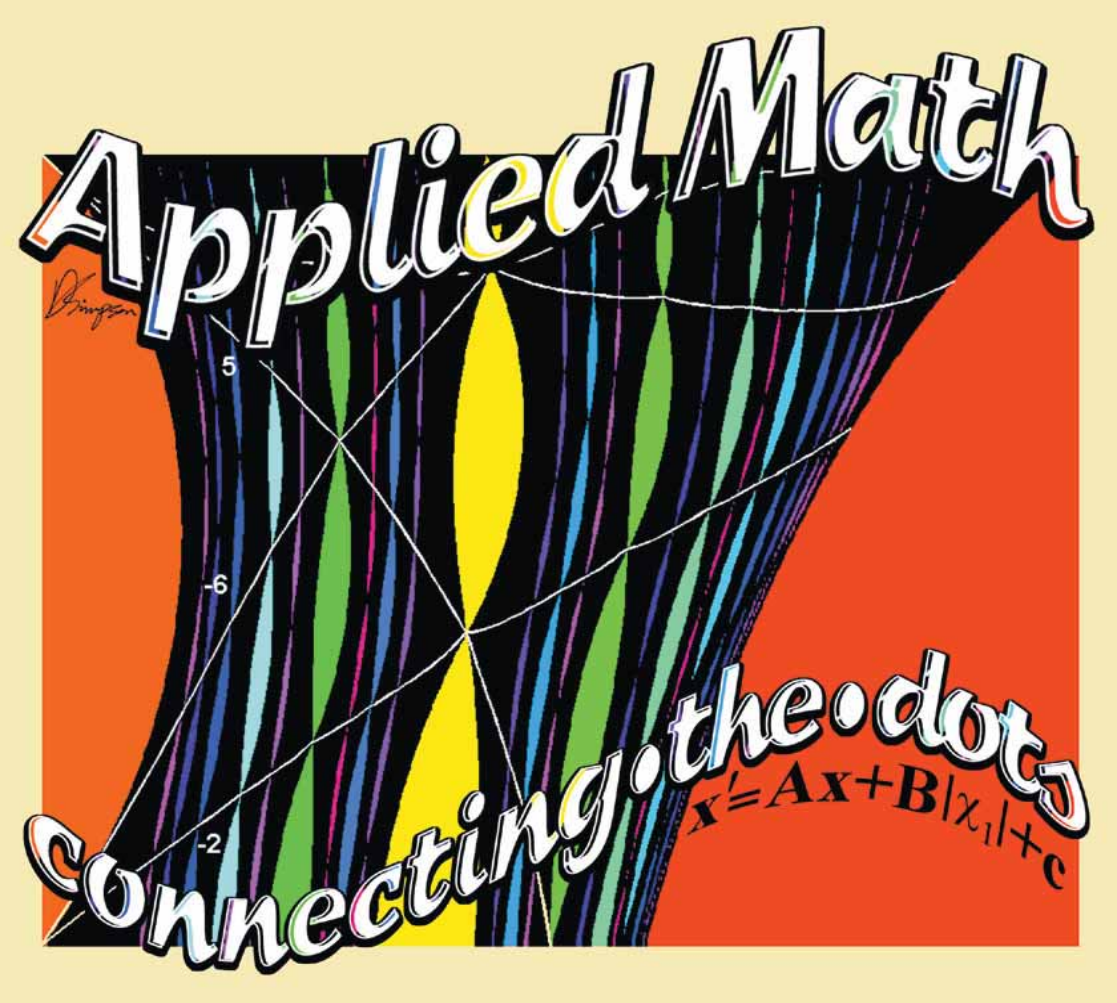
Department of Applied Mathematics

Annual Report 2007



Colorado
University of Colorado at Boulder

Department of Applied Mathematics

University of Colorado at Boulder

Vision

The vision of the Department of Applied Mathematics at the University of Colorado is to be an internationally leading department in Applied Mathematics in research and education.

Mission

The Department of Applied Mathematics at the University of Colorado strives to provide excellent teaching, research, and service to the university community and to the world in the application of mathematics to other disciplines.

Objectives

The Department of Applied Mathematics has four primary objectives:
To teach our students well;
To seek out and develop new, interesting applications of mathematics in other disciplines;
To provide each student with a rich educational experience;
To create new mathematics.

We interpret this to mean:

- Provide undergraduate and graduate students with a high quality education and training in applied mathematics and prepare them for careers in government, industry, laboratories, and the academic professions;
- Offer and monitor degree programs leading to BS, MS and PhD degrees in Applied Mathematics;
- Nourish and maintain a professional environment in which excellence in teaching, learning, scholarship, and creativity are of central importance;
- Assure teaching and research expertise in a number of key areas of applied mathematics including the methodology of applied mathematics, computational mathematics and algorithms, industrial applications, applied probability, and statistics.

Cover Art

Each year the Department of Applied Mathematics holds a T-shirt design contest, encouraging its students to illustrate aspects of current research in the department. This year, David Simpson, a PhD student and research assistant under Professor Jim Meiss, won the contest with his image showing resonance tongues of a two-dimensional piecewise-linear continuous map. The map belongs to a greater class of dynamical systems known as piecewise smooth systems that are used commonly to model physical situations involving non-smooth behavior such as impacting or switching. Resonance tongues are regions within which the map exhibits periodic solutions of a particular frequency. Unlike in smooth maps, the tongues display a distinctive lens-chain structure. Lenses connect at so-called shrinking points. We have been able to numerically compute curves joining shrinking points, connecting the dots, so to speak. In some situations these curves seem to form a boundary between chaotic and non-chaotic behavior.

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Overview

The Department of Applied Mathematics is steeped in strategies and traditions giving students three core advantages: Communication skills, Computational skills, and Mathematical skills. Along with these core skills, the Department strives to educate and train its students in the tools, methods, and strategies of solving real world problems. We believe that history continues to show that the question is not whether mathematics will be applied–the only question is where and when!

Our mission is little different from the Engineering Mathematics Department's mission from 1906. Since 1996, the Applied Mathematics community, composed of the department's students, faculty, and staff, has addressed its objectives with admirable levels of engagement.

The Department offers a Bachelor of Science (BS) in Applied Mathematics, as well as a minor, and a five-year concurrent Bachelor of Science/Master of Science (BS/MS) degree. At the Graduate level, the department offers the Master of Science (MS) and Doctor of Philosophy (PhD) degrees. This past 2007 year, Applied Mathematics had 15 tenure and tenure-track faculty, five instructors, and several lecturers who taught 14,347 undergraduate credit hours and 799 graduate credit hours. In 2007, there were 125 majors and 65 minors, and 86 graduate students. The department also successfully recruited a new Assistant Professor, Dr. Juan Restrepo, who will join the Department for the 2008-2009 academic year.

An Applied Mathematics degree is an extremely flexible technical degree. A consequence is that the Department is constantly on the look out for new areas of engagement or hot new application areas. For example, several years ago we noted that about 20% of our majors were interested in mathematics related to finance. Hence, we have been working with our colleagues in the Leeds Business School at the University of Colorado at Boulder to continue to develop offerings in that direction.

Furthermore, the Department is developing curriculum initiatives that promise to be very exciting. These new foci already include departmental areas of strength such as Mathematical Biology, where the department has three excellent Assistant Professors. This will allow the Department to train students in the life sciences while focusing on aspects of genetics as well as components of molecular biology. A second initiative focus will allow the department to participate in the more technical aspects of the gaming industry where getting the mathematics and physics "right," is becoming increasingly important. Here, we believe that the department can offer a Gaming and Simulation Track, focusing on mathematics and computing. In both cases, an important thing to note about these initiatives is that the Department will be working with new partners on campus: the campus wide Biotech Initiative and the Alliance for Technology, Learning, and Society Institute (ATLAS). Such opportunities could be very exciting for our students and faculty. On this note, the Department would like to give a special thanks to our alums, Dr. Laurie Heyer and Dr. David Eberly for their discussions and insights leading to the Department's better understanding potential opportunities in these directions.

As noted in the past, the Department has a very distinguished faculty at all ranks. For example, Department faculty include a former president of the world's largest Society of Industrial and Applied Mathematicians, faculty who are among the most highly cited for their research publications, recipients of outstanding student advisor awards, and numerous distinctions and awards for excellence in teaching. For example, Professor Anne Dougherty was awarded the outstanding faculty advisor for the College of Engineering and Applied Sciences. Assistant Professor, Dr. Per-Gunnar Martinsson was awarded an NSF-Career Award, one of the most prestigious awards from the National Science Foundation. This NSF honor is given to the best and brightest young scientists and mathematicians in the nation. Dr. Martinsson's NSF-Career award is a "first" for the Department

In closing, let us consider two additional forward looking efforts in the Department: The ORALS assessment Experiment led by Instructor Dr. Mary Nelson and the Department's VIGRE proposal led by Professor James Meiss. Both of these NSF proposal efforts share the goal of developing the capacity of the Department for students and faculty. The VIGRE proposal also is focused on developing research, "communities," around the following areas of significant interest: Renewable Energy, Climate Change and Bio-Technology.

The Department of Applied Mathematics at the University of Colorado at Boulder is increasingly well positioned with its excellent faculty and excellent students, along with its Vision, Mission, and Goals so that it will not only participate in this bright future, but also continue to develop and produce excellent scholar-students, excellent research, and excellent service to the State and the Nation. The best is yet to come. "Do more Math!"

Dr. James H. Curry
Department Chair

Dr. Anne Dougherty
Associate Chair

Departmental Activities

Undergraduate Education

Undergraduate education in the Department of Applied Mathematics provides students with broad-based preparation for the challenges and opportunities of today and tomorrow. Through courses, projects, research, and other educational activities, the Department provides unique experiences to its majors and minors. The Department also has a large teaching commitment since most undergraduate engineering majors are required to take four courses in Applied Mathematics.

Applied Mathematics Students Enter Math Modeling Contest

The art of creating and testing mathematical models of real-world problems is an important part of our undergraduate training. Undergraduate students are given an opportunity to showcase their mathematical, computational, and communication skills in the annual Mathematical Contest in Modeling (MCM), an international contest sponsored by The Consortium for Mathematics and its Applications (COMAP). Students from all science, math, and engineering majors are encouraged to enter and any undergraduate student, regardless of major, may participate; however, participants may not have a college degree.

The 2007 Math Modeling Contest took place February 8-12. Four teams of University of Colorado at Boulder students, a total of 12 students, and three faculty sponsors, Anne Dougherty and Bengt Fornberg from the Department of Applied Mathematics, and Mike Ritzwoller from the Department of Physics, participated in this activity. The contest began at 6:01 P.M. on Thursday, February 8 and ended at 6:00 P.M. Monday, February 12. Students worked in teams of three, using any inanimate reference sources to solve one of three possible problems. These problems frequently have business, engineering, or industrial origins.

Over 900 teams participated in the Math Modeling Contest. This year, as a result of 96 hours of hard work, two Applied Mathematics teams received Honorable Mention, two teams were rated Meritorious, and one team received the Ben Fusaro Award. This award is only presented to one team for utilizing the most creative solution and represents the first time an Applied Mathematics team has won this honor.

Team #1920 (Benjamin O. Barrow, Andrew F. Glugla, and John B. Shelton; with advisor Mike Ritzwoller of the Department of Physics) chose Problem A and received a rating of Meritorious along with the Ben Fusaro Award.

Team #1919 (Charles L. Ellison, Alexander C. Fletcher, Shelvin Rahimpour; with advisor Mike Mitzwoller of the Department of Physics) chose Problem B and received a rating of Meritorious.

Team #1917 (David Goluskin, Jordan A. Hachtel, Henry P. Romero; with advisor Bengt Fornberg of the Department of Applied Mathematics) chose Problem A and received Honorable Mention.

Team #1916 (Brandon M. Booth, Benjamin R. Safdi, and Kye M. Taylor; with advisor Anne Dougherty of the Department of Applied Mathematics) chose Problem A and received Honorable Mention.

Benjamin Safdi Receives Astronaut Scholarship Foundation Award

In a presentation given by Mercury 7 Astronaut and University of Colorado at Boulder Aerospace Alumni Scott Carpenter on Thursday, November 15, 2007, University of Colorado Applied Mathematics and Engineering Physics student Benjamin Safdi received a $10,000 award from the Astronaut Scholarship Foundation.

The Astronaut Scholarship Foundation was established by the six surviving original Mercury Astronauts in 1984 to help the United States retain a world leadership position in science and technology by providing scholarships to exceptional university-level students in the fields of science and engineering. Astronauts from the Gemini, Apollo, Skylab, and Space Shuttle programs, along with private benefactors, trustees, and university institutions later joined the Foundation in order to further assist in meeting the Foundation's goals. Scholarship recipients, known as Astronaut Scholars, have gone on to pursue careers as astronomers, biologists, chemists, consultants, engineers, entrepreneurs, inventors, mathematicians, military officers, physicists, professors, and research scientists. More than $2 million in scholarships have been awarded to over 212 deserving students since the program's inception.

Under the advising direction of Applied Mathematics Professor Harvey Segur, Safdi is co-authoring a paper with Segur on singular solutions of non-linear partial differential equations to appear in the December 2007 issue of Physical Review Letters. This family of equations appears in a diverse array of studies and fields including optics, Bose-Einstein Condensates, waves in deep water, plasmas, and black holes. In the paper, Segur and Safdi describe how they found a new kind of singularity not previously known to

exist. In addition to his Applied Mathematics research, Safdi works in the Physics Optics Lab and will co-author a paper with members of that department to appear in a forthcoming issue of Science. Safdi is an outstanding student with a 4.0 GPA and in his free time away from studies and research, is fluent in Japanese, a world traveler, and a competitive rock climber.

For further information on the Astronaut Scholarship foundation, visit: www.astronautscholarship.org.

Applied Mathematics Students Top In College of Engineering

Kristopher Tucker (BS/MS May 2007) was awarded the Academic Achievement Award at the May 2007 College of Engineering and Applied Science graduation ceremony. Tucker earned the highest GPA in the College of Engineering among graduating students.

Applied Mathematics undergraduate student Craig A. Fogle was recognized as the Outstanding Graduate for Research at the December 2007 College of Engineering and Applied Science graduation ceremony. Fogle completed a double major in Applied Mathematics and Engineering Physics.

Graduate Education

The role of the graduate program is to give students in-depth training in applied mathematics and to provide the skills necessary for success in industry, government laboratories, and academia. Different departments around the country use different definitions of “applied mathematics.” In this department, the areas of mathematical expertise are: scientific computation, physical applied mathematics, dynamical systems, analysis, statistics/probability, and mathematical biology. In addition, the Department maintains an active program of affiliated faculty. These are faculty members in other departments with an interest in applying mathematics within their own disciplines. A graduate student in Applied Mathematics can pursue a doctorate in Applied Mathematics with an affiliated faculty member as the thesis advisor, along with an Applied Mathematics co-advisor. A basic goal of this department is to seek out and develop new areas of application for mathematics and our affiliated faculty members play a crucial role in that process.

