMS computing resources and participated in a significant number of proposals submitted from other departments, centers and institutions. The Research Committee has assisted many of these efforts through informal review, advice on submission and format, organization of group efforts, and dissemination of information. In the past year, the encouragement of collaborative efforts within NJIT included a meeting of CIS faculty and CAMS members exploring the research interests of the two groups. The committee is pleased by and grateful for the high level of professionalism and cooperation it has encountered in working with other CAMS committees and individual members. These will be essential ingredients in future efforts to build the research environment in which we work.

XII. CAMS COMPUTATION LABORATORIES

A. CAMS/ MATH COMPUTATION LABORATORY

Committee on Computation
Eliza Michalopoulou (Chair), Dawn Lott-Crumpler, and Burt Tilley.

Systems Administrator
Irene Giouvanos

The year started without a full-time systems administrator. The committee worked with two students, Biju Joseph and Emmanuel Makrakis, on the maintenance of the CAMS labs and faculty computers. Biju's and Emmanuel's contributions have been invaluable and the lab and network have been running smoothly.

During the academic year, the computer committee conducted a series of interviews in order to identify a suitable systems administrator for the Department and Center. As a result, Ms. Irene Giouvanos started working with us in April 1998. Ms. Giouvanos has already made a positive contribution by organizing our labs, establishing rapport with the academic computing services on campus, and playing a principal role in projects.

In addition to the search for a full-time systems manager and routine maintenance and troubleshooting, the computer committee, the systems manager, and the two student assistants worked on the following projects:

- A proposal on wiring the Mathematical Sciences Department for connectivity to a 10baseT network.

- A proposal for upgrades of faculty desktop machines, purchase and implementation of a sophisticated back-up system, and acquisition of funds for scientific software (MATLAB, Maple, Mathematica, Splus), graduate student workstations, a main computational server, printers, and multimedia equipment.

- Updating the www pages of the Department and Center in collaboration with the Publications Committee.

- Creation of a system for easy interdepartmental e-mailing.

- Resource optimization.

- Easier access to software updates.

B. STATISTICS CONSULTING LABORATORY

Bonnie Ray, Director

The Statistics Consulting Laboratory (SCL) started functioning in Spring 1998, although it is yet to be formally launched. The purpose of the SCL is to act as a clearinghouse for statistical advice and consulting to various academic / research units within or outside NJIT. More details are available under a link from the Departmental web page. A summary of consulting activities conducted by the SCL during Spring 1998 is as follows:

- **Project #1**
  Date : March 1998
  Client : Victor Callahan, HSMRC, NJIT.
  Description : Regression analysis of relation between car emissions and car variables. Analyses using S-PLUS.
  Consultant : B. Ray

- **Project #2**
  Date : April 1998
  Client : Dr. Lucille Eller, School of Nursing, Rutgers University, Newark.
  Description : Statistical aspects of data analysis for a study on "Effects of pain on cellular immunity in HIV positive and HIV negative subjects." Analysis and interpretation of data analysis results using a repeated measures design, with repeated measures on one factor. Implementation using SPSS.
  Consultants : R. Dios and M.C. Bhattacharjee

As a result of discussions with Dr. Patricia Harley, director of the Office of Research and Development, College of Nursing, Rutgers-Newark; the SCL has entered into an agreement to provide need based statistical consulting to individual faculty at the College of Nursing. This agreement includes a negotiated rate of compensation for consulting services offered.

C.   NSF CAPSTONE LABORATORY

Advisors: Bruce Bukiet, John Bechtold and Bonnie Ray

The NSF Capstone Lab (supported by an NSF ILI grant) houses Silicon Graphics Workstations and equipment for physical experiments which are used by undergraduate students in a Capstone course for research projects in applied math and statistics. Students worked on the following projects during the academic year 1997-98:

• Long-Range Forecasts in Futures Contracts (Faculty Advisor: Bonnie Ray)

• Design of a Spring-Mass-Damper System Simulating a Car Shock (Faculty Advisor: Bruce Bukiet)

• Design of an Algorithm to Produce Cross-Sectional Images of Three-Dimensional Objects Scanned by Magnetic Resonance Imagers (MRI's) (Faculty Advisor: John Bechtold)

The project involving Magnetic Resource Imagers was initiated by the Consortium for Mathematics and Its Applications Mathematical Contest in Modeling, in which a team of NJIT math students received Honorable Mention.

XIII. EXTERNAL ACTIVITIES AND AWARDS

Daljit S. Ahluwalia

Member, United States National Committee/Theoretical and Applied Mechanics, National Research Council, 1995-1999.

John Bechtold

Ph.D. Committee Member, Princeton University, October 1997

Manish Bhattacharjee

Member, International Organizing Committee, *3rd International Triennial Calcutta Symposium, On Probability and Statistics*, Calcutta, India, December 1997.

Bruce Bukiet

Associate Editor, SIAM Journal on Scientific & Statistical Computing

Nuno Crato

Organizer of International Workshop, *Time Series Econometrics: New Research Topics*, Arvibida, Portugal, July 1997

Sunil Dhar

Statistical Consultant, Customer Labs, AT&T Labs

Technical Staff V, Business Operations Research, AT&T Labs

Vladislav Goldberg

Editor, Journal Webs and Quasigroups, Tver State University

Gregory A. Kriegsmann

Editor-in-Chief, SIAM Journal on Applied Mathematics

Associate Editor, IMA Journal on Applied Mathematics

Editorial Board, Journal of Engineering Mathematics

Associate Editor, Journal of Analysis and Applications

Member, Organizing Committee, *IUTAM Symposium on Computations on Unbounded Domains*

Member, Organizing Committee, *4th International Conference on Mathematics and Numerical Aspects of Wave Phenomena*

Jay Meegoda

Editorial Board, ASTM Geotechnical Testing Journal

Petronije Milojevic

Editorial Board, Communications on Applied Nonlinear Analysis

Demetrius Papageorgiou

Associate Editor, SIAM Journal on Applied Mathematics

Michael Porter

Innovators Award, 75th Year Anniversary, Naval Research Laboratory*, Forum on Innovation*.

Member, Scientific Committee, First International Symposium on Physics in Signal and Image Processing.

Anthony Rosato

Assistant Editor, Mechanics Research Communications