Department of Applied Mathematics

Annual Report 2009

Applied

COHERENCE

WITHIN CHAOS
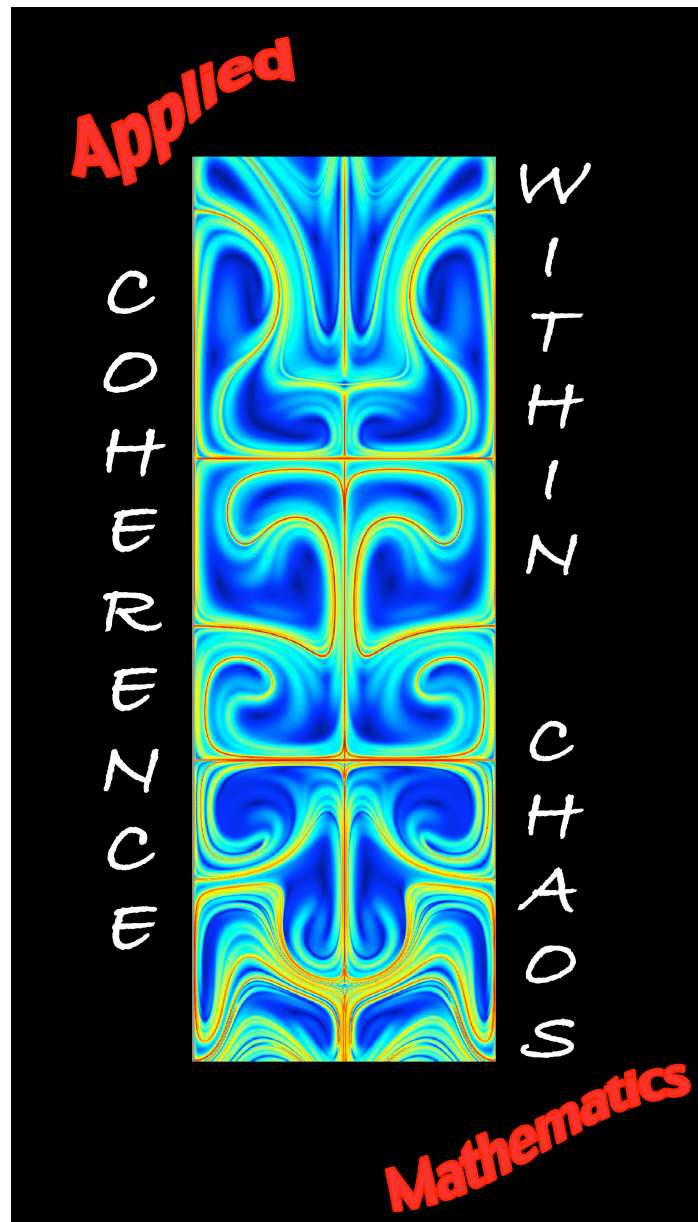
Mathematics

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 at the University of Colorado at Boulder creates a t-shirt that illustrates aspects of current research in the department. This year's winner was Brock Mosovsky, a PhD candidate in our program. This year's design depicts approximate manifolds called Lagrangian Coherent Structures (LCS) arising in a time-dependent system modeling pairs of counter-rotating vortices in a fluid flow (*see Shadden, Shawn C., et. al. "Definition and properties of Lagrangian coherent structures from finite-time Lyapunov exponents in two-dimensional aperiodic flows." Physica D, 212:271-304, 2005 for the full system description*). Motion and transport in two-dimensional chaotic dynamical systems can be understood, at least in part, by identifying invariant manifolds within the flow. These manifolds divide the phase space into dynamically distinct regions, and in so doing provide a skeleton of sorts for the underlying flow by means of which we can quantify transport and mixing within the system.

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Overview

The Department of Applied Mathematics focuses on strategies and maintains 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 has shown that the question is not whether mathematics will be applied – the only question is where and when!

Our mission has changed little 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. We continue to seek new methods to continue the growth in enrollment we have seen across all our degrees over the last ten years.

An Applied Mathematics degree is an extremely flexible technical degree. A consequence of this flexibility is that the Department is constantly on the look out for new areas of engagement or new areas to apply mathematics. Game development, including smart phone applications, is a field in which growth shows no signs of stopping, and Applied Mathematics hopes to be at the forefront, contributing high value and new ideas. The University has identified statistics as another important area for the future and Applied Math is poised to rapidly expand our research and teaching in that area as well.

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.

The Department of Applied Mathematics at the University of Colorado at Boulder has moved from strength to strength with its excellent faculty and excellent students. With its Vision, Mission, and Goals will not only participate in shaping the 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   **Dr. Anne Dougherty**
Department Chair   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 our 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. The Department taught over seven thousand undergraduate and graduate students in 2009. See p. 37 for a detailed list of the courses taught. We had 127 undergraduate Applied Mathematics majors in 2009, a seven percent increase from 2008.