The department offers three formal interdisciplinary programs, all at the MS level.

- A Combined MA/MS with the Molecular, Cellular, and Developmental Biology Department (MCDB). The combined MA/MS is a three-year interdisciplinary program designed to produce students trained both in applied mathematics and in molecular biology. A student who completes this program can begin a career in the biological sciences with a very desirable combination of skills, or can continue on to a PhD either in APPM or in MCDB.

- An MS with a Computational Science and Engineering Track. This track is designed for a student in a participating department in science or engineering, with a strong interest in scientific computation and mathematical analysis. Under this plan, the student obtains an MS in APPM on the way to a PhD in the other department. Six other departments now participate in this program.

- Teacher-Licensure Option. An APPM graduate student can fulfill the outside-sequence requirement in the School of Education. By also meeting the requirements of that School, a student can obtain both an MS in applied mathematics and a license to teach mathematics in a secondary school (i.e., in middle through high school). More information about the graduate program is available at <http://amath.colorado.edu/programs/grad.html>

Enrollment Statistics

Enrollment in the courses offered by the Department continues at extremely high levels. It is particularly noteworthy that, given the faculty's small size, the Department teaches so many students. The statistics over the past sixteen years are as follows:

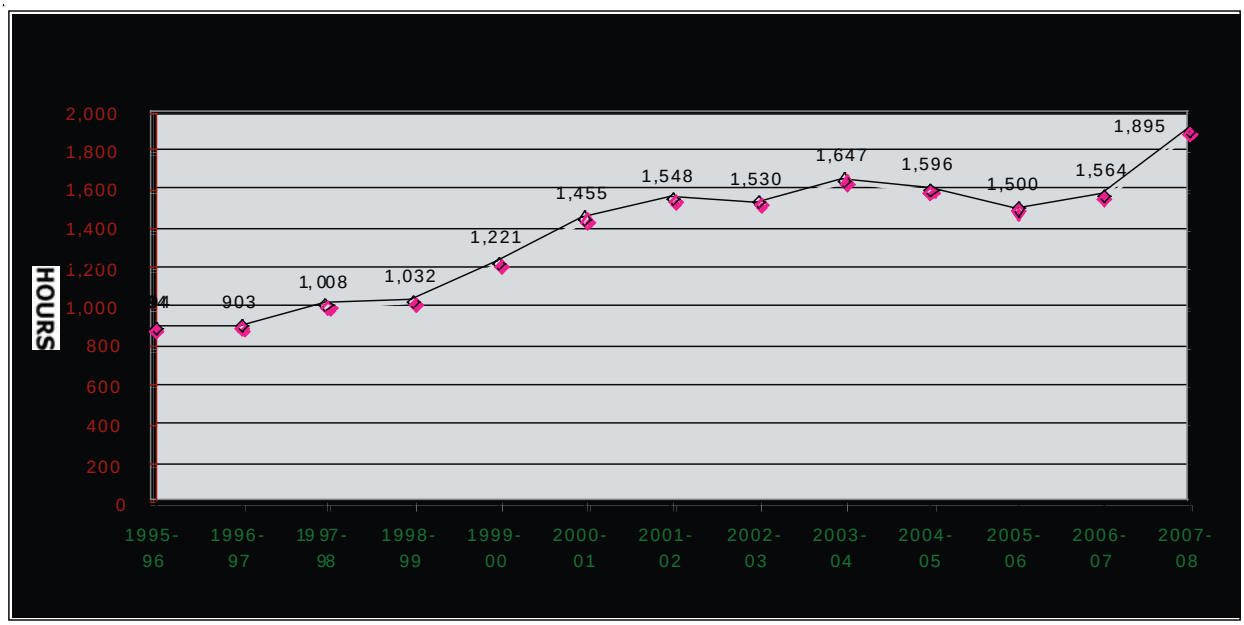
Year	Total Number of Enrolled Students in All Courses	Number of Enrolled Graduate Students	Number of Enrolled Undergraduate Majors	Number of Enrolled Undergraduate Minors
1991-92	2781	27	50	
1992-93	2797	28	47	
1993-94	2809	33	47	
1994-95	2670	39	51	
1995-96	2734	40	54	
1996-97	2973	46	52	
1997-98	3108/3323*	51	44	
1998-99	3172/3566*	49	54	
1999-00	3166/3529*	50	60	21
2000-01	3091/3517*	61	63	28
2001-02	3275/3701*	63	66	40
2002-03	3417/3878*	70**	69**	44**
2003-04	3414/3978*	75**	97**	44**
2004-05	3187/3664*	73**	108**	43**
2005-06	3650/4118*	70**	105**	54**
2006 (Calendar)	3690/4189*	76**	110**	57**
2007 (Calendar)	3947/4491*	86***	125**	65**

*The numbers in bold include all Calculus I and II Work Study Groups, as well as Calculus III Labs and Differential Equations Labs. Enrollment in our upper division courses has continued to increase. With projected increases in undergraduate enrollment, the Department continues to foresee enrollment increases in Applied Mathematics courses.

**Number of unduplicated students.

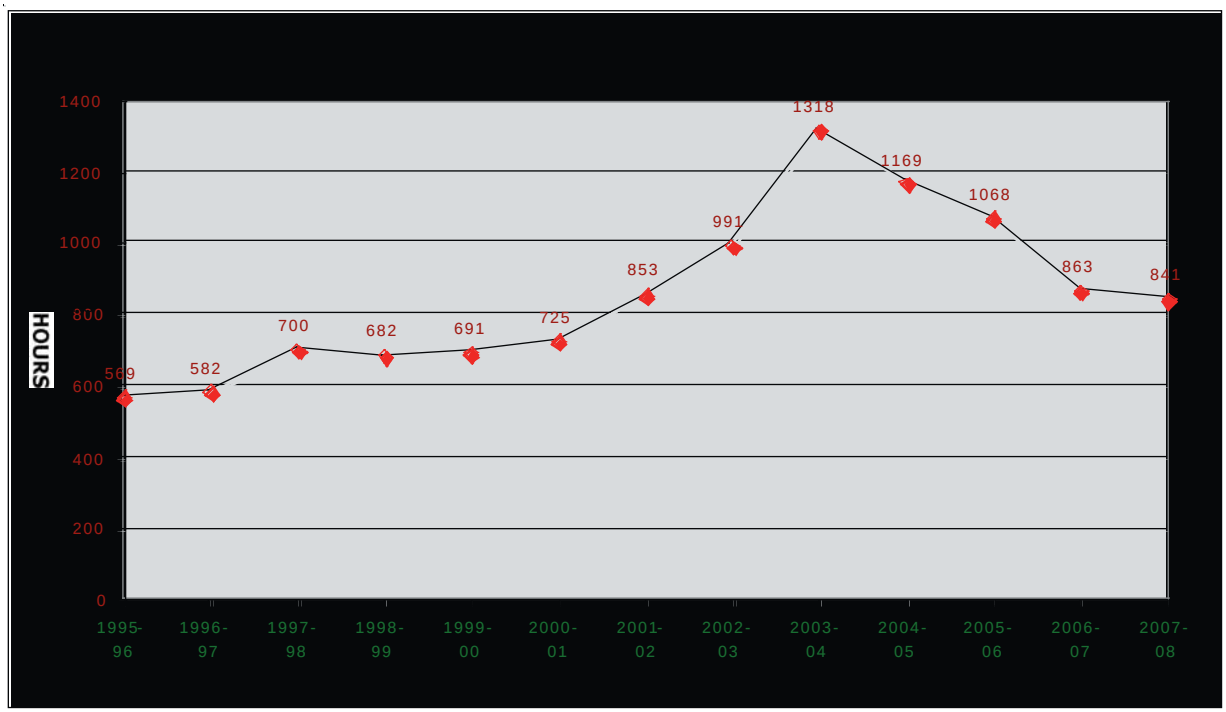
*** Spring 2007 had 64 graduate level students. Fall 2007 had 68 graduate level students. This shows a net gain of four students between academic years. In Fall 2007, 23 new students entered the program.

Undergraduate Enrolled Upper-Division Student Credit Hours



There is a general upward trend in undergraduate enrollment. Our higher-level Calculus and Differential Equations classes have been growing consistently. There is also a noticeable increase in minors over the last few years. This is a major factor in the increase in upper division student credit hours.

Graduate Enrolled Credit Hours



Graduates

May 2007

PhD

Chao Jin

Parallel Domain Decomposition Methods for Stochastic Partial Differential Equations and Analysis of Nonlinear Integral Equations

Advisor: Xiao-Chuan Cai and Congming Li

Brendan Sheehan

Multigrid Methods for Isotropic Neutron Transport

Advisor: Thomas Manteuffel

MS

Danielle Bousquet

Peter Charbonneau

Jose Garcia

Determination of the Magnetic Field of the Sun's Photosphere Based on the Solution of the Radiative Transfer Equation in a Milne-Eddington Atmosphere

Advisor: Thomas Manteuffel

Jennifer Fox

James Lawrence

Pete Schmitt

David Wilkens

BS/MS

Nathan Balk

Concept Questions in Calculus 1: Pinpointing Students' Difficulties and Misconceptions

Advisor: Mary Nelson

Bradley Klingenberg

Non-negative Matrix Factorization: The Extreme Data Property and Issues of Ill-Posedness

Advisor: James Curry and Anne Dougherty

Kristopher Tucker

Query-seeded Concept Decompositions and a New Approach to Performance Quantification in Information Retrieval

Advisor: James Curry and Anne Dougherty

BS

Brandon Booth
Eric Burns
Jesus Hierro-Salinas
Amy Hirschman
Thomas Josephson
Gisella Kagy
Rachel Keyser
Andrew Ledvina
John Lewis
McCall Mullen
Salvatore Rigatti
Henry Romero
Christopher Smith
Kate Spooner
John Steffan
Bryan Wren

August 2007

PhD

Jisun Lim

The Qualitative Study of a Chemical Reaction Diffusion System and Some Integral Equations
Advisor: Congming Li

Jonathan Pietarila-Graham

Regularizations as Subgrid Models for Turbulent Flows
Advisor: Annick Pouquet

Thaned Rojsiraphisal

A Study of the Variability in the North Indian Ocean
Advisor: Lakshmi Kantha

Jian Wang

Recovering Bayesian Networks with Applications to Gene Regulatory Networks
Advisor: Jem Corcoran

Julia Zuev

Recent Advances in Numerical Partial Differential Equations
Advisor: Bengt Fornberg

BS/MS

Lauren Christine Anderson

Isolation and Implementation of the Dynamical Core from the German Weather Service's Numerical Weather Prediction Model
Advisor: Jeffrey Forbes

Rachel Anne Danson

A Survey of Tools Used to Analyze the Genesis of Event Related Potentials
Advisor: James Curry and Anne Dougherty

Laura Alexandra Waterbury

A Mathematical Model of Biological Signaling Networks and Network Characteristics Correlated With Signaling Behavior
Advisor: Meredith Betterton

BS

Erin Lanae Best | Hsing-Ting Chen | Jitendra Sameera Wijesinghe

December 2007

PhD

Wenjin Mao

Dimension Jumping and Auxiliary Variable Techniques for Markov Chain Monte Carlo Algorithms
Advisor: Jem Corcoran

MS

Christopher Gibbons

Determination of Power and Sample Size for Levene's Test
Advisor: Jeffrey Luftig

Josh Hemann

Assessing Positive Matrix Factorization Model Fit: A New Method to Estimate Variability and Bias in Factor Contributions at the Daily Time Scale
Advisor: Jem Corcoran

MS (cont.)

Curtis Higgins

BS

Craig Fogle
David Goluskin
Brandon Gonzales
David Roth
Tedy Weber

Changes in Personnel

Tiejun Tong Joins Department as Assistant Professor

Dr. Tiejun Tong was hired to fill the Assistant Professor position in the area of Statistics, his appointment beginning in the fall semester of 2007. Dr. Tong received his PhD in Statistics from the University of California, Santa Barbara in 2005. He received a BS in Electrical Engineering (1998) and an MS in Statistics (2001) from the University of Science and Technology of China. Prior to joining the Department of Applied Mathematics, Dr. Tong was a Postdoctoral Associate at Yale University. His research interests include nonparametric regression methods including spline smoothing, mixed effects models, genetics and genomics, and gene expression microarray data analysis. In his free time, Tong enjoys fishing, swimming, tennis, bridge, hiking, and watching NBA basketball. Tong and his wife are expecting their first child in March of 2008.

Luis Melara Joins Department as Visiting Instructor

Due to the increased enrollment of Engineering students and the support of the College of Engineering, the Department of Applied Mathematics was able to establish a Visiting Instructor position. Dr. Luis Melara was hired into this two-year position, his appointment beginning in the fall semester of 2007. Dr. Melara received his MA (2001) and PhD (2003) in Computational and Applied Mathematics from Rice University. He obtained a BS in Applied Mathematics with Specialization in Computing in 1996 from the University of California, Los Angeles. Prior to joining the Department, Dr. Melara was an Assistant Professor in the Department of Mathematics and Computer Science at Colorado College. In addition to teaching, Dr. Melara serves as the faculty advisor for the undergraduate SIAM chapter at the University of Colorado at Boulder.

Applied Mathematics Welcomes New Staff Members

Susan Pryor – Graduate Program Assistant
David Hanley – Accounting Technician and Undergraduate Program Assistant
Ian Campbell – Internet/Publications Designer and Art Director

Faculty Awards and Honors

Mark Ablowitz Still Most Highly Cited

Dr. Mark Ablowitz was once again listed as one of the most highly cited researchers in the field of Mathematics by the ISI Web of Science.

James Curry Serves as J.R. Woodhull/Logicon Teaching Professor and NSF PI

Dr. James Curry continues to serve as the J.R. Woodhull/Logicon Teaching Professor in Applied Mathematics and Trustee of the CU Foundation. Additionally, Dr. Curry is the Principal Investigator (PI) on a proposal to the National Science Foundation (NSF) entitled EMSW21-MCTP: Colorado Advantage. This proposal, to enhance and foster research for undergraduate Applied Mathematics majors, was submitted on the 12th of October 2005, awarded in 2006, and is currently underway.

Anne Dougherty Receives Faculty Outstanding Advisor Award

Dr. Anne Dougherty was awarded the Faculty Outstanding Advisor Award from the University of Colorado College of Engineering. Dr. Dougherty was also recognized in the Summer 2007 issue of Colorado Engineer Magazine, a publication created by the University of Colorado Engineering School.

Jim Meiss on Sabbatical

Dr. Jim Meiss took a year sabbatical in 2007. He spent his spring semester at the Math Sciences Research Institute in Berkeley as a Research Professor in Mathematics. He then traveled to and around England, Austin, and several other locales before returning to the Department for 2008.

Mary Nelson Receives Awards for her Commitment to Success

Dr. Mary Nelson received two awards recognizing her commitment to success at the University of Colorado at Boulder. She was awarded the CU Multicultural Engineering Program faculty award for her commitment to the success of Multicultural Engineering Program (MEP) scholars, and also received the University of Colorado at Boulder Leadership, Excellence, Achievement, and Diversity Alliance (CU LEAD) Faculty Appreciation Award for her work with CU-LEAD Scholars. Dr. Nelson is a member of the Defense Agency Committee on Women in the Services (DACOWITS), 2005-2007. She also serves as the Chair for this national committee.

Adam Norris Receives John and Mercedes Peebles Award

In 2007, Dr. Adam Norris, an Applied Mathematics instructor, was awarded the John and Mercedes Peebles Award for Innovation in Education. The Innovation in Education award recipient was nominated and decided by student vote and presented at the May 2007 Recognition Ceremony.

Faculty, Instructors, Research Associates, Visitors, and Staff

Core Faculty, Instructors, and Research Associates

Cory Ahrens – *Postdoctoral Associate;* PhD, University of Colorado at Boulder. Nonlinear Waves, Fast Computational Algorithms, Inverse Problems.

Mark J. Ablowitz – *Professor; College of Arts and Sciences Professor of Distinction;* PhD, Massachusetts Institute of Technology. Partial Differential Equations, Solutions, Nonlinear Waves.

Jerrold Bebernes – *Professor Emeritus;* PhD, University of Nebraska. Differential Equations, Reaction Diffusion Systems, Combustion Theory, Analysis.

Gregory Beylkin – *Professor;* PhD, New York University. Computational Methods, Wavelets, Geophysical Inverse Scattering.

Cathy Bishop – *Lecturer;* MS, University of Colorado. Computer Science, Software Development and Training.

David Bortz – *Assistant Professor;* Ph.D, North Carolina State University. Biological Systems.

Marian Brezina – *Postdoctoral Associate;* PhD, University of Colorado at Denver. Multigrid Methods, Scalable Algorithms, Parallel Computing.

Jem Corcoran – *Associate Professor;* PhD, Colorado State University. Applied Stochastic Processes, Perfect Simulation, Statistical Physics.

James H. Curry – *Department Chair; Professor; J. R. Woodhull Logicon Teaching Professor of Applied Mathematics;* PhD, University of California at Berkeley. Dynamical Systems, Numerical Methods, Nonlinear Equations.

Anne Dougherty – *Associate Department Chair; Chair of Undergraduate Studies: Senior Instructor;* PhD, University of Wisconsin, Madison. Applied Probability, Stochastic Processes.

Robert Easton – *Professor Emeritus;* PhD, University of Wisconsin. Dynamical Systems, Hamiltonian Mechanics.

Bengt Fornberg – *Professor;* PhD, Uppsala University, Sweden. Numerical Analysis, Computations of Wave Phenomena.

Ute C. Herzfeld – *Lecturer;* PhD, University of Mainz, Germany. Geostatistical Analysis of Remote Sensing Data, applications in Glaciology, Marine Geophysics and Global Change Research.

Theodoros Horikis – *Postdoctoral Associate;* PhD, Imperial College, England.

Keith Julien – *Chair of Graduate Studies; Associate Professor;* PhD, Cambridge University, United Kingdom. Mathematical and Computational Fluid Dynamics, Dynamical Systems Theory.

Congming Li – *Professor;* PhD, New York University. Elliptic Partial Differential Equations.

Manuel Lladser – *Assistant Professor;* PhD, Ohio State University. Probability Theory.

Tomas Manteuffel – *Professor;* PhD, University of Illinois, Urbana. Computational Math, Numerical Linear Algebra, Iterative Mathematics, Numerical Solution of Partial Differential Equations, Parallel Computation, Computational Fluid Dynamics.

Per-Gunnar Martinsson – *Assistant Professor;* PhD, University of Texas at Austin. Numerical Analysis, Modeling of Heterogeneous Media, Computational Biochemistry.

Stephen McCormick – *Professor;* PhD, University of Southern California. Computational Math, Numerical Partial Differential Equations, Multigrid Methods, Parallel Computation, computational Fluids, Tomography, Electromagnetics, Biomathematics.

James D. Meiss – *Professor;* PhD, University of California at Berkeley. Dynamical Systems, Hamiltonian Mechanics, Plasma Physics.

Luis Melara – *Visiting Instructor;* PhD, Rice University. Computational and Applied Mathematics.

Lucas Monzon – *Postdoctoral Associate;* PhD, Yale University. Harmonic Analysis, Wavelets.

Mary Nelson – *Instructor;* PhD, University of Colorado at Boulder. Assessment.

J. Adam Norris – *Instructor;* PhD, University of Colorado at Boulder. Phase Change Kinetics, Perturbation Methods, Numerical Methods.

Fernando Perez – *Postdoctoral Associate;* PhD, University of Colorado at Boulder. Numerical Field Theory, Fast Numerical Algorithms.

Barbara Prinari – *Visiting Professor;* PhD, S.I.S.S.A. Italy. KP Equations, NLS Systems.

Anca Radulescu – *Instructor;* PhD, State University of New York. Clinical Neuroscience, Theoretical Neuroscience, Dynamical Systems.

John Ruge – *Postdoctoral Associate;* PhD, Colorado State University. Algebraic Multigrid Methods.

Kristian Sandberg – *Postdoctoral Associate;* PhD, University of Colorado at Boulder. Wave Propagation, Tomography, Image Processing.

Harvey Segur – *Professor;* PhD, University of California at Berkeley. Nonlinear Waves, Fluid Dynamics, Asymptotic Methods.

Tiejun Tong – *Assistant Professor;* PhD, University of California, Santa Barbara. Statistics.

John Williamson – *Professor Emeritus;* PhD, University of Minnesota. Statistical Methods in Genetics, Applied Probability, Mathematical Statistics.

Affiliated Faculty

Steve C. Arendt – *Colorado Research Associates;* Theoretical Fluid Dynamics.

Mark Balas – *Aerospace Engineering, Electrical Engineering;* Control of Large Scale and Distributed Parameter Systems, System Identification and Adaptive Control, Nonlinear Partial Differential Equations, Numerical Methods for Model Reduction, Controller Synthesis and Stability Analysis.

Elizabeth Bradley – *Computer Science;* Scientific Computation, Artificial Intelligence, Nonlinear Dynamics.

Richard Byrd – *Computer Science;* Numerical Computation, Optimization Algorithms.

Xiao-Chuan Cai – *Computer Science;* Numerical and Parallel Computations.

John Cary – *Physics;* Nonlinear Dynamics, Plasma Physics, Accelerator and Space Physics.

Claudio Cioffi-Revilla – *Political Science;* Long-Range Analysis of War.

Senarath P. de Alwis – *Physics;* Theoretical Physics, String Theory, Quantum Gravity.

Thomas DeGrand – *Physics;* Numerical Methods for Quantum Field Theory.

Fred Glover – *College of Business;* Large-scale Systems, Applied Artificial Intelligence, Optimization Models.

Martin Goldman – *Physics;* Plasma Physics, Nonlinear Waves, Turbulence.

Vijay K. Gupta – *Civil, Environmental, and Architectural Engineering;* Hydrology, Stochastic Processes, Fluid Dynamics.

Ute C. Herzfeld – *Institute of Arctic and Alpine Research (INSTAAR);* Geostatistical Analysis of Remote Sensing Data, applications in Glaciology, Marine Geophysics and Global Change Research.

Christine M. Hrenya – *Chemical Engineering;* Gas-Particle Fluidization, Granular Flow Mechanics, Turbulent Flows, Computational Fluid Mechanics.

Tissa Illangasekare – *Environmental Science and Engineering Division, Colorado School of Mines;* Mathematical Modeling of Flow and Transport in Porous and Fractured Media, Computational Methods, Numerical Modeling.

Elizabeth Jessup – *Computer Science;* Numerical Computation, Parallel Computation.

David R. Kassoy – *Mechanical Engineering;* Fluid Dynamics, Combustion Theory, Thermal Science.

Manuel Laguna – *College of Business;* Exact and Heuristic Methods for Combinatorial Optimization Problems, Network Flow Programming, Applied Artificial Intelligence.

Michael Lightner – *Electrical and Computer Engineering;* Very Large Scale Integration (VLSI), Discrete Mathematics, Graph Theory.

Oliver McBryan – *Computer Science;* Parallel computation, Graphics and Visualization, Computational Fluid Dynamics.

Kamran Mohseni – *Aerospace Engineering Sciences;* Physical Applied Mathematics.

Andrew Moore – *Atmospheric and Oceanic Sciences (ATOC);* Ocean Atmosphere Modeling.

Doug Nychka – *Geophysical Statistics Project, National Center for Atmospheric Research (NCAR);* Geophysical Statistics.

Lev Ostrovsky – *National Oceanic and Atmospheric Administration (NOAA);* Nonlinear Waves, Fluid Dynamics, Oceanography, Acoustics.

K. C. Park – *Aerospace Engineering Sciences;* Parallel computation, Structural vibrations.

Scott Parker – *Physics;* Plasma Physics.

Carl E. Patton – *Physics;* Solid State Physics.

Annick Poquet – *National Center for Atmospheric Research (NCAR);* Physical Applied Math, Weather Prediction Models.

Harihar Rajaram – *Civil, Environmental, and Architectural Engineering;* Fluid Flow, Transport Phenomena and Reactive Processes in Geologic/Geochemical Phenomena.

Thomas F. Rutherford – *Economics;* Formulation and Analysis of Large-Scale Economic Equilibrium Models.

Robert Sani – *Chemical and Biological Engineering;* Computational Fluid Dynamics, Free and Moving Boundary Problems, Stability of Systems.

Robert B. Schnabel – *Computer Science;* Numerical Methods for Optimization, Nonlinear Equations, Parallel Scientific Computation.

J. Michael Shull – *Astrophysical and Planetary Sciences (APS);* Theoretical Astrophysics.

Rex Skodje – *Chemistry;* Nonlinear Dynamics, Quantum Chaos, Molecular Dynamics.

Renjeng Su – *Electrical and Computer Engineering;* Nonlinear Dynamics Modeling, Control, Robotics.

Juri Toomre – *Astrophysical and Planetary Sciences (APS);* Astrophysics, Mathematical Modeling, Numerical Simulation.

Henry Tufo – *Computer Science;* Computational Science, Parallel Algorithms for High Performance Computers.

Oleg V. Vasilyev – *Mechanical Engineering;* Computational Fluid Mechanics, Large Eddy Simulations of Turbulent Flow, Wavelet Methods for Modeling and Simulation of Complex Multi-Scale Phenomena, Thermal Convection Flows.

Thomas Warner – *Atmospheric and Oceanic Sciences (ATOC);* Numerical Modeling of Mesoscal Atmospheric Phenomena; Marine Meteorology.

Patrick Weidman – *Mechanical Engineering;* Hydrodynamic Stability, Solitary Waves and their Interaction, Counter-Rotating Vortex Rings, Stokes Flow on Dendrite Models, Similarity Flows in Natural Convection, Fluid Sloshing in Freely Suspended Containers.

Jeffrey B. Weiss – *Astrophysical and Planetary Sciences (APS), Atmospheric and Oceanic Sciences (ATOC);* Geophysical Fluid Mechanics, Turbulence, and Climate predictability.

Joseph Werne – *Colorado Research Associates;* Fluid dynamics.

Visitors in 2007

Tom Bogdan - National Oceanic and Atmospheric Administration (NOAA), Boulder, CO. January 19, 2007

Larry Hunter - University of Colorado at Denver and Health Sciences Center, Denver, CO. January 26, 2007

Hans De Sterck - University of Waterloo, Waterloo, ON, Canada. January 30, *Sponsor: Tom Manteuffel and Steve McCormick*

Gadi Fibich - Tel Aviv University, Tel Aviv, Israel. January 30, 2007

Andrew J. Christlieb - Michigan State University, East Lansing, MI. February 5, 2007

Mingzhong Wu - Colorado State University, Fort Collins, CO. February 27, 2007.

Harry Swinney - University of Texas at Austin, Austin, TX; February 29, 2007

Leslie Greengard - New York University, New York City, NY. March 2, 2007

Matteo Sommacal – Post Doctoral Fellow, Perugia, Italy. March 6 through May 29, *sponsor: Mark Ablowitz.*

Peter Lax - New York University, New York City, NY. March 9, 2007

Serpil Kocabiyik - Memorial University of Newfoundland, St. John's, NL, Canada. March 13, 2007.

Alexander Tovbis - University of Central Florida, Orlando, FL. March 13, 2007.

Peter Teets - Former President of Lockheed Martin, Former Under Secretary of the United States Air Force. March 16, 2007

William L. Kath - Northwestern University, Chicago, IL. April 3, 2007.

Karima Khusnutdinova - Loughborough University, Leicestershire, UK. April 10, 2007

Natasha Flyer - National Center for Atmospheric Research (NCAR), Boulder, CO. April 13, 2007

Mark Bradley - Colorado State University, Fort Collins, CO. April 24, 2007.

Dongbin Xiu - Purdue University, West Lafayette, IN. April 27, 2007

Bob Eisenberg - Rush University Medical Center, Chicago, IL. May 4, 2007

Ken Miller – Wichita State University, Wichita KS. August 1 through December 1, *sponsor: Bengt Fornberg*.

Elisabeth Larsson – Uppsla University, Sweden. August 25 through September 3, *sponsor: Bengt Fornberg*.

Cleve Moler - Math Works, Inc., Natick, MA. September 7, 2007

Barbra Prinari - Università di Lecce, Lecce, Italy. September 11, 2007.

Juan G. Restrepo - Northeastern University, Boston, MA. September 14, 2007

Joe Grear - Lawrence Berkeley National Laboratory, Berkeley, CA. 2007 September 21, 2007

Travis Austin - Los Alamos National Laboratory, Los Alamos, NM. September 28, 2007.

Luis Chacon - Los Alamos National Laboratory, Los Alamos, NM. October 12, 2007.

John R. Cary - Tech X Corporation, Boulder, CO. October 19 2007.

Randy LeVeque - University of Washington, Seattle, WA. October 26, 2007

Mark Hoefer - United States Department of Commerce, National Institute of Standards and Technology (NIST). October 30, 2007

Mike Wakin - California Institute of Technology, Pasadena, CA. November 2, 2007.