30 students received their baccalaureate degrees this year. (See p. 8 for a list of our graduates.) We are proud that 26 students in the fall and 30 in the spring semester made the Dean's List for academic achievement, with grade-point averages of 3.75 or better. Our minor program, attracting students from other majors who are interested in more in-depth training in applied mathematics, shows a similar enrollment bump as the major exhibited. 58 students in Spring 2009, and 46 students in Fall 2009 had an Applied Math minor, and more are taking at least some of the upper division courses towards it. (This is a roughly 9% increase from 2008.)

The undergraduate student chapter of SIAM (the Society for Industrial and Applied Mathematics) is responsible for promoting interactions between applied math faculty and majors. It also sponsors activities and presentations that introduce undergraduates to the use of mathematics in engineering and the sciences. Events this past year included the annual Student Research Conference.

The CU Boulder undergraduate chapter of SIAM, one of the newest engineering societies at CU, was founded to promote interactions between Applied Math 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 2008-2009 Co-Presidents Joseph Adams, Ryan Schilt, Garrett Clark, and Jonathan Olson. Anne Dougherty serves as Faculty Advisor.

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.

Some of the demographics of the graduate program in the Applied Math Department:

- In 2009, the department had 85 graduate students.

- In Fall 2009, we welcomed 19 new graduate students to our program.

- We continue to attract a large fraction of U.S. citizens: in 2009, over 85% of the incoming students with

financial support were U.S. citizens.

- 17 of our graduate students are women.

- Our graduate program had two under-represented minority students in 2009. In the field of mathematics, Asian minority students are not considered under-represented.

- Seven students completed their PhDs in 2009. 13 students received MS degrees, with nine continuing towards the PhD at CU. See p. 8 for a list of this year's graduates.

- Funding: 40% of our graduate students (34) were Teaching Assistants (TAs) in the fall semester (includes both full time and part time TAs), with 32 serving as TAs in the spring.

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 nine years are as follows:

Year	Total Number of Enrolled Students in All APPM Courses	Number of Enrolled Graduate Students (MS/PhD)	Number of Enrolled Undergraduate Majors	Number of Enrolled Undergraduate Minors
2001 (Calendar)	5,435	22/57	66	29
2002 (Calendar)	5,899	28/55	67	34
2003 (Calendar)	6,127	39/54	85	37
2004 (Calendar)	6,443	35/60	90	42
2005 (Calendar)	6,342	31/54	105	48
2006 (Calendar)	6,358	28/50	120	65
2007 (Calendar)	6,746	32/55	110	63
2008 (Calendar)	6,775	26/52	119	64
2009 (Calendar)	7,428	37/48	127	69

Applied Mathematics saw a significant jump in overall course enrollment in 2009 – an 8% increase over the previous year, and a full 27% increase since 2001. This suggests that increased recruiting efforts on the part of the University are proving successful. Undergraduate Majors and Minors have experienced slow, steady growth over the past nine years, with minor enrollment consistently measuring approximately half of major enrollment.

Undergraduate Enrolled Upper-Division Student Credit Hours
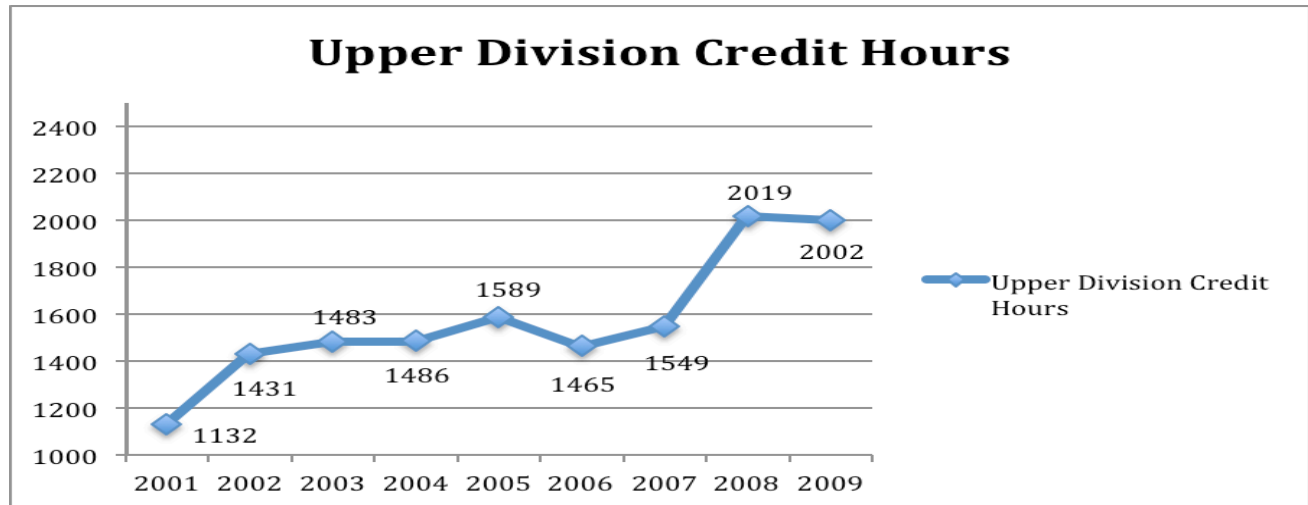
There has been a general upward trend in undergraduate enrollment, although this year saw a small drop (<1%) in enrolled hours. Our higher-level Calculus and Differential Equations classes have been growing consistently – we are currently teaching just over 2,000 student credit hours of upper-division courses. The steady growth of enrolled undergraduate minors is a significant factor in the increase in upper division student credit hours.