Oleg Emanouilov - Colorado State University, Fort Collins, CO. November 6, 2007.

Igor Krichever - Columbia University, New York City, NY., November 6, 2007.

Martin Mohlenkamp – Ohio University, Athens, OH. November 27 through December 7, sponsor: Gregory Beylkin.

James Brannick - Penn State University, University Park, PA. December 7, 2007.

Staff

Marcia Flynt – Department Administrator.

Susan Pryor – Graduate Program Assistant.

David Hanley – Accounting Technician and Undergraduate Program Assistant.

Ian Campbell – Internet/Publications Designer and Art Director.

Loren Ellison, Colin Misare, Scott Portnoy, Joann Yecies - Part Time Student Assistants.

Weekly Colloquia and Seminars

Applied Mathematics Colloquium

The Applied Mathematics Colloquium series was held on Friday afternoons during the academic year at 3:00 pm, with refreshments preceding at 2:30 pm outside the Applied Mathematics conference room, ECOT 226. Bengt Fornberg chaired and organized the Colloquium Series during the Spring 2007 semester. Tom Manteuffel chaired and organized the Colloquium Series during the Fall 2007 semester.

Tom Bogdan, National Oceanic and Atmospheric Administration (NOAA), Space Environment Center, 2007 January 19, *A Tale of Three Waves: Coupled Wave Equations Used in the 'Sounding' of Magnetized Atmospheres.*

Larry Hunter, University of Colorado at Denver and Health Sciences Center, Center for Computational Pharmacology, 2007 January 26, *Staying at the Forefront of Biomedical Knowledge: Text Mining and Semantic Data Integration.*

David Kassoy, University of Colorado at Boulder, Department of Mechanical Engineering, 2007 February 2, *Confessions of a Master Perturbator: A Matter of Scales.*

Scott Elkington, University of Colorado at Boulder, Laboratory for Atmospheric and Space Physics (LASP), 2007 February 9, *Physical Models of the Earth's Space Radiation Environment.*

Jean Hertzberg, University of Colorado at Boulder, Department of Mechanical Engineering, 2007 February 16, *Beautiful Physics from Ordinary Fluids.*

Ken Miller, Wichita State University, Department of Mathematics, 2007 February 23, *Steady Axisymmetric Vortex Flows*.

Harry Swinney, University of Texas at Austin, Department of Physics, 2007 February 29.

Special Celebration: Applied Mathematics One Hundred Years

Leslie Greengard, New York University, Courant Institute of Mathematical Sciences, 2007 March 2, *One Hundred Years of Electromagnetic Waves: Physics, Simulation, and Design.*

Peter Lax, New York University, Courant Institute of Mathematical Sciences, 2007 March 9, *One Hundred Years Celebration: Mathematics and Physics Intertwined.*

Peter Teets, Former President of Locheed Martin, Former Under Secretary of the United States Air Force, 2007 March 16, *Applied Mathematics: Gateway to Success.*

Bengt Fornberg, University of Colorado at Boulder, Department of Applied Mathematics, 2007 April 6, *Radial Basis Functions for Solving Partial Differential Equations - Some Recent Developments.*

Natasha Flyer, National Center for Atmospheric Research (NCAR), Institute for Mathematics Applied to Geosciences (IMAGe), 2007 April 13, *Modeling Simple Atmospheric Flows on the Sphere Using Radial Basis Functions.*

Webster Cash, University of Colorado at Boulder, Department of Astrophysical and Planetary Sciences (APS), 2007 April 20, *Struggling With the Mathematics of Diffraction and The Search for Life In the Universe.*

Dongbin Xiu, Perdue University, Department of Earth and Atmospheric Sciences, 2007 April 27, *Efficient Methods for Numerical Simulations With Uncertainty.*

Bob Eisenberg, Rush University Medical Center, Department of Molecular Biophysics and Psychology, 2007 May 4, *Ion Channels: Devices for Atomic Control of Molecular Transport.*

Cleve Moler, Math Works, Inc., 2007 September 7, *Evolution of MATLAB.*

Juan G. Restrepo, Northeastern University, Center for Interdisciplinary Research On Complex Systems, 2007 September 14, *Dynamics on Complex Networks: Synchronization, Percolation and the Dynamical Importance of Nodes and Links.*

Joe Grear, Lawrence Berkeley National Laboratory, 2007 September 21, *John von Neumann and the Origins of Scientific Computing*.

Travis Austin, Los Alamos National Laboratory, 2007 September 28, *Cardiac Activation Modeling Using Fast Multilevel Solvers.*

Luis Chacon, Los Alamos National Laboratory, 2007 October 12, *On Fully Implicit Methods for Extended Magnetohydrodynamics.*

John R. Cary, Tech X Corperation, 2007 October 19, *Self-Consistent Electromagnetic Modeling With Boundaries.*

Randy LeVeque, University of Washington, 2007 October 26, *Shock Wave Propagation in Tissue and Bone.*

Mike Wakin, California Institute of Technology, 2007 November 2, *The Geometry of Compressed Sensing.*

Francois G. Meyer, University of Colorado at Boulder, 2007 November 9, *We Can Read Your Mind: The Decoding of fMRI Datasets*.

Liz Bradley, University of Colorado at Boulder, 2007 November 16, *Dynamics of Data Assimilation.*

Greg Tucker, University of Colorado at Boulder, 2007 November 30, *Numerical Modeling of Landscape Evolution.*

James Brannick, Penn State University, 2007 December 7, *Multigrid Solvers for Lattice QCD.*

Nonlinear Waves Seminars

The Applied Mathematics Nonlinear Waves seminars were held on Tuesday afternoons during the academic year at 4:00 P.M. The seminars were offered in association with APPM 7300, ***Nonlinear Waves and Integrable Equations.*** *Mark Ablowitz chaired and organized the Seminar Series, in association with Douglas Baldwin.*

Gadi Fibich, School of Mathematical Sciences, Tel Aviv, Department of Applied Mathematics, 2007 January 30, New Singular Solutions of the Nonlinear Schrodinger Equation (NLS), *Waves in Nonlinear Lattices: Ultrashort Optical Pulses and Bose-Einstein Condensates.*

Oren Cohen, University of Colorado at Boulder, JILA, 2007 February 6, *All-Optical control of High Harmonic Generation.*

Sean Nixon, University of Colorado at Boulder, Department of Applied Mathematics, 2007 February 13, *Crowdy's Extension of the Schawrz-Christoffel Mapping to Multiply Connected Domains.*

Oren Cohen, University of Colorado at Boulder, JILA, 2007 February 20, *Optical spatial Solutions in Highly-Nonlocal Nonlinear Media.*

Mingzhong Wu, Colorado State University, Department of Physics, 2007 February 27, *Observations of Fermi-Pasta-Ulam Recurrence.*

Matteo Sommacal, Università di Perugia, Dipartimento di Matematica, 2007 March 6, *Semi-Line Solutions of a Nonlinear Heat Conduction Problem.*

Alexander Tovbis, University of Central Florida, Department of Mathematics, 2007 March 13, *Semiclassical (Zero Dispersion) Limit for Focusing Nonlinear Schroedinger Equation (NLS).*

William L. Kath, Northwestern University, Engineering Sciences and Applied Mathematics, 2007 April 3, *Methods for Simulating Rare Events in Soliton-Based Lightwave Systems The Gating of Dendritic Spikes in Hippocampal CA1 Pyramidal Neurons.*

Karima Khusnutdinova, Loughborough University, Department of Mathematical Sciences, 2007 April 10, *A Hierarchy of Weakly Nonlinear Models for Multi-Phase Wavetrains and Energy Exchange in a Two-Component System.*

Mark Bradley, Colorado State University, Department of Physics, 2007 April 24.

Barbra Prinari, Università di Lecce, Dipartimento di Fisica and Sezione INFN, 2007 September 11, *Analyzing Quality with Generalized Kinetic Models.*

Yeon Kil Jung, University of Colorado at Boulder, Department of Applied Mathematics, 2007 September 18, *Non-Linear Dispersive Wave Propagation and Reflection in Complicated Bottom Profiles.*

Cory Ahrens, University of Colorado at Boulder, Department of Applied Mathematics, 2007 October 9, *An Informal Talk: A Brief Introduction to Inverse Problems.*

Ute C. Hertzfeld, University of Colorado at Boulder, Department of Applied Mathematics, 2007 October 16, *Identification of Surface Features in Remote-Sensing Signals.*

Mark Hoefer, United States Department of Commerce, National Institute of Standards and Technology (NIST), 2007 October 30, *Waves in Nanomagnets.*

Oleg Emanouilov, Colorado State University, Department of Mathematics, 2007 November 6, *Controllability and Observability of Evolution Equations.*

Igor Krichever, Columbia University, Department of Mathematics, 2007 November 6, *Isomonodromy Transformation and Analytic Theory of Difference Equation.*

Computational Mathematics Seminars

The Applied Mathematics Computational Mathematics seminars were held on Tuesday mornings during the academic year at 10:00 A.M. , at 1320 Grandview Terrace - the headquarters of the department's Computational Mathematics group. The seminars were offered in association with APPM 8600, ***Joint Computational Mathematics Seminar.*** *Steve McCormick chaired and organized the Seminar Series.*

Hans De Sterck, University of Waterloo, 2007 January 30, *Markov Chains and Web ranking: A Multilevel Adaptive Aggregation Method.*

Andrew J. Christlieb, Michigan State University, 2007 February 5, *Simulations of Plasma Dynamics Using a Grid Free Technique.*

Serpil Kocabiyik, Memorial University of Newfoundland, 2007 March 13, *Numerical Simulation of Free Surface Flow Past an Oscillating Cylinder.*

Jose Garcia, University of Colorado, 2007 April 17, *Determination of the Magnetic Field of the Sun's Photosphere Based on the Solution of the Relative Transfer Equation in a Milne-Eddington Atmosphere.*

Franck Vernerey, University of Colorado at Boulder, Department of Civil, Environmental, and Architectural Engineering, 2007 August 28, *Multiscale Problems in Solid Mechanics and Numerical Strategies.*

Mike Levy, University of Colorado at Boulder, 2007 September 18, *A High-order Galerkin Solver for the Global Shallow Water Equations.*

Dusan Odstrcil, University of Colorado at Boulder, National Oceanic and Atmospheric Administration (NOAA), Space Environment Center, 2007 October 2, *Challenges in Magnetohydrodynamic Modeling of Solar Wind Transients with Application to Space Weather Forecasting.*

James Adler, University of Colorado at Boulder, 2007 October 9, *FOSLS-AMG on a 2D Reduced Resistive MHD Problem.*

Adrianna Gillman, University of Colorado at Boulder, 2007 October 23, *The Numerical Performance of a Mixed-hybrid Type Solution Methodology for Solving High-frequency Helmholtz Problems.*

Markus Pflaum, University of Colorado at Boulder, 2007 October 30, *Pseudodifferential Operators With A View Towards the Singular Setting.*

Chris Woods, University of Colorado at Boulder, 2007 November 13, *Exploration of Mechanistic Changes In Vascular Structure Associated With Pulmonary Hypertension Modeled With CFD.*

Dynamics Seminars

The Applied Mathematics Dynamics seminars were held on Thursday afternoons during the academic year at 2:00 P.M. The seminars were offered in association with APPM 8100, ***Seminar in Dynamical Systems.*** *David Bortz, Keith Julien, and James Meiss co-chaired and organized the Seminar Series.*

Anca Radulescu, University of Colorado at Boulder, 2007 February 8.

Nahum Aray, University of Colorado at Boulder, Department of Physics, 2007 February 15.

Glen Stewart, University of Colorado at Boulder, Laboratory for Atmospheric and Space Physics, 2007 March 1.

Jillian Hartford, University of Colorado at Boulder, Department of Civil Engineering, 2007 March 22.

Luis Melara, Colorado College, 2007 April 12.

Joe Kubitscheck, University of Colorado at Boulder, Department of Mechanical Engineering, 2007 April 19.

Juan Restrepo, Northeastern University, 2007 September 13, *Synchronization in Large Networks of Dynamical Systems.*

Robert W. Easton, University of Colorado at Boulder, 2007 September 20, *Rational Decisions in an Uncertain World.*

James Meiss, University of Colorado at Boulder, 2007 September 27, *Some Dynamics of Volume Preserving Maps.*

Manuel Lladser, University of Colorado at Boulder, 2007 October 11, *Sufficient Markovian Embeddings of Non-Markovian Sandom Sequences.*

Michael Watson, University of Colorado at Boulder, 2007 October 18, *Pseudo-Inverses and Linear Stability Analysis.*

Gregory P. Chini, University of New Hampshire, 2007 October 25, *Asymptotic Analysis of Strongly Nonlinear Convection in the Ocean Surface Mixed Layer.*

Benjamin Jamroz, University of Colorado at Boulder, 2007 November 1, *Reduced Modeling of the Magnetorotational Instability.*

Glen Stewart, University of Colorado at Boulder, Laboratory for Atmospheric and Space Physics (LASP), 2007 November 8, *Coexistence of Liquid and Vapor Phases in Saturn's Rings.*

Colleen Webb, Colorado State University, Biology, 2007 November 15, *The Role of Spatial Modularity In Ecosystem Robustness.*

John Younger, University of Michigan, Department of Emergency Medicine, 2007 November 29, *Dynamics of Blood Stream Infection.*

Jutta Bikowski, Colorado State University, Department of Mathematics, 2007 December 6, *The Conductivity Problem: Calderon's Method and Direct Reconstructions.*

Undergraduate and Graduate Organizations

Society for Industrial and Applied Mathematics (SIAM)

The University of Colorado at Boulder undergraduate chapter of the Society for Industrial and Applied Mathematics (SIAM) was founded to promote interactions between Applied Mathematics students and faculty. Society functions include technical presentations by students, faculty, and industry speakers, field trips and student/faculty social events –all designed to introduce undergraduates to the widespread use of applied mathematics in engineering and the sciences. All interested students, from any major, are encouraged to participate in SIAM-sponsored events.

The graduate student chapter of SIAM at the University of Colorado at Boulder is a low-pressure, informal setting for discussing and learning about applied mathematics. The graduate student chapter holds regular meetings every other Thursday throughout the academic year. Faculty are not allowed at these meetings and the atmosphere is very low-key so that students can feel free to ask questions that they may not otherwise address to faculty members. Other activities include the Front Range Applied Mathematics Student Conference and trips to visit local industry and research groups.

The 2007-2008 SIAM University of Colorado at Boulder Undergraduate Chapter Officers were Co-Presidents Joseph Adams, Ryan Schilt, Colin Peterson, and Jonathan Olson; and Faculty Advisor Luis Melara.