Graduate Enrolled Credit Hours
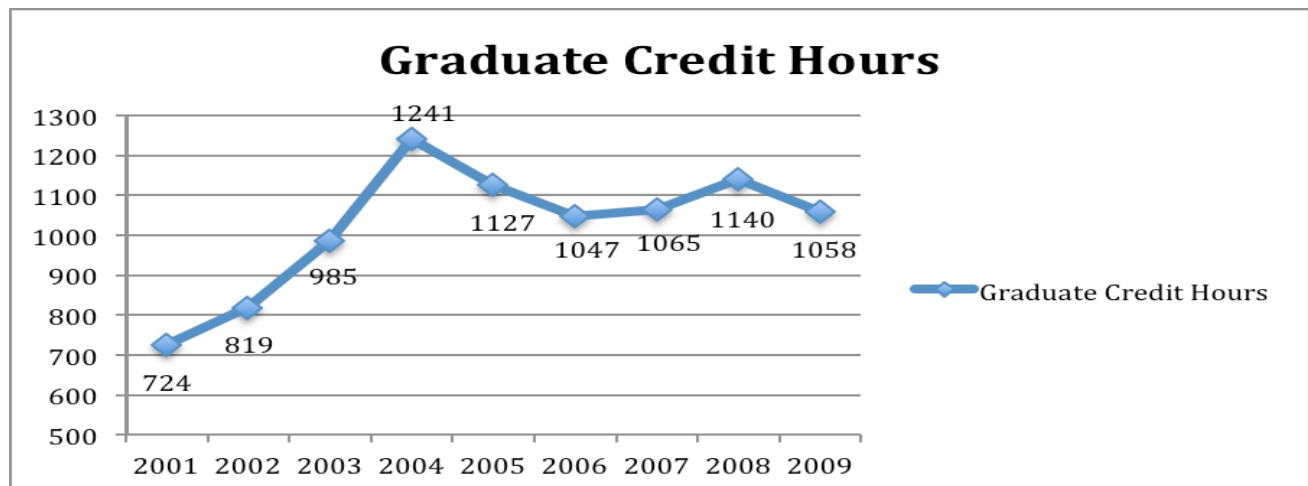
Graduate credit hours dropped 8% this year, despite an equivalent increase in individual enrollment.

Graduating Students

May 2009	August 2009	December 2009

Bachelor's Degrees

May 2009	August 2009	December 2009
Jessica Lynn Byers	Yulia Anna Kushner	Nathan David Calvert
Henry Diaz	Brenda Lynn Marcum	Eric David Campbell
William O'Rahilly Dowling	Joseph Allen Severino	Jeremy Michael Hanson
Eric Verne Eason	Alyson Nicole Vahling	Katherine Marie Peterson
Alexander Charles Fletcher		Karen Michelle Suppes
En-Jay Antony Hsu		Annie Marie Venturo
Paul Michael Joos		Elena Winchester
Ryan David Kennedy		
Debra Michelle Kesner		
Hilary Anne Kushnir		
Ruth Ann Martin		
Alec Joseph McQuilkin		
Kyle M Miller		
Theodore John Miyasaki		
Maxwell Cassady Moe		
Jessica Meredith Nuzzi		
Andrew Joseph Scacco		
Bruce Farley Wallin		
Austin Tyler Winger		

Master's Degrees

May 2009	August 2009	December 2009
Bryan James Loughry	Brock Alan Mosovsky	Julia Marie Sando-Hilton
Jason Peter Boorn,		Michael Allen Kochen
		Christopher W Woods
		Anthony Peter Rasca
		Amrik Sen
		Kuo Liu
		Daniel Nathan Kaslovsky
		Adrianna Marie Gillman
		Ryan Dean Lewis
		Daniel Benjamin Larremore

Doctoral Degrees

May 2009	August 2009	December 2009
Andrew Timothy Barker	James Haley Adler	Christian Willys Ketelsen
	Benjamin Franklin Jamroz	Michael Nathan Levy
	Gregory James Norgard	Si Liu

Changes in Personnel

In the fall of 2009, Christopher Curtis joined the Applied Mathematics department as an Instructor. Chris came to the department from the Department of Applied Mathematics at the University of Washington, Seattle. His research interests include determining the stability of solutions to nonlinear wave equations, and computation and analysis of the spectrum of linear operators. He taught two sections of Calculus 1 in his first semester with the department.

In Fall 2009, the department began a search to fill a newly created Assistant Professor position, to begin in Fall 2010.

APPM Account Tech David Hanley and his wife Jen had their first son, Devan, in August.

Faculty Awards and Honors

Applied Mathematics faculty is regularly honored both nationally and internationally.

Mark Ablowitz was named the University of Colorado CRCW Distinguished Research Lecturer.