Third SIAM Front Range Applied Mathematics Student Conference

This conference has been set up to showcase the many research projects that students are working on and is hosted by the SIAM student chapters on the Boulder, Colorado Springs, and Denver campuses of the University of Colorado.

The conference was held on Saturday, March 3, 2007 at the University of Colorado at Denver on the Auraria Campus. Leslie Greengard, the Director of the Courant Institute of Mathematical Sciences, gave the keynote address. Students gave the other 20 talks at the conference.

Lunch with Shaun Davies

Shaun Davies, an Applied Mathematics alum who has been working as a financial analyst for Smith Breeden Associates (SBA) for several years, visited Boulder on October 30, 2007 and gave an informal lunch-time presentation on what the finance field is like, what types of problems he works on, and the skills that SBA looks for in new hires.

Women in Math (WIM)

The University of Colorado at Boulder's Women in Math (WIM) program is a joint group of faculty, postdoctoral associates, graduate students, and undergraduate students in the departments of Mathematics and Applied Mathematics. The goals of WIM are to encourage more women to engage in mathematical sciences and mathematical research, to promote a greater understanding of the contributions of women in the mathematical sciences, to mentor and encourage women in math, and to provide a network between departments and among women in both departments. WIM hosts events approximately once a month.

Research

Department of Applied Mathematics faculty continue to demonstrate appreciable accomplishments in research.

Department-wide Grants

Mentoring Through Critical Transition Points

During Fall 2006, the Department of Applied Mathematics received a grant from the National Science Foundation (NSF) entitled Mentoring Through Critical Transition Points (MCTP). The grant provides fiscal resources for student research and focuses on strengthening the links between undergraduate students, graduate students, and faculty while simultaneously encouraging students to pursue advanced degrees in Applied Mathematics. Each year, between 15 and 20 Applied Mathematics undergraduates have the ability to receive stipends, allowing them to further explore their research interests. Initially recruited as freshmen through honors seminars, individuals are invited to join small research seminars led by faculty and advanced graduate students as sophomores and juniors.

Professor James Curry heads MCTP along with co-investigators Anne Dougherty, Keith Julien, James Meiss and Harvey Segur. All have extensive experience working with undergraduates, both in the classroom and on individual research projects. According to Associate Department Chair, Anne Dougherty, "Experiences in the department over the past decade strongly support the proposition that undergraduate research projects early in the careers of students can be life changing. Students learn that they can make unique and original contributions to the mathematical sciences, and many are motivated to continue their education by taking more challenging courses and continuing on to graduate school. As a consequence, Applied Mathematics alumni can be found in some of the most prestigious graduate programs in the country."

Previously, undergraduate research was funded through an NSF Vertical Integration of Research and Education (VIGRE) grant. When that grant ended in the Spring of 2007, the Department shifted its focus to MCTP.

Under MCTP, undergraduates are provided with valuable research experience and preparation for the pursuit of an advanced degree while graduate students are simultaneously given experience in advisory positions. Research under MCTP is expected to increase the number of undergraduate Applied Mathematics majors at the University of Colorado at Boulder, increase enrollment in upper division mathematics courses, and increase the number of students who pursue advanced degrees in math and other sciences nationwide.

At the Society for Industrial and Applied Mathematics (SIAM) Front Range Applied Mathematics Student Conference on March 3, 2007, Kye Taylor, Mike Watson, Gisella Kagy, and Benjamin Safdi spoke about their MCTP research topics. Applied Mathematics students Brandon Booth, Jisun Lim, Lauren Anderson, Josh Nolting, and Geoff Sanders were also conference speakers.

On March 17, 2007 Colby Kaess, Gisella Kagy, Kirk Nichols and Kristopher Tucker spoke to potential future University of Colorado at Boulder students at Explore CU Engineering Day. The four students answered questions concerning their respective research topics and encouraged potential undergraduates to pursue studies in Applied Mathematics, citing their research under MCTP to highlight their mathematics careers at The University of Colorado at Boulder.

Under MCTP, several research projects are currently underway. A sampling of projects include:

Atmospheric and Ocean Circulation

PhD student Mike Watson directs up to four undergraduate students in research focusing on computational geophysical fluid dynamics.

Variational Integration of Mechanical Systems

Dr. Todd Murphey, of the Department of Electrical and Computer Engineering, directs Applied Mathematics undergraduate Kirk Nichols in exploring variational integrators by modeling mechanical systems in Mathematica.

Heating and Cooling in a Bakery

Applied Mathematics undergraduates Colby Kaess and Gala Comacho research heating and cooling phenomena under the direction of Dr. James H. Curry.

Option Pricing Theory via the Black-Scholes Partial Differential Equation

Under the direction of Dr. James H. Curry, Applied Mathematics seniors Chris Smith and Bryan Wren

continue their analysis of the Black-Scholes Option Pricing Equations begun in APPM 4350: Partial Differential Equations and Fourier Analysis.

Diffusion Maps

Dr. François Meyer, of the Department of Electrical Engineering, mentors Applied Mathematics senior Kye Taylor in exploring techniques for analyzing high dimensional data including Diffusion Maps.

Progresa

Professor Barham, of the Behavioral Science Institute, and Applied Mathematics student Gisella Kagy investigate the impact of Progresa, Mexico's principle anti-poverty tool, on children's health when taking into account health supply and demand effects created by the program.

Real Time Video Compression

Applied Mathematics student Zach Miers, under the direction of Dr. Anne Dougherty, is creating a digital video camera that has the ability to do real-time video compression.

Finite-time Singularities in Coupled Nonlinear Schrodinger Equations with 4-Wave Mixing

Dr. Harvey Segur mentors Applied Mathematics student Ben Safdi in finding new singular solutions in coupled nonlinear Schrodinger (NLS) equations with 4-wave mixing.

HIV Early Infection Pathogenesis Modeling

Under the direction of Dr. David Bortz, Applied Mathematics student Anna Lieb is developing and analyzing novel early infection models of HIV.

Research on Student Learning

Applied Mathematics graduate student Mike Ruston is analyzing the impact of conducting oral exams to prepare calculus students for their course exams. Mr. Ruston is working under the direction of Dr. Harvey Segur and Dr. Mary Nelson.

Individual Research Grants

Ablowitz, Mark

NSF-DMS: "Nonlinear wave motion"; 2003 – 2007; PI: Ablowitz MJ.

NSF-DMS: "Mathematical and computational methods for high-performance light-wave systems"; 2005 – 2008; PI: Ablowitz MJ. Collaborative Research: This is one part of a two-way research group grant. The other PI with separate award is from SUNYAB.

Air Force Office of Scientific Research, Program in Physical Mathematics: "Nonlinear wave propagation"; 2006 – 2008.

NSF-DMS: "Nonlinear wave motion"; 2006 - 2009; PI: Ablowitz MJ, Beylkin G.

DOE: "Integrated Multiscale Modeling of Molecular Computing Devices"; Award No.: DE-FG02-03ER25583; 2007 May 15 – 2009 May 14; PI: Ablowitz MJ.

DARPA/DOD Army ARO: "Separated Representation and Fast Algorithms for Materials Science", Award No.: W911NF-06-1-0254; 2006 June 15 – 2007 June 14; PI: Ablowitz MJ.

DOE/UT-Battelle/ORNL: "Multiresolution Adaptive Numerical Evaluation and Scientific Simulation"; Award No.: 4000038129; 2005 January 15 – 2010 January 14; PI: Ablowitz MJ.

NSF: "Fast Multiresolution Methods and Nonlinear Approximations for Multidimensional Problems"; Award No.: DMS 0612358; 2006 July 1 – 2009 June 30; PI: Ablowitz MJ.

AFOSR: "Geospatial Representation, Analysis and Computing Using Bandlimited Functions"; Award No.:FA9550-07-1-0135; 2006

December 1 – 2007 November 30; PI: Ablowitz MJ, Curry JH.

NSF: “Noyce Fellowships”; 2004 July – 2008 December; PI: Ablowitz MJ, [Other PIs Unknown at the Time of This Publication].

Fornberg, Bengt

NSF: “Pseudospectral Methods and Radial Basis Functions”; Award No.: DMS- 0309803; 2003 September 1 – 2007 August 31; PI: Fornberg B.

NSF: “Radial Basis Functions”; Award No.: DMS-0611681; 2006 September 1 – 2009 August 31; PI: Fornberg B.

DOD ARO: “Training Knowledge and Skills for the Networked Battlefield”; Award No.: W9112NF-05-1-0153; 2005 May 1 – 2010 April 30; PI: Fornberg B.

NSF-ATM: “CMG - Freedom from Coordinate Systems and Spectral Accuracy with Local Refinement: Radial Basis Functions for Climate and Space-Weather Prediction”; Award No.: 0620068; 2006 September 1 – 2009 August 31; PI: Fornberg B. Collaborative Research.

Julien, Keith

NASA: Solar Heliospheric Program: “Modeling Magneto-Inertial-Gravity waves in the Lower Convection Zone”; 2007; PI: Julien K.

NASA: Living with a Star Guest Investigator Program: “Community Hounds and Hares Exercises in Local Helioseismology”; PI: Julien K.

Innovative Seed Grant: “Multi-scale Modeling and Simulation in the Geosciences: Towards Petascale Computing”; 2007; P. I.: Julien K.

NSF: “Opportunities for Research Collaborations between the Mathematical Sciences and Geosciences”; Award No.: DMS-0724859; 2007 – 2008; PI: Julien K.

Li, Congming

NSF: “Qualitative properties of nonlinear differential and integral equations”; Award No.: DMS-0401174; 2005 – 2007; PI: Li C.

Lladser, Manuel

NIH: “Scientific Computation for RNA Catalysis of Translational Reactions”; 2007 October 1 – 2010 January 31; PI: Yarus M, Lladser M.

Manteuffel, Tom

DOE: “First-order system least-squares (FOSLS) for nonlinear systems arising from DOE applications”; Award No.: DE-FG02-03ER25574; 2006 November 15 – 2009 October 1; PI: Manteuffel T, McCormick S.

NSF: “hp-adaptive FOSLS methods for nonlinear problems with singularities”; Award No.: DMS-0410318; 2004 October – 2007 September; PI: Manteuffel T, McCormick S.

NSF MRI Grant; 2004 November – 2007 December; PI: Tufo H.

NSF: “CMG: Modelling River Basin Dynamics: Parallel Computing and Advanced Numerical Methods”;
Award No.: EAR – 0621199; 2006 September 15 – 2010 August 31; PI: Peckham S, Manteuffel T, McCormick S, Tucker G.

DOE: “Towards Optimal Petascale Simulation (TOPS)”; 2006 September 15 – 2011 September 9; PI: McCormick S, Cai XC, Man-

teuffel T.

CRCW Faculty Fellowship, AY 2006 – 2007.

IBM Faculty Fellowship, AY 2006 – 2007.

McCormick, Stephen

LLNL: “FAC, Adaptive AMG, and Compatible Relaxation for Solving Problems That Arise in LLNL Applications”; 2002 October – 2007 September; PI: McCormick S.

DOE: “Towards optimal petascale simulations (TOPS)”; 2006 October – 2011 September; PI: McCormick S.

LLNL: “Geometric and Algebraic Multigrid Methods for QCD, MHD, Elasticity, Transport, and Other DOE Applications”; 2007 November – 2010 September; PI: McCormick S.

NSF: “Multigrid QCD at the Petascale”; 2007 December – 2011 December; PI: McCormick S.

DOE: “First-order system least squares (FOSLS) for nonlinear systems arising in DOE applications”; 2007 October – 2010 September; PI: Manteuffel T, McCormick S.

NSF: “hp-adaptive FOSLS methods for nonlinear PDE problems with singularities”; 2004 October – 2007 September; PI: Manteuffel T, McCormick S.

NSF: “CMG Research: Modeling River Basin Dynamics: Parallel Computing and Advanced Numerical Methods”; 2006 September – 2011 August; PI: Peckham S, McCormick S.

Meiss, Jim

NSF: “Geometry and Computation of Dynamics for Conservative Systems”; Award No.: DMS-0202032; 2002 – 2007; PI: Meiss JD.

NSF: “Chaos and Bifurcations in Volume-Preserving Dynamics”; Award No.: DMS-0707659; 2007 – 2012; PI: Meiss JD.

Segur, Harvey

NSF: “Collaborative Research: Nonlinear Dispersive Waves with Weak Dissipation”; Award No.: DMS-0709415; 2007 July 1 – 2010 June 30; PI: Segur H.

Publications

Ablowitz, Mark

Ablowitz MJ, Ilan B, Schonbrun E, Pietsun R. 2007. *Two-dimensional solitons in irregular lattice systems*. Theoretical Math Phyics 151: 723-734.

Ablowitz MJ, Biondini G, Prinari B. 2007. *Inverse scattering for the integrable discrete nonlinear Schrodinger equation with nonvanishing boundary conditions*. Inverse Problems 23: 1711-1758.

Hoefer MA, Ablowitz MJ. 2007. *Interactions of dispersive shock waves*. Physica D 236: 44-64.

Ablowitz MJ, Docherty A. 2007. *Solitary waves from optics to fluid dynamics*. Frontiers of Applied Mathematics, World Scientific:

155-186.

Beylkin, Gregory

Beylkin G, Cramer R, Fann G, Harrison RJ. 2007. *Multiresolution separated representations of singular and weakly singular operators,* Appl. Comp. Harmonic Anal. 23: 235-253.

Beylkin G, Kurcz C, Monzon L. 2007. *Grids and transforms for band-limited functions in a disk.* Inverse Problems 23: 2059-2088.

Bortz, David

Li D, Hohne D, Bortz DM, Bull J, Younger JG. 2007. *Modeling bacterial clearance from the bloodstream using computational fluid dynamics and monte carlo simulation*. Journal of Critical Care 22(4): 344.

Younger JG, Chung HY, Cartwright M, Bortz DM, Jackson TL. 2007. *Neutropenic **S. epidermidis bacteremia** modeled as a pharmacodynamic system.* SHOCK: 68–69.

Curry, Jim

Klingenberg B, Curry J, Dougherty A. 2007. *Non-Negative Matrix Factorization*, Submitted, Pattern Recognition.

Dougherty, Anne

Klingenberg B, Curry J, Dougherty A. 2007. *Non-Negative Matrix Factorization*, Submitted, Pattern Recognition.

Fornberg, Bengt

Fornberg B, Zuev J, Lee J. 2007. *Stability and accuracy of time-extrapolated ADI-FDTD methods for solving wave equations*, Journal of Computational and Applied Mathematics 200: 178-192.

Fornberg B, Zuev J. 2007. *The Runge phenomenon and spatially variable shape parameters in RBF interpolation*, Computers and Mathematics with Applications. 54: 379-398.

Fornberg B, Piret C. 2007. *A stable algorithm for flat radial basis functions on a sphere*. SIAM J. Sci. Comput. 30: 60-80.