Harvey Segur was honored as the principal lecturer of the 2009 annual Geophysical Fluid Dynamics Summer Program at Woods Hole Oceanographic Institute.

Jim Meiss was awarded the Sydney University International Visiting Research Fellowship.

Bengt Fornberg was a Visiting Fellow at Oxford University (UK).

Anne Dougherty, together with Bengt Fornberg and David Bortz, organized five teams (14 students) to participate in the international Mathematical Contest in Modeling, February 2009. One team received Outstanding and was designated as the Informs winner, one team received Meritorious (top 15%) and three teams were designated as Successful Participant.

Mary Nelson was a candidate for the Woodhull-Logical Endowed Professor award.

Faculty, Instructors, Research Associates, Visitors, and Staff

Core Faculty, Instructors, and Research Associates

Cory Ahrens – *Research 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 – *Research 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.

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.

Thomas 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.

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.

Juan Restrepo -- *Assistant Professor;* PhD, Northeastern University.

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 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*; Physical Applied Mathematics.

Andrew Moore – *Atmospheric and Oceanic Sciences*; 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*; 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 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 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*; 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*; Geophysical Fluid Mechanics, Turbulence, and Climate predictability.

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

Visitors in 2009

In addition to our visiting speakers, the following guests visited the department, primarily for research:

Nalan Antar – *Istanbul Technical University,* hosted by Professor Mark Ablowitz (09/12/09 – 01/12/10)

Silvana DeLillo – *University of Perugia, Italy,* hosted by Professor Mark Ablowitz (April 2009)

Holger Dullin – *University of Sydney, Australia,* hosted by Professor James Meiss (June 2009)

Tao Jiang – *Zhejiang Gongshang University*, hosted by Professor Tiejun Tong (04/01/09 – 03/10/10)

Elisabeth Larsson – *Uppsala University, Sweden*, hosted by Professor Bengt Fornberg (Oct – Nov 2009)

Yutian Lei – *Nanjing Normal University, China*, hosted by Professor Congming Li (08/20/09 – 08/20/10)

Robert Maier – *University of Arizona, Tucson,* hosted by Professor Mark Ablowitz (2009)

Barbara Prinari – *University of Salento, Lecce, Italy*, hosted by Professor Mark Ablowitz (Feb – May 2009)

Matteo Sommacal – *International School for Advanced Studies, Trieste, Italy,* hosted by Professor Mark Ablowitz (Jan – Apr 2009)

Staff

Marcia Flynt – *Department Administrator.*

Susan Pryor – *Graduate Program Assistant.*

David Hanley – *Accounting Technician and Undergraduate Program Assistant.*

Ian Cunningham - *Office Coordinator*

Shannon Priem, Vincent Wheeler – *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. Harvey Segur chaired and organized the Colloquium Series.

01/12/09*		**Jeffrey Ovall**, California Institute of Technology, *A Robust and Flexible Error Estimator for Finite Element Discretizations of Elliptic PDEs*

01/16/09		**Andrew Christlieb**, Department of Mathematics, Michigan State University, *An Accurate Sub-cell Method for Mesh Based Lagrangian Particle Codes*

01/23/09		**Mark Kramer**, Center for BioDynamics, Boston University, *Brain Rhythms: In Sickness and in Health*

01/30/09		**David Anderson**, Department of Mathematics, University of Wisconsin-Madison, *Deterministic and Stochastic Methods for Biochemical Reaction Systems*

02/06/09		**Laurent Demanet,** Department of Mathematics, Stanford University**,** *Compressive Wave Computation*

02/13/09		**Margo Levine**, Department of Radiology, University of Chicago, *Formation of Quantum Dots in Thin Films: From Step-Flow Growth to Self-Assembly*

02/20/09		**Kamran Mohseni,** Department of Aerospace, University of Colorado at Boulder**,** *CFD and Dynamical System Techniques in Modeling Propulsion in Jellyfish*

02/27/09		**Dan Cooley**, Department of Statistics, Colorado State University, *A New Parametric Model for Multivarate Extremes and Prediction for Extremes Via an Angular Measure*

03/06/09		**Vladimir Rokhlin**, Computer Science, Yale University, *Accurate Randomized Algorithms of Numerical Analysis*

03/13/09		**Mark Newman**, Department of Physics, University of Michigan, *Networks and Influence*

03/20/09		**Matt McQueen,** Institute for Behavioral Genetics, University of Colorado at Boulder, *Family-Based Methods in the Genome-Wide Association Era*

03/20/09		**Sam Stechmann**, Department of Mathematics, University of California- Los Angeles, *Models of Clouds and Atmospheric Waves in the Tropics*

04/03/09**		**Mark Ablowitz,** Department of Applied Mathematics, University of Colorado at Boulder, *Extraordinary Waves and Math-- From Beaches to Lasers*

04/10/09		**Joe Tribbia**, National Center For Atmospheric Research, Boulder, CO, *Climate and Mathematics: 54 years later*

04/17/09		**Manuel Lladser**, Department of Applied Mathematics, University of Colorado at Boulder, *A New Approach to Population Diversity: The Extrapolation Problem*

04/24/09		**Daniel J. Scheeres**, Department of Aerospace, University of Colorado at Boulder, *Celestial Mechanics and the Lifestyles of Small Asteroids*

09/11/09   **Steve Childress**, Courant Institute, New York University, *Symmetry and Locomotion*

09/18/09   **Stein Sture,** Interim Provost of University of Colorado at Boulder**,** *Computational Science and Engineering: An Overview*

09/25/09   **Rich Regueiro,** Department of Civil Engineering, University of Colorado at Boulder**,** *Grain-to-Macro-Scale Modeling Resolution of Localized Deformation in Bound and Unbound Particulate Materials*

10/02/09   **Garland Durham,** Leeds School of Business, University of Colorado at Boulder**,** *Beyond Stochastic Volatility and Jumps in Returns and Volatility*

10/09/09   **Sujeet Bhat,** Department of Applied Mathematics, University of Colorado at Boulder**,** *Homogenization of A Nonlinear Elliptic Boundary Value Problem Related to Corrosion Modeling*

10/16/09   **James P.M. Syvitski**, CU Boulder Research Cabinet, *Community Surface Dynamics Modeling System Morphodynamic Models: An Overview*

10/23/09   **Gunnar Martinsson,** Department of Applied Mathematics, University of Colorado at Boulder, *Fast Matrix Computations Via Randomized Sampling*

10/30/09   **Shannon Hughes,** Department of Electrical and Computer Engineering, University of Colorado at Boulder**,** *Learning on and Characterization of High-Dimensional Datasets in Multiple Domains*

11/6/09   **Mike Shull,** Department of Astrophysical and Planetary Sciences, University of Colorado at Boulder**,** *Computational Cosmology: Theory and Simulation*

11/10/09***   **Brandon Bale**, Photonics Research Group Aston University, Great Britain, *Intra-cavity Pulse Dynamics in Mode-Locked Fiber Lasers*

11/13/09   **Yekaterina Epshteyn**, Department of Mathematical Sciences and Center for Nonlinear Analysis, Carnegie Mellon University, *Chemotaxis and Numerical Methods for Chemotaxis Models*

11/17/09***   **Saverio Spagnolie**, Department of Mechanical and Aerospace Engineering University of California, San Diego, *The Hydrodynamics of Locomotion at Low and Intermediate Reynolds Numbers*

11/20/09   **Henry Fu,** Department of Engineering, Brown University**,** *Swimming in Viscoelastic Fluids and Gels*

11/30/09   **Vanja Dukic**, Department of Health Studies, University of Chicago, *Tracking Flu Epidemics -- Google Flu Trends and Particle Learning Algorithms*

12/03/09***   **Christel Hohenegger**, Courant Institute of Mathematical Sciences, New York University, New York, *Understanding the Dynamics and Mechanics of Complex Fluids*

12/04/09   **Bernard Amadei**, Department of Civil Engineering, University of Colorado at Boulder, *Role of Engineers in Poverty Reduction: Challenges and Opportunities*

*   The first colloquium of the semester was on Monday, January 12, 2009 at 4:00pm in ECCR 155.
** Mark Ablowitz's lecture took place at 3:30pm in Old Main Chapel
*** These colloquia were special events, held at 2:00 PM in DLC Collaboratory

Nonlinear Waves Seminars

The Nonlinear Waves seminar series was held on Tuesday afternoons during the academic year at 4:00 pm, in ECOT 226. Mark Ablowitz chaired and organized the seminar series.

01/27/09 **Jon Wilkening,** Department of Mathematics, University of California, Berkeley, *Time-Periodic Solutions of the Benjamin-Ono Equation*

02/03/09 **Matteo Sommacal,** Dipartimento di Matematica e Informatica, Università degli Studi di Perugia, Italy, *An Analytical Model for Synthetic- and Bio- Polymers Based on Continuous Elastic Rods: Circular Helix Solutions*

03/03/09 **Harihar Rajaram,** Department of Civil, Environmental and Architectural Engineering, University of Colorado at Boulder, *A Stefan Problem Arising from Two-Species Reaction-Diffusion with Applications to Chemical Oxidation of Contaminants in Fractured Rock*

03/10/09 **Curtis Menyuk,** Optical Fiber Communications Laboratory, University of Maryland Baltimore County, *Solitons, Self-Induced Transparency, and Modelocking in Quantum Cascade Lasers*

03/17/09, 3:00 PM **Jennifer Mueller,** Department of Mathematics, Colorado State University, *Numerical Solution of the Novikov-Veselov Equation by the Inverse Scattering Method*

04/07/09 **Barbara Prinari,** Dipartimento di Fisica, Università del Salento (Lecce), *Inverse Scattering Transform (IST) for the Multicomponent Nonlinear Schrodinger (NLS) Equation Under Non-Vanishing Boundary Conditions*

04/14/09 **Monika Nitsche,** Department of Mathematics and Statistics, University of New Mexico**,** *Evolution of Solitary Waves in a Two-Pycnocline System*

04/21/09 **Boaz Ilan,** Applied Mathematics, University of California at Merced**,** *Dynamics of Solitons in Spectral Gaps and Near the Gap's Edge*

06/16/09 **Vladimir P. Gurarii,** Engineering and Industrial Sciences, Swinburne University of Technology**,** *Divergent Expansions: Error Bounds, Duality and Stokes Phenomenon*

09/15/09 **Mark Hoefer**, Department of Mathematics, North Carolina State University, *Two-Dimensional Supersonic, Superfluidic Flows*

09/29/09 **Anton Dzhamay**, School of Mathematical Sciences, University of Northern Colorado, *Factorizations of Rational Matrix Functions with Applications to Discrete Integrable Systems and Discrete Painlevé Equations*

10/06/09 **Mark Bradley**, Department of Physics, Colorado State University, *Solitons and Shocks on the Surface of a Current-Carrying Metal Thin Film*

10/13/09, 3:30 PM **Terry Haut**, Department of Applied Mathematics, University of Colorado at Boulder, *Asymptotic Expansions for Solitary Gravity-Capillary Waves in Two and Three Dimensions*

10/20/09 **Christopher Curtis**, Department of Applied Mathematics, University of Colorado at Boulder, *Exact and Approximate Methods for Determining Spectral Stability*

11/03/09 **Guy Baruch**, Department of Applied Mathematics, Tel Aviv University, *New Singular Solutions of the Biharmonic NLS Equation*

11/10/09 **Govind Menon,** Division of Applied Mathematics, Brown University, *Kinetic Theory and Lax Equations for Burgers Turbulence*

11/17/09, 3:30 PM   **Lev Ostrovsky**, Zel Technologies/Earth Systems Research Laboratory, NOAA, *Dynamics of Strongly Nonlinear Solitons and Kinks in a Two-Layer Fluid*

12/01/09   **Nalan Antar,** Department of Mathematics, Istanbul Technical University, *Fundamental, Dipole and Vortex Solitons in Complex 2D Nonlinear Lattices*

Computational Mathematics Seminars

The Computational Mathematics seminar series was held on Tuesday mornings during the academic year at 10:00 am, in the Grandview Conference Room.   Steve McCormick chaired and organized the sminars in the spring semester, and Tom Manteuffel chaired and organized in the fall.

01/20/09   **James Adler,** Department of Applied Mathematics, University of Colorado**,** *Energy Variational Approach to MHD Equations*

02/17/09   **Abhijit Chaudhuri,** Department of Civil, Environmental, and Architectural Engineering, University of Colorado**,** *Buoyant Convection Resulting from Dissolution and Permeability Growth in Vertical Limestone Fractures*

02/24/09   **Jingmei Qiu,** Department of Mathematical and Computer Science, Colorado School of Mines**,** *Conservative High Order Semi-Lagrangian Method for the Vlasov Equation*

03/31/09   **Ulrich Rude**, Department of Computer Science, University Erlangen-Nuremberg, *Parallel Simulation and Animation of Complex Flows*

04/14/09   **James Adler,** Department of Applied Mathematics, University of Colorado at Boulder**,** *Nested Iteration and First-Order Systems Least Squares on Incompressible Resistive Magnetohydrodynamics*

10/06/09   **Jeff Heys,** Department of Chemical and Biological Engineering, Montana State University**,** *Modeling Fluid Structure Interactions with Application to Biofilms*

12/08/09   **Jacob Schroder.** University of Illinois**,** *Advancements in Algebraic Multigrid Methods*

Dynamics Seminars

The Dynamics/Complex Systems seminar series was held on Tuesday mornings during the academic year at 10:00 am, in the APPM Conference Room. Jim Meiss and Juan Restrepo co-chaired this series.

01/15/09   **N. Nirmal Thyagu.** Indian Institute of Technology Madras**.** *Chaotic Advection of Inertial Particles in Two-dimensions: The Paradigm of Embedding Maps*

01/22/09   **Juan Restrepo,** Department of Applied Mathematics, University of Colorado**,** *Synchronization of Calcium Alternans in Tissue*

01/29/09   **Kye Taylor,** Department of Applied Mathematics, University of Colorado**,** *Sparse Recovery and Parameterization of Manifold Valued Data*

02/12/09   **Michael Mozer,** Computer Science, Institute of Cognitive Sciences, University of Colorado**,** *Rational Models of Cognitive Control*

02/19/09   **Aaron Beach,** Department of Computer Science, University of Colorado

02/26/09   **Yi Zhu,** Department of Applied Mathematics, University of Colorado**,** *Universal Map for Fractal Scattering in Weak Solitary Wave Interactions*

03/12/09   **Vakhtang Putkaradze,** Department of Mathematics, Colorado State University**,** *Geometric mechanics of charged ribbons, or orientation-dependent nonlocal interactions along charged filaments*

03/19/09   **Patrick Weidman,** Department of Mechanical Engineering, University of Colorado**,** *Modified Shape of the Eiffel Tower Determined for a Realistic Parisian Wind*

04/02/09   **Gregory Duane,** National Center for Atmospheric Research, Boulder,CO**,** *Synchronization of Extended Systems from Internal Coherence*