Julien, Keith

Petersen M, Julien K, Stewart GR. 2007. *Baroclinic vorticity production in protoplanetary disks. I. Vortex Formation.* Astrophysical Journal 658 (2): 1236-1251.

Petersen M, Stewart GR, Julien K. 2007. *Baroclinic vorticity production in protoplanetary disks. II. Vortex Growth and Longevity.* Astrophysical Journal 658 (2): 1252-1265.

Julien K, Knobloch E. 2007. *Reduced Models for Fluid flows with Strong Constraints*. Journal of Mathematical Physics 48 (6): Art No. 065405 (34 pages).

Li, Congming

Jin C, Cai X, Li C. 2007. *Parallel Domain Decomposition Methods for Some Stochastic Partial Differential Equations*. SIAM J. of Sci. Comp. 2: 2096-2114.

Li C, Lim J. 2007. *The singularity analysis of solutions to some systems of integral equations.* Comm. Pure and Appl. Anal. 6(2):

453-464.

Lladser, Manuel

Lladser M. 2007. *Uniqueness of polynomial canonical representations*. Discrete Mathematics and Theoretical Computer Science Proceedings: AH, 463-470.

Manteuffel, Tom

Chang B, Manteuffel TA, McCormick SF, Sheehan B. 2007. *Spatial multigrid for isotropic neutron transport.* SIAM J. Sci. Comp. Vol. 29, No. 5.

Lee EJ, Manteuffel TA. 2007. *FOSLL* method for the eddy current problem with three dimensional edge singularities.* SIAM J. Numer. Anal. Vol. 45: 787.

Brannick J, Brezina M, Livne O, Livshits I, MacLachlan S, Manteuffel T, McCormick S, Ruge J, Zikatanov L. 2007. *Adaptive smoothed aggregation in lattice. Lecture Notes* Comp. Sci. Eng. Springer Verlag Vol. 55: 505-512.

Martinsson, Gunnar

Liberty E, Woolfe F, Martinsson PG, Rokhlin V, Tygert M. 2007. *Randomized algorithms for the low-rank approximation of matrices.* Proceedings of the National Academy of Sciences Volume 104.

Martinsson PG, Rokhlin V. 2007. *A fast direct solver for scattering problems involving elongated structures.* Journal of Computational Physics Volume 221: 288-302.

Martinsson PG, Babuska I. 2007. *Mechanics of Materials with Periodic Truss or Frame Micro-structures.* Archives of Rational Mechanics and Analysis Volume 185: 201-234.

Martinsson PG, Babuska I. 2007. *Homogenization of materials with periodic skeletal micro-structures.* Mathematical Models and Methods in Applied Sciences Volume 17: 805-832.

Martinsson PG, Rokhlin V. 2007. *An Accelerated Kernel-Independent Fast Multipole Method in One Dimension.* SIAM J. of Scientific Computing Volume 29.

Martinsson PG. 2007. *A fast direct solver for network matrices.* arXiv.org report number 0706.4348.

McCormick, Stephen

Brannick J, Brezina M, Livne O, Livshits I, MacLachlan S, Manteuffel T, Ruge J, Zikatanov L. 2007. *Adaptive smoothed aggregation in lattice QCD, Lecture Notes* Comp. Sci. Eng. 55: 505-512.

McCormick S, Chang B, Manteuffel T, Ruge J, Sheehan B. 2007. *Spatial multigrid for isotropic neutron transport.* SIAM J. Sci. Comp. 29: 1900-1917.

Meiss, Jim

Meiss JD. 2007. **Differential Dynamical Systems.** Philadelphia (PA): SIAM. 412 pp., ISBN 978-0-899816-35-1.

Simpson DJW, Meiss JD. 2007. *Andronov-Hopf Bifurcations in Planar, Piecewise-Smooth, Continuous Flows.* Phys. Lett. A 371(3): 213-220.

Radulescu, Anca

Radulescu A. 2007. *On complexity of quartic polynomials and the Connected Isentropes Conjecture*. Discrete and Continuous Dynamical Systems, Series B, 19 (1): 139-175.

Radulescu A. 2007. *Computing topological entropy in a space of quartic polynomials.* Journal of Statistical Physics 130 (2): 373-385.

Segur, Harvey

Segur H. 2007. *Waves in shallow water, with emphasis on the tsunami of 2004.* **Tsunami and nonlinear waves**, ed. by Kundu A, Springer GeoSc: 3-30.

Segur H, Deconinck B, Kimura Y. 2007. *Finite–dimensional pole dynamics of solutions of the viscous Burgers equation*. J. Physics A:Math.Theor. 40: 5459-5467.

Segur H, Henderson DM. 2007. *The modulational instability revisited.* Euro. Phys. Journal 147: 25-43.

Segur H, Safdi BR. 2007. *Explosive instability due to 4-wave mixing.* Phys. Rev. Lett. 99 DOI: 10.1103 / PhysRevLett.99.245004.

Tong, Tiejun

Tong T, Wang Y. 2007. *Optimal Shrinkage Estimation of Variances With Applications to Microarray Data Analysis.* Journal of the American Statistical Association 102: 113-122.

Liu A, Tong T, Wang Y. 2007. *Smoothing Spline Estimation of Variance Function.* Journal of Computational and Graphical Statistics 16: 312-329.

Invited Lectures and Meetings Attended

Ablowitz, Mark

Boaz, Ilan, Ablowitz MJ, Cundiff S T. 2007. *Quantum-Noise Limit on the Linewidth of Frequency Combs*. In: Conference on Lasers and Electro-Optics (CLEO), CTuJ2.

Boaz, Ilan, Ablowitz MJ, Schonbrun E, Pietsun R. 2007. *Multidimensional solutions in irregular-lattice media.* In: Conference on Nonlinear Photonics.

Ablowitz MA. 2007. *Soltions: Discovery and Impact.* 2007 February 11; Departments of Mathematics: Princeton and Rutgers Universities.

Ablowitz MA. 2007. *Nonlinear waves in optics and fluid dynamics.* 2007 April 23; Department of Mathematics, University of Vermont.

Ablowitz MA. 2007. *Soltions: Discovery and Impact.* 2007 April 25; Department of Mathematics, North Carolina State University.

Ablowitz MA. 2007. *Nonlinear waves in optics and dispersive shock waves.* 2007 July 19; Department of Mathematics, Imperial College, London, UK.

Ablowitz MA. 2007. *Nonlinear waves in optics and fluid dynamics.* In: International Conference: WAVES 2007; 2007 July 23; Reading University.

Ablowitz MA. 2007. *Soltions: Discovery, Applications and Impact*. In: Brazilian Mathematical Colloquium; 2007 August 1; IMPA,

Rio de Janeiro, Brazil.

Ablowitz MA. 2007. *Dispersive shock waves.* In: International Conference: Partial Differential Equations; 2007 August 6.

Ablowitz MA (Organizer). 2007. Mini-Conference: Nonlinear Waves and ...More; 2007 August 15; Department of Applied Mathematics, University of Colorado at Boulder.

Ablowitz MA. 2007. *Pulses and dynamics in mode locked lasers.* In: AFOSR Workshop: Nonlinear Optics; 2007 September 25; University of Arizona.

Beylkin, Greg

Beylkin G. 2007. *Toward Solving the Multiparticle Schrodinger Equation via an Unconstrained Sum of Slater Determinants.* 2007 January 25-26; Pacific Northwest National Laboratory, Richland, WA.

Beylkin G. 2007. *Fast algorithms for adaptive application of integral operators in high dimension*. 2007 February 2; University of North Carolina at Chapel Hill.

Beylkin G. 2007. *Fast algorithms for adaptive application of integral operators in high dimension.* In: The 2007 John H. Barrett Memorial Lectures; 2007 April 28.

IPAM Reunion II; *Nonlinear inversion of bandlimited Fourier transform and discrete transforms for bandlimited functions in a disk*, 2007 June 10-15.

Beylkin G. 2007. *Separated Representations and Nonlinear Approximations for Fast Algorithms in High Dimensions.* In: Minisymposium “Numerical multilinear algebra: a new beginning”; 2007 July 17; ICIAM, Zurich, Switzerland.

Beylkin G, Mohlenkamp MJ, Perez F. 2007. Preliminary results on approximating a wavefunction as an unconstrained sum of Slater determinants. In: Minisymposium “High-dimensional analysis meets scientific computing”; 2007 July 17; ICIAM, Zurich, Switzerland.

Bortz, David

Bortz DM. 2007. Approximation Methods for Design and Control. 2007 March 7; Buenos Aires, Argentina.

Bortz DM. 2007. MBI Young Researchers; 2007 March 12; Columbus, OH.

Bortz DM. 2007. AMS Western Sectional Meeting; 2007 April 2; Tucson, AZ.

Bortz DM. 2007. Atlantic Coast Conf. on Math in the Life and Biol. Sciences; 2007 May 3; Blacksburg, VA.

Bortz DM. 2007. Colorado Center for AIDS Research; 2007 June 6; Denver, CO.

Bortz DM. 2007. Comp. and Math. Methods in Science and Engineering; 2007 June 20; Chicago, IL.

Bortz DM. 2007. Int’l Congress on Industrial and Applied Mathematics; 2007 July 19; Zurich, Switzerland.

Bortz DM. 2007. SMB Annual Meeting; 2007 August 1; San Jose, CA.

Bortz DM, Younger JG. 2007. In: Experimental Design and Model Selection, International Conference on Complexity in Acute Illness; 2007 October 7; Long Beach, CA.

Bortz DM. Math Modeling and Comp. Methods in Science and Engineering; 2007 October 23; Kobe, Japan.

Corcoran, Jem

Corcoran J. 2007. *Efficient Graph Counting Techniques for MCMC Recovery of Bayesian Graphical Models.* In: Workshop on the Practice and Theory of Stochastic Simulation; October 22-26, 2007; Palo Alto, CA.

Fornberg, Bengt

Fornberg B. 2007. Colloquium. University of Colorado at Boulder, Department of Applied Mathematics.

Fornberg B. 2007. Colloquium. University of Colorado at Boulder, Department of Psycology.

Fornberg B. 2007. Colloquium. Carnegie-Mellon University.

Fornberg B. 2007. Colloquium. UK Meteorological Office; Exeter, UK.

Fornberg B. 2007. In: 22nd Biennial Conference on Numerical Analysis; University of Dundee.

Julien, Keith

Julien K. 2007. *Generalized Quasi-geostrophy for Spatially Anisotropic Rotationally Constrained Flows*. In: IPAM Workshops on Small Scales and Extreme Events: The Hurricane; 2007 February.

Julien K. 2007. *Generalized Quasi-geostrophy for Spatially Anisotropic Rotationally Constrained Flows.* In: CNLS seminar; 2007 March; Los Alamos National Laboratories.

Julien K. 2007. *Saturation of the MagnetoRotational Instability.* In: Astrophysical and Planetary Sciences (APS) Annual Division of Fluid Dynamics Meeting; 2007 November.

Julien K. 2007. *Generalized Quasi-geostrophy for Spatially Anisotropic Rotationally Constrained Flows*. In: SIAM Geosciences Workshops; 2007 March.

Li, Congming

Li C. 2007. PDE Seminar. 2007 May; UC Davis, Department of Mathematics; Davis, California.

Li C. 2007. Colloquium. 2007 July; HeBei Normal University, Department of Mathematics; ShiJiaZhuang, Hebei, PRChina.

Li C. 2007. Colloquium . 2007 July; Capital Normal University, Department of Mathematics; Beijing, PRChina.

Li C. 2007. In: Workshop Lecture Series; 2007 July; TsingHua University, Department of Applied Mathematics; Beijing, China.

Li C. 2007. The International Conference on Partial Differential Equations and Their Numerical Analysis. 2007 Summer; HeNan Normal University, Department of Mathematics; XingXiang, Henan, PRChina.

Li C. 2007. *Recent progress on nonlinear elliptic and parabolic problems and related abstract methods.* In: Banff International Research Station for Mathematical Innovation and Discovery; 2007 Fall.

Lladser, Manuel

Lladser M. 2007. *Minimal Markov chain embeddings of pattern problems.* In: Proceedings of the 2007 Information Theory and Applications Workshop; 2007 January 29 – February 2; University of California, San Diego.

Lladser M. 2007. 2007 Frontier Probability Days; 2007 May 21 – 22; University of Colorado, Colorado Springs,.

Lladser M. 2007. 2007 International Conference on Analysis of Algorithms; 2007 June 17 – 22; Juan-le-Pins, France.

Lladser M. 2007. *Session on Trees.* In: 32nd Conference on Stochastic Processes and their Applications; 2007 August 9; University of Illinois at Urbana-Champaign.

Lladser M. 2007. *Session on Simulation*. In:32nd Conference on Stochastic Processes and their Applications; 2007 August 10; University of Illinois at Urbana-Champaign.

Lladser M. 2007. Discrete Mathematics Seminar. 2007 August 24; Universidad de Chile, Center of Mathematical Modeling.

Lladser M. 2007. Probability Seminar. 2007 August 29; Universidad de Chile, Center of Mathematical Modeling.

Lladser M. 2007. Combinatorics and Probability Seminar. 2007 September 11; University of Pennsylvania, Mathematics Department.

Lladser M. 2007. 2007 October 4; University of Illinois at Urbana-Champaign, ECE Department.

Lladser M. 2007. AMS Special Session on Algorithmic Probability and Combinatorics. 2007 October 6; DePaul University.

Lladser M. 2007. Dynamical Systems Seminar. 2007 October 11; University of Colorado at Boulder, Department of Applied Mathematics.

Lladser M. 2007. CO/WY American Statistical Association, Fall Meeting; 2007 October 26.

Manteuffel, Tom

Manteuffel T. 2007. Distinguished Lecture Series. 2007 April 3; University if Illinois, Computer Science Department.

Manteuffel T. 2007. Plenary Address. In: DOE Workshop on Recent Advances in System Solvers; 2007 May 23; Livermore, CA.

Manteuffel T. 2007. Department Colloquium. 2007 November 8; Penn. State University, Department of Mathematics.

Martinsson, Gunnar

Martinsson G. 2007. *Randomized algorithms and fast direct solvers.* In: Numerical analysis seminar; 2007 March; University of Texas at Austin.

Martinsson G. 2007. *Rapid evaluation of electrostatic interactions in multi-phase media.* In: International Congress of Industrial and Applied Mathematics; 2007 July; Zurich.

Martinsson G. 2007. *Two randomized methods for the approximation of matrices.* In: International Congress of Industrial and Applied Mathematics; 2007 July; Zurich.

Martinsson G. 2007. *Fast direct solvers.* In: International Congress of Industrial and Applied Mathematics; 2007 July; Zurich.

Martinsson G. 2007. *Randomized methods for the approximation of matrices.* 2007 September; Institute for Pure and Applied Mathematics.

Martinsson G. 2007. *Fast numerical methods for solving linear PDEs.* In: Applied mathematics seminar; 2007 November; Duke University.

Martinsson G. 2007. *Fast numerical methods for solving linear PDEs.* In: Applied mathematics seminar; 2007 November; Stanford University.

Martinsson G. 2007. *Fast numerical methods for solving linear PDEs*. In: Matrix computations seminar; 2007 November; Berkeley Department of Mathematics.

Martinsson G. 2007. *Fast numerical methods for solving linear PDEs.* 2007 December; Institute for Pure and Applied Mathematics at UCLA.

Martinsson G. 2007. *Fast numerical methods for solving linear PDEs.* In: Applied mathematics seminar; 2007 December; Caltech.

Martinsson G. 2007. *Approximation of structured matrices via randomized sampling.* In: Lake Arrowhead workshop; 2007 December; organized by the Institute for Pure and Applied Mathematics at UCLA.

Meiss, Jim

Meiss JD. 2007. *Dynamics of 3D Volume-Preserving Maps.* In: MRSI; 2007 January 25; Berkeley.

Meiss JD. 2007. *Chaotic Dynamics in Volume Preserving Maps.* In: Mathematics Colloquium; 2007 March 23.

Meiss JD. 2007. *Twistless Bifurcations in Volume Preserving Maps.* In: SIAM Dynamical Systems Meeting; 2007 May 28; Snowbird, UT.

Meiss JD. 2007. *Bifurcations of Invariant Circles for Volume Preserving Maps.* In: Perspectives in Nonlinear Dynamics PNLD 2007; 2007 July 17; Int. Center for Theoretical Physics, Trieste.

Meiss JD. 2007. *Visualization of Dynamics: Two to Four Dimensional Maps.* In: Perspectives in Nonlinear Dynamics PNLD 2007; 2007 July 17; Int. Center for Theoretical Physics, Trieste.

Meiss JD. 2007. *Tori and Invariant Circles for Volume Preserving Maps, Nonlinear Dynamics and Chaos: Advances and Perspectives.* 2007 September 21; Univ. of Aberdeen, Scotland.

Meiss JD. 2007. *Transport and Lobes for Volume Preserving Maps.* In: Amer. Math. Society Meeting; 2007 October 5; De Paul University.

Meiss JD. 2007. *Bifurcations of Invariant Circles, Mathematics: Analysis, Modeling, Optimization and Simulation.* 2007 October 18; University of Texas at Austin.

Meiss JD. 2007. *Volume Preserving Maps.* In: Joint Math/Physics Dynamical Systems Seminar; 2007 October 25; Univ. of Texas at Austin.

Meiss JD. 2007. *Normal Forms and Bifurcations for Volume Preserving Maps.* In: Mathematics Colloquium; 2007 November 13; Imperial College London,.

Meiss JD. 2007. *Hopf and Neimark Sacker Bifurcations for Piecewise Smooth Dynamical Systems.* In: Engineering Mathematics Colloquium; 2007 November 14; Univ. of Bristol,.

Meiss JD. 2007. *Bifurcations of Invariant Circles for Volume Preserving Maps.* In: Mathematics Seminar; 2007 November 21; Loughborough Univ.

Nelson, Mary

Nelson M, Geist MR, Miller RL, Streveler RA, Olds BM. 2007. *How to Create a Concept Inventory: The Thermal and Transport Concept Inventory.* In: Annual ASEE Conference; 2007 June.

Nelson MA. 2007. Oral Assessments in Calculus I: Improvement in Understanding, Grades and Retention. In: Annual meeting of American Educational Research Association (AERA); 2007 April; Chicago, IL.

Nelson MA, Geist MR, Miller RL, Streveler RA, Olds BM. 2007. How to Create a Concept Inventory: The Thermal and Transport Concept Inventory. In: Annual meeting of American Educational Research Association (AERA); 2007 April; Chicago, IL.

Nelson MA. 2007. *The Implementation of the STEM Colorado Grant in the Applied Mathematics Department.* In: Joint Mathematics Meeting; 2007 January; New Orleans, LA.

Nelson MA. 2007. *How Research Can Improve Teaching and Learning. In: Graduate Teaching Program*; 2007 March 8.

Nelson MA. 2007. *The effect of oral assessments on learning*. In: Creativity in Teaching Workshop organized by the engineering lead TAs; 2007 March 14.

Radulescu, Anca

Radulescu A. 2007. *Hebbian inspecificity in unsupervised learning.* In: Computational and Systems Neuroscience annual meeting; Salt Lake City, UT.

Radulescu A. 2007. *A systems approach to schizophrenia.* In: Mt. Sinai International Congress on Schizophrenia Research; Colorado Springs, CO.

Radulescu A. 2007. *A systems approach to schizophrenia.* In: 8th International Conference on Systems Biology; Long Beach, CA.

Radulescu A. 2007. *Schizophrenia – a parameters' game?* In: Coleman Institute and RERC Annual Meeting; Westminster, CO.

Radulescu A. 2007. *A dynamics model of schizophrenia.* In: Seminar presentation; Boston University; MA.

Radulescu A. 2007. *A time-series analysis of complexity and attractor dimension.* In: Seminar presentation; University of Colorado at Boulder, Department of Applied Mathematics.

Radulescu A. 2007. *A dynamical systems theoretical model of schizophrenia.* In: Seminar presentation; University of Colorado at Boulder, Psychology Department.

Segur, Harvey

Segur H. 2007. *Stable wave patterns of nearly permanent form on deep water.* 2007 February 14; Department of Physics, Tokyo University; Japan.

Segur H. 2007. *Stabilizing the Benjamin-Feir instability.* 2007 March 28; Department of Mathematics, University of Buffalo; NY.

Segur H. 2007. *Stable, three-dimensional wave patterns of nearly permanent form on deep water.* 2007 March 30; Department of Mathematics, Florida State University; Tallahassee, FL.

Segur H. 2007. *Stable, three-dimensional waves of nearly permanent form on deep water.* In: IMACS conference; 2007 April 17; Athens, GA.

Segur H. 2007. *Explosive instability due to 4-wave mixing.* In: NEEDS conference; 2007 June 20; L'Ametlla, Spain.

Segur H. 2007. *Waves in the Ocean.* 2007 October 9; Boulder Public Library; Boulder, CO.

Segur H. 2007. *Waves in the Ocean.* 2007 November 7; University of Colorado at Boulder, Department of Geological Sciences; Boulder, CO.

Tong, Tiejun

Tiejun T. 2007. *Minimax Estimation of Means with Applications to Microarray Experiments.* In: ENAR Spring Meeting; 2007 March; Atlanta, GA.

Tiejun T. 2007. *Minimax Estimation of Means with Applications to Microarray Experiments.* 2007 October; University of Colorado at Denver and Health Sciences Center, The Center for Computational Pharmacology.

Tiejun T. 2007. *Minimax Estimation of Means with Applications to Microarray Experiments.* In: Geophysical Statistics Project; 2007 November; National Center of Atmospheric Research (NCAR); Boulder, CO.

Tiejun T. 2007. *Minimax Estimation of Conference Means with Applications to Microarray Data Analysis.* In: Fifth Rocky Mountain Bioinformatics Conference; 2007 November; Snowmass, CO.

Outreach

Outreach activities help to share the knowledge and enthusiasm of the Department with others. The outreach efforts of the Department are an extension of its mission to provide education and training in applied mathematics. These efforts are focused in two areas: professional development for secondary math teachers and mathematical encouragement and enrichment for high school students.

Boulder Partnership for Excellence in Mathematics Education Continues in Second Year

Applied Mathematics is in its second year of a three-year collaboration with Boulder Valley School District (BVSD), The University of Colorado's School of Education, and the Freudenthal Institute. This collaboration is called the Boulder Partnership for Excellence in Mathematics Education and is funded by a grant from the Colorado Department of Education. The goals of this project include significant improvement in mathematical achievement among low-income and minority population groups in grades 6-8. The project involves two-week summer workshops and monthly half-day training sessions for participating middle school math teachers in BVSD. The Department hopes that this project will form the foundation for additional collaborations with area school districts. Mary Nelson and Anne Dougherty will lead the effort from the Department.

Department of Applied Mathematics Sponsors Colorado Math Circle

The Department of Applied Mathematics sponsors monthly meetings of Colorado Math Circle (CMC) in order to address the needs of primary and secondary students. These meetings are held in the University of Colorado Engineering Center. They typically feature lectures by professors and mathematicians from around the state. Topics range from number theory and combinatorics to probability, geometry, and game theory.

Interest in CMC has grown steadily since its inception, and the average monthly attendance has increased by approximately 80% from 2004 to 2007.

Along with the monthly lectures, students participate in competitions. The competitions include a weekend of activities that are sponsored by the American Regions Math League (ARML) and bring together the nation’s top mathematics students. In 2007 the ARML activities involved more than 100 fifteen-member teams from nearly every state. Of these, two teams comprised of CMC students were sent to Las Vegas to participate in the Western Division finals. One of the teams took fourth place.

In addition to ARML, the Department also sponsors the Colorado Math Circle Euler Group. This group meets monthly and consists of advanced students who work on Olympiad-level problems. Meetings are led by Sam Elder, of Poudre High School, who is a former Mathematical Olympiad Summer Program participant. Mr. Elder has qualified three times for the USA Mathematical Olympiad and was ranked ninth in the individual national standings at the 2007 ARML competition.

Colorado Math Circle is directed by Silva Chang and Dr. Bradley K. Alpert. It is sponsored by Applied Mathematics faculty members Anne Dougherty and Congming Li. In addition, Silva Chang advises the Fairview High School Math Club and coaches the Summit Middle School MATHCOUNTS Team. In 2006 and 2007 Chang also coached the Colorado team at the National MATH-COUNTS Competition. Alpert is a researcher in applied mathematics at the National Institute of Standards and Technology (NIST).

Colorado Math Circle is supported by The University of Colorado Outreach Committee, the Department of Applied Mathematics, the Mathematical Sciences Research Institute (MSRI), and local donors who contribute to The Art of Problem Solving Foundation. For further information, visit: http://www.coloradomath.org.

Faculty Service to the University, Department, and Societies

Ablowitz, Mark

Served upon: Department of Applied Mathematics undergraduate committee.

Chaired: faculty review committee: P. Martinsson (Assistant Professor--comprehensive review).

Chaired: faculty review committee: K. Julien (Promotion to Professor).

Chaired: Chemistry Department Internal Review Committee.

Chaired: Task force discussing the possibility of beginning a graduate school interdisciplinary effort in computational science and engineering.

Bortz, David

Organizer: minisymposium, “Future Directions in PDE Simulations,” at ICIAM in Zurich, Switzerland.

Consultant: Immunetrics (computational design of pharmaceuticals) (2007 January).

Served upon: Department of Applied Mathematics Undergraduate committee.

Served upon: Statistics/Applied probability search committee.

Peer review: one article for IEEE Transactions on Biomedical Engineering.

Peer review: one article for Journal of Critical Care.

Peer review: two articles for Journal of Theoretical Biology.

Peer review: one article for Mathematics and Computers in Simulation.

Participated: LEAP workshop 2007 May.

Corcoran, Jem

Served upon: graduate committee, Spring 2007,

Served upon: undergraduate committee, Fall 2007.

Curry, Jim

Chair: Department of Applied Mathematics.

Trustee: University of Colorado Foundation.

Served upon: Selection committee for the AMS Frank and Brennie Morgan Prize for outstanding Research in Mathematics by an undergraduate Student (SIAM representative - term ends in 2011).

Managed: Afro-Americans in the Mathematical Sciences listserv.

Served upon: American Mathematical Society Committee on the Profession (2006- 2009).

Served upon: SIAM Education Committee.

Served upon: National Research Council Fellowships Office Advisory Committee (2006-2009).

Served upon: Vietnam Education Foundation (VEF) prospective graduate evaluation committee (14 days in Vietnam, 2007 August 1 to August 14).

Served upon: Editorial Board of SIAM Undergraduate Research Online Journal.

Served upon: Ford Foundation Diversity Fellowship Committee.

Served upon: National Center for Atmospheric Research (NCAR), Institute for Mathematics Applied to the Geosciences (IMAGe) Advisory Committee, 2006-present.

Served upon: National Science Foundation External Review Panel, for VIGRE II. (Rice University, 2007 November 19).

Served upon: Primary Unit Evaluation Committee, UCB School of Education.

Served upon: Primary Unit Evaluation Committee, UCB School of Law.

Dougherty, Anne

Associate Chair: Department of Applied Mathematics (2000 July 1 to present).

Faculty advisor (Spring 2007) for the University of Colorado at Boulder SIAM undergraduate chapter.

Served upon: Applied Mathematics Probability and Statistics Prelim Committee (2007 January).

Chaired: Applied Mathematics Undergraduate Committee.

Organized: Department of Applied Mathematics presentation for the College of Engineering's High School Honors Institute, Explore Engineering for Admitted Students, Engineering Orientation, Engineering Open House, WIEP and MEP Senior Day Event.

Contributor: CU Engineering, 2007 magazine.

Representative to: Undergraduate Education Council in the College of Engineering.

Served upon: Honors Subcommittee.

Served upon: Actuarial Studies and Quantitative Finance Certificate Program Committee.

University of Colorado at Boulder Representative to: Goldwater Scholarship.

Coordinated: Department of Applied Mathematics online tutoring, Spring 2007.

Contributor: Boulder Partnership for Excellence in Mathematics Education.

Co-PI (with Congming Li and Silva Chang) on award from the CU-Boulder Outreach Committee to partially fund the Colorado Math Circle. One award was received for AY 2006-2007. A second award was received for AY 2007-2008.

Fornberg, Bengt

Chair: Colloquium Committee (Spring 2007).

Acted as a contact person between the Department of Applied Mathematics and two Korean universities, Kyungpook and Chonnam National Universities, in establishing departmental collaborative agreements under the BK21 Korean government education initiative.

Served upon: The University of Colorado Innovative Grant Program (IGP) review panel (Physical sciences / Engineering panel).

Reviewed: proposals for NSF and its counterparts in some other countries.

Reviewed: about 20 articles during the year for various journals and book publishers.

Julien, Keith

Co-director: National Center for Atmospheric Research (NCAR), Institute for Mathematics Applied to the Geosciences (IMAGe) 2008 Theme of Year.

Associate Chair: Applied Mathematics Graduate Program.

Served upon: Arts and Science Committee.

Served upon: Arts and Science Budget Committee.

Reviewer: Journal of Fluid Dynamics.

Reviewer: Physics of Fluids article.

Li, Congming

Primary Unit Evaluation Committee for Dr. Mary Nelson's reappointment as instructor.

Chair: Prelim for Applied Analysis.

Member: Grievance Committee, Council of the College of Arts and Sciences.

Editor of: Communication on Pure and Applied Analysis. Handles many manuscripts as an editor as well as a reviewer.

Peer reviews: Two articles for Pacific Journal of Mathematics.

Peer reviews: Three articles for Journal of Differential Equations.

Peer reviews: Articles for Discrete and Continuous Dynamical Systems.

Peer reviews: One article for Mathematical Research Letters.

Peer reviews: Two articles for Communications on Pure and Applied Mathematics.

Peer reviews: Articles for Proceedings of the AMS.

Advising and Lecturing: ‘Colorado Math Circle for Advanced High School Students’ in mathematics.

Lladser, Manuel

Peer Evaluation of Staff Performance: Susan Pryor (Department of Applied Mathematics, University of Colorado at Boulder, Fall 2007).

Served upon: Spring/Fall 2007, Probability and Statistics Search Committee.

Assisted in potential faculty recruitment: Juan G. Restrepo (two-body problem), Divya E. Vernery (two-body problem), and the IBG candidates: Kwang-Young Kim, Tiejun Tong, and Wei-Min Chen (Fall 2007).

Assisted in Graduate Search Committee interviewing: several of the prospective graduate students to the Department of Applied Mathematics program (Spring 2007).

Served upon: Spring 2007, Stat/Probability Prelim Committee.

Manteuffel, Tom

Served upon: SIAM Publication Committee.

Served upon: SIAM Science Policy Committee.

Served upon: DOE, Office of Science, Advanced Scientific Computing Advisory Committee.

Served upon: Governing Board, Statistics and Applied Mathematics Scientific Institute (SAMSI).

Served upon: Advisory Board, Bavarian Graduate School of Computational Engineering.

Served upon: Advisory Board, Fundamental and Computational Sciences Directorate, Pacific Northwest Laboratory.

Served upon: Chair Colloquium Committee.

Served upon: Analysis Prelim Committee.

Associate Editor: Electronic Transactions in Numerical Analysis.

Editorial Board: Numerical Linear Algebra and Applications.

Editor-in-Chief: SIAM Journal on Numerical Analysis.

Editorial Board: SIAM News.

Associate Editor: Multiscale Modeling and Simulation, SIAM Press.

Editorial Board: SIAM Journal of Scientific Computing.

Reviewer: DOE and NSF proposals.

Reviewer: SIAM Journal on Scientific Computing.

Reviewer: SIAM Journal on Numerical Analysis.

Reviewer: Numerical Methods for Partial Differential Equations.

Reviewer: SIAM Review.

Served upon: 13th Copper Mountain Conference on Multigrid Methods Program Committee.

Martinsson, Gunnar

Served upon: Applied Mathematics graduate committee.

Reviewer: “International Journal for Numerical Methods in Engineering”.

Reviewer: “Journal of Computational Physics”.

Reviewer: “IEEE Transactions on Antennas and Propagation”.

Reviewer: “Mathematics of Computation”.

McCormick, Stephen

Served upon: Graduate Committee.

Served upon: Ad Hoc Executive Committee.

Served upon: Primary Unit Evaluation Committee.

Reviewer: NSF and DOE proposals.

Reviewer: SISC.

Reviewer: SINUM.

Reviewer: J. Comp. Physics.

Reviewer: AMS Reviews.

Reviewer: Zentralblatt.

Organizing Committee, 13th Copper Mountain Conferece on Multigrid Methods, Copper Mountain, Colorado, March 18-23.

Chair, AMG Summit, Lake City, CO, September 16-23.

Co-Organizer of the 13th Copper Mountain Conference on Multigrid Methods, Copper Mountain, Colorado. Funded by DOE, NSF, and IBM.

Chair of the AMG Summit, Lake City, CO. Funded by LLNL.

Meiss, Jim

Reviewer: Book Manuscript for Princeton University Press.

Served Upon: Comprehensive Exam Committee, Seth Claudepierre, PhD Student, Applied Mathematics.

Fellow: Center for Integrated Plasma Studies.

Served Upon: Honors Thesis Committee for Shawn Baland, Dept. of Mathematics.

Reviewer: Physica D.

Reviewer: Nonlinearity.

Reviewer: Physical Review Letters.

Reviewer: Chaos (AIP Journal).

Reviewer: Discrete and Continuous Dynamical Systems.

Reviewer: Journal of Nonlinear Science.

Reviewer: Physical Review E.

Reviewer: NSF proposal for the Division of Mathematical Sciences (2007 February).

Reviewer: Physics Letters A.

Melara, Luis

Co-advisor: SIAM Undergraduate Chapter (Fall 2007).

Nelson, Mary

Chaired: Defense Agency Committee on Women in the Services (DACOWITS).

Supervised: project to create and test concept questions to be used by Calculus I instructors as clicker questions.

Thesis advisor: Nathan Balk (BS/MS, May 2007).

Co-supervised: Work of two Department of Applied Mathematics Noyce fellows, Matt Rugierro and Nathan Balk, who are writing a, “clicker book,” which also describes the transformations taking place in the Applied Mathematics Department. Contributed a chapter in above, “clicker book,”

Organized/Contributed: Oral assessments and questions for all Calculus II students (offered to 450+ students).

Organized/Contributed: Oral assessments and questions for all Calculus I students (offered to 600+ students).

Organized and Conducted: Mock oral assessments for all APPM 1350 instructors and teaching assistants and other interested individuals in order to help explain how orals for APPM 1350 should be conducted.

Trained: Oral assessment facilitators.

Supervised: Noyce fellows, Kate Spooner, and Amanda Geist.

Coordinated: APPM 1340 (Fall 2007), APPM 1345 (Spring 2007), APPM 1360 (Spring 2007).

Supported: The Colorado LAtest effort; counseling prospective K-12 mathematics teachers, supervising the work of Department of Applied Mathematics learning assistants and assisting in the transformation of classes in Applied Mathematics.

Supported: LATest grant on the Boulder campus. Met every other week with DBER (Discipline Based Educational Research) faculty from Physics, Chemistry, Astronomy, Applied Mathematics, Geology and Education. Assisted the K-12 tier of the grant.

Served upon: Steering committee for PTLC.

Participated: Transforming the preparation of K-12 math and science teachers through the NMSI grant.

Reviewer: All applications for PTLC 2007-2008 projects, Proposals for the AERA 2008 conference.

Reviewer: Journal of Teacher Education, Journal of Engineering Education.

Reviewer: Manuscript for Rogawski's Precalculus Chapter 3.

Planned/Taught: Professional development sessions for BSVD middle school teachers.

Developed/Taught: Two-week course on proportional reasoning and algebraic thinking for BVSD middle school teachers as part of the Boulder Partnership for Excellence in Mathematical Education.

Participated: Invited panel for Boulder Valley mathematics program discussing of how to improve the teaching of mathematics and how to involve all stakeholders.

Participated: Dawson Math Day. Planned and supervised exponential growth activity with students.

Norris, Adam

Recruited/Organized: Hired exam graders for APPM 1350, 1360, 2350 and 2360.

Collected and Distributed: Special needs exams for all scheduled exams for APPM 1350, 1360, 2350 and 2360.

Organized: Proctoring of the special needs exam room for APPM 1350, 1360, 2350 and 2360.

Served Upon: Member of the Department of Applied Mathematics Undergraduate Committee.

Participated: Interview, selection, and coordination of the activities of the Department of Applied Mathematics Learning Assistants.

Outreach: Alexander Dawson School Visit, organized and presented an activity station on bio-mechanics of human motion.

Coordinator: Calculus III lectures (Spring 2007 and Fall 2007).

Faculty Advisor: Theta Tau (a professional engineering fraternity).

Represented: The Department of Applied Mathematics for Explore CU Engineering, through presentations and activities illustrating the use of mathematics to solve real-world problems.

Represented: The Department of Applied Mathematics for High School Honors Institute, by preparing and presenting activities illustrating the mathematical modeling of mechanical systems and bio-mechanical systems.

Represented: The Department of Applied Mathematics for Engineering Open House, through presentations and activities illustrating the use of infinite series to solve real-world problems.

Represented: The Department of Applied Mathematics for College of Engineering Orientation including participation in a panel on classroom and academic expectations of engineering freshman.

Speaker: GEEN 1500 to describe the Applied Mathematics major and related activities.

Coordinated: Math review session for Fundamentals of Engineering exam.

Represented: The Department of Applied Mathematics at the College of Engineering's advising fair.

Represented: The Department of Applied Mathematics for a general information and specific topics session for MEP's Summer Bridge Program.

Represented: Boulder Faculty Assembly to the CU Intercollegiate Athletics Committee and the Chancellor's Committee on Program Accessibility.

Represented: Non-tenure at-large member of the Boulder Faculty Assembly.

Radulescu, Anca

Reviewer: “Physica A”.

Coordinated: APPM 1350 (Spring 2007).

Segur, Harvey

Served upon: Department Chair's Advisory Committee.

Reviewer: Journal of Fluid Mechanics.

Reviewer: Journal of Computational Physics.

Reviewer: Fluid Dynamics Research.

Reviewer: Physical Review Letters.

Reviewer: Physics Letters A.

Reviewer: Wave Motion.

Reviewer: International Offshore and Polar Eng. Conf.

Tong, Tiejun

Reviewer: The Australian and New Zealand Journal of Statistics.

Reviewer: Computational Statistics and Data Analysis.

Reviewer: Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences.

Reviewer: Chapter in “Frontiers in Biostatistics and Bioinformatics”, USTC Press.

Teaching Activities

Undergraduate Courses Taught by Department Faculty

SPRING 2007

Course Number	Instructor	Course Title
APPM 1345	Byrne, Nelson	Calculus 1B w/ Algebra
APPM 1350	Prentice, Radulescu	Calculus 1 for Engineers
APPM 1360	Horikis, Nelson, Radulescu, Tearle	Calculus 2 for Engineers
APPM 2350	Mayhew, Norris	Calculus 3 for Engineers
APPM 2360	Bortz, Heuett, Lee	Differential Equations w/ Linear Algebra
APPM 2450	Reynolds, Schmitt	Calculus 3 Lab
APPM 2460	Biagioni, Hammond, Robinson	Differential Equations Lab
APPM 2750	Bishop	Java 2
APPM 3050	Tearle	Scientific Computing in Matlab
APPM 3310	Dougherty	Matrix Methods
APPM 3570	Lladser	Applied Probability
APPM 4120/5120	Hallowell	Operations Research
APPM 4360/5360	Fornberg	Complex Variables
APPM 4520/5520	Rider	Intro to Mathematical Statistics
APPM 4540/5540	Kuznetsov	Intro to Time Series
APPM 4570/5570	Heuett	Statistical Methods
APPM 4580/5580	Luftig	Statistical Methods Data
APPM 4650	Fox	Intro to Numerical Analysis 1
APPM 4660	Norris	Intro to Numerical Analysis 2
APPM 4720/5720	Hughson	Mathematical Finance
APPM 4720/5720	Kim	Numerical Linear Algebra
APPM 4950	Bishop	Seminar in Applied Mathematics
APPM 4950	Dougherty	Wavelets
GEEN 1350	Bousquet	Calculus 1 Workgroup
GEEN 1360	Grooms	Calculus 2 Workgroup
HONR 1001	Dougherty	Calculus 3 and Differential Equations

SUMMER 2007

Course Number	Instructor	Course Title
APPM 1350	Balk	Calculus 1 for Engineers
APPM 1360	Grooms	Calculus 2 for Engineers
APPM 2350	Girard, Mayhew	Calculus 3 for Engineers
APPM 2360	Byrne, Nixon	Differential Equations w/ Linear Algebra
APPM 2450	Reynolds	Calculus 3 Lab
APPM 2460	Hammond	Differential Equations Lab
APPM 3310	Radulescu	Matrix Methods
APPM 4650	Norris	Intro to Numerical Analysis 1

FALL 2007

Course Number	Instructor	Course Title
APPM 1340	Melara, Nelson	Calculus 1A w/ Algebra
APPM 1350	Melara, Nelson, Radulescu, Segur	Calculus 1 for Engineers
APPM 1360	Dougherty, Li	Calculus 2 for Engineers
APPM 2350	Herzfeld, Norris	Calculus 3 for Engineers
APPM 2360	Horkis, Julien, Prinari	Differential Equations w/ Linear Algebra
APPM 2450	Reynolds	Calculus 3 Lab
APPM 2460	Hammond, Nixon	Differential Equations Lab
APPM 3010	Radulescu	Intro to Nonlinear/Chaos
APPM 3310	Beylkin, Dougherty	Matrix Methods
APPM 4350/5350	Ablowitz	Methods in Applied Math 1: Fourier Series
APPM 4520/5520	Tong	Intro to Math Statistics
APPM 4560/5560	Corcoran	Markov Processes
APPM 4570/5570	Corcoran	Statistical Methods
APPM 4650	Norris	Intro to Numerical Analysis 1
APPM 4720/5720	Bortz	Mathematical Biology
GEEN 1350	Biagioni, Smith-Palmer	Calculus 1 Workgroup
GEEN 1360	Brown	Calculus 2 Workgroup
HONR 1001	Dougherty	Calculus 1 and 2 for Engineers

Graduate Courses Taught by Department Faculty

SPRING 2007

Course Number	Instructor	Course Title
APPM 5450	Martinson	Applied Analysis 2
APPM 5480	Segur	Approximation Methods
APPM 5610	Beylkin	Numerical Analysis 2
APPM 6640	McCormick	Multigrid Methods
APPM 6900	Corcoran	Independent Study
APPM 7400	Fornberg	Radial Basis Functions
APPM 7400	Maier	Software Tools/Comp. Sci. and Engineering
APPM 7400	Lladser	Advanced Probability
APPM 8000	Fornberg	Colloquium
APPM 8100	Ablowitz	Seminar in Nonlinear Waves
APPM 8600	McCormick	Seminar in Computational Math

FALL 2007

Course Number	Instructor	Course Title
APPM 5440	Manteuffel	Applied Analysis 1
APPM 5470	Curry	Methods of Applied Mathematics 3: PDE's
APPM 5600	McCormick	Numerical Analysis 1
APPM 6610	Manteuffel	Numerical Partial Differential Equations
APPM 7400	Anne Dougherty	Teaching Exc
APPM 7400	Luftig	Advanced Topics in Statistics
APPM 8000	Tom Manteuffel	Colloquium
APPM 8100	Jim Meiss	Seminar in Dynamical Systems
APPM 8100	Mark Ablowitz	Seminar in Nonlinear Waves
APPM 8600	McCormick	Seminar in Computational Math

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