04/09/09   **Kamran Mohseni,** Department of Aerospace Engineering Sciences, University of Colorado

04/16/09   **Samuel Flaxman,** Department of Ecology and Evolutionary Biology Sciences, University of Colorado**,** *Simultaneous Habitat Selection by Predators and Prey: Theory and Experiments*

04/23/09   **Anca Radulescu,** Department of Applied Mathematics, University of Colorado, *A Firing-Rate Model of Bursting in Neuronal Populations*

09/03/09   **Dane Taylor**, Department of Electrical Engineering, University of Colorado at Boulder, *Studying Spontaneous Synchronization of Kuramoto Oscillator Systems with Added Frequency Adaptation*

09/17/09   **Paul Chinowski,** Department of Civil, Environmental, and Architectural Engineering, University of Colorado at Boulder, *A Social Network Theory of Project High Performance: Moving a Project Toward Collaboration and Knowledge Transfer*

09/24/09   **Liz Bradley,** Department of Computer Science, University of Colorado at Boulder, *Chaos in Computer Performance*

10/01/09   **Ana Maria Rey,** JILA, University of Colorado at Boulder, *Exploring Nonlinear Phenomena using Ultra-cold atoms in bi-chromatic Optical Lattices*

10/15/09   **Brock Mosovsky,** Department of Applied Math, University of Colorado at Boulder**,** *Adaptive Tracking of Lagrangian Coherent Structures*

10/22/09   **Dave Biagioni,** Department of Applied Math, University of Colorado at Boulder, *Algorithms for Removing Thermodynamically Infeasible Loops from Flux Balance Analysis Solutions*

10/29/09   **Kamran Mohseni,** Department of Aerospace Engineering Sciences, University of Colorado at Boulder**,** *Shock and Turbulence Regularization in Euler Equations: Derivation from Basic Principles*

11/05/09   **Liz Bradley**, Department of Computer Science, University of Colorado at Boulder, *Chaos in Computer Performance*

11/12/09   **David Albers,** Department of Biomedical Informatics, Columbia University**,** *Dynamical Biomedicine: At the Interface Between Biomedicine and Nonlinear Science*

11/19/09   **Krissy Snyder,** Department of Applied Math, University of Colorado at Boulder**,** *Exploring the Role of an Internal Associative Map in Metabolic Minimization in Running*

12/03/09   **Mettupalayam V. Sivaselvan,** Department of Civil, Environmental, & Architectural Engineering, University of Colorado at Boulder

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 2008-2009 Co-Presidents were Joseph Adams, Ryan Schilt, Garrett Clark, and Jonathan Olson. Anne Dougherty serves as Faculty Advisor. Officers for the Grad Student chapter were President Dan Kaslovsky, and Vice-President Dan Larremore. Tom Manteuffel acted as Faculty Advisor.

SIAM Undergraduate 2009 Events

2009 SIAM Student Conference
Saturday, March 14th, 2009
Location: University of Colorado at Denver
The SIAM student chapters of Colorado hosted their fifth annual regional student conference on applied mathematics for all schools along the Front Range. This event allowed students from different universities in the area to see what is being done in this field and promote interest in applied mathematics in general. This event is open to both undergraduates and graduate students.

Industry Talk by Eric Ray (SUN Microsystems)
Thursday March 19, 2009 at 5:00pm
Location: ECCR 155 (Engineering Center)
What do employers really look for when hiring? How important is your GPA? Eric Ray, from SUN Microsystems, will tell students how to be competitive in the job market, and how not to shoot themselves in the foot when preparing to search for a job/career.

SIAM Graduate 2009 Events

Student Talk
February 12, 2009
Matt Reynolds: *Hankel matrices, approximation by exponentials, and an application to MRL.*

2009 SIAM Student Conference
Saturday, March 14th, 2009
Location: University of Colorado at Denver
The SIAM student chapters of Colorado hosted their fifth annual regional student conference on applied mathematics for all schools along the Front Range. This event allowed students from different universities in the area to see what is being done in this field and promote interest in applied mathematics in general. This event is open to both undergraduate and graduate students.

Organizational meeting
September 10, 2009
Meet and greet

Special Guest Talk
October 1, 2009
NASA's Jet Propulsion Lab

Student Talk
October 22, 2009
Adrianna Gillman: *Sublinearly fast solvers for finite difference operators on mostly structured grids*

Student Talk
December 13, 2009
Doug Lipinski: *Computation and applications of Lagrangian coherent structures in fluid dynamics problems*

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. In the past, WIM has hosted events approximately once a month.

Research

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

Department-wide Grants

MCTP

Mentoring Through Critical Transition Points (hereafter, MCTP) is a National Science Foundation (NSF) funded program that brings together undergraduate students, graduate students, and faculty on common research projects. Previously, undergraduate research was funded through a NSF Vertical Integration of Research and Education (VIGRE) grant which ended in the spring of 2004. MCTP picks up where VIGRE left off, providing support for innovative research in the Department. Over the last five years, the MCTP grant has supported X undergraduates with stipends of up to $6,500 per year.

Students have been recruited as freshmen through honors seminars. As students progressed into the sophomore and junior level, they were invited to join small research seminars led by faculty and advanced graduate students. After the seminars, the students would often continue their own research projects alone or in small groups.

The grant is headed by Professor and Department Chair James Curry. Anne Dougherty, Keith Julien, James Meiss and Harvey Segur serve as co-investigators. Every one of these faculty members have extensive experience working with undergraduate students, both in the classroom and on individual research projects.

Project topics and the students researching them in 2009:

- **Instabilities of Internal Gravity Waves –** Aaron Smith

- **Experimental Study of a Thermal Convection Driven by Centrifugal Buoyancy in a Rapidly Rotating Annulus –** Ho Yun "Bobby" Chan

- **Variational Integration of Mechanical Students –** Kirk Nichols

- **Chaotic Advection and Blinking Vortices –** Ryan Schilt, Joe Adams, Anna Lieb

- **Finite Time Lyapunov Exponents –** Ryan Thorpe, Nick Weinreich

- **Using Ideas of Dynamical Stability to Explore Gait –** Tim Dunn, Ignas Satkauskas

- **Distribution of Values in FTLE Fields –** Shaun Starbuck

- **FTLE of the Standard Map –** Pavel Zelinsky

- **Finding the Hausdorff Dimension of a Self-Affine Set –** Marshall Carpenter

- **Finding the Eigenstructure of Isoceles Triangles Using McCartin's Method –** Anil Damle, Geoffrey Peterson

- **Shallow Water Equations –** Ruth Martin

- **Contaminants in Water Distribution Systems –** Cody Cichowitz

- **Spider Webs – Do They Exhibit a Natural Network –** Paul Fornia, Margaret Noble, Tiana Stastny

- **Modeling the Immune Complement Response –** Matanya Horowitz and Toni Klopfenstein

- **Artistic Outreach for Science, Mathematics and Engineering** – Alysia Davis

- **Calculus Exploration Lab Development** – Jacob Smith, Toby Jones

- **Endocytosis and Calculus Exploration Lab Development** – Katherine Peterson

- **Spline Exploration Lab Development** – Pavel Zelinsky

- **Endocytosis and Cell Mechanism Simulation** – Ryan Schilt

- **Numerical Methods for Quantum Chromodynamics** – Anne Lieb

- **Simulating Clusters of Charged Particles in Electric Potential Fields** – JaeAnn Dwulet

- **Numerical Evaluation of Lattice Green's Functions** – Tracy Babb

Oral Assessment-NSF Grant

In November 2008, The University of Colorado at Boulder applied mathematics department was awarded a $450,000 grant by the National Science Foundation to introduce pre-examination "oral assessments" in a number of courses to improve student understanding.

Led by principal investigator and applied math department instructor Mary Nelson, the oral assessments effort was increased on the CU-Boulder campus and implemented at several other sites. Faculty from CU-Boulder's aerospace engineering sciences department, UC-Colorado Springs mathematics Professor Gene Abrams and teachers at Fairview High School also were involved.

The NSF grant will make it possible to collect and analyze data and to introduce oral assessments into a wider range of courses both at CU-Boulder and local schools. Oral assessments are now in use in calculus classes at CU-Boulder and UC-Colorado Springs and are being introduced in two algebra classes at Fairview High School. In fall 2009, oral assessments will be offered in CU-Boulder introductory mechanical engineering and aerospace engineering classes

Individual Research Grants

Ablowitz, Mark

NSF-DMS: "Nonlinear wave motion," 2006--2009
NSF-DMS: "Nonlinear wave motion," 2009--2012

Beylkin, Gregory

DOE/UT-Battelle/ORNL: "Multiresolution Adaptive Numerical Evaluation and Scientific Simulation," 2005 – 2010
AFOSR: ``Geospatial Representation, Analysis and Computing Using Bandlimited Functions," 2006 – 2009
NSF: "Fast Multiresoloution Methods and Nonlinear Approximations for Multidimensional Problems," 2006 –2010
DOE: "Integrated Multiscale Modeling of Molecular Computing Devices," 2007 – 2010

Bortz, David

AFOSR: "Solving Differential Equations with Random Ultra-Sparse Numerical Discretizations"
DOE-NREL: "Applied Mathematics Research for High Performance Systems Biology"
NIH: "Biomechanics of Bloodstream Infections", J. G. Younger (PI) and M. J. Solomon (co-PI).
NSF: "Collaborative Research: Type II: Flow-induced fragmentation mechanisms in bacterial biofilms by hierarchical modeling of polymeric, interfacial and viscoelastic interactions", M.J. Solomon (PI)

Curry, James

NSF: "Mentoring Through Critical Transition Points (MCTP)," 2006-2011
NSF: "Course Curriculum and Laboratory Improvement (CCLI) Phase II," 2008-2010, PI: M Nelson

Dougherty, Anne

NSF: "Colorado Advantage", 2006 – 2010.
NSF: "Course Curriculum and Laboratory Improvement (CCLI) Phase II; Colorado Momentum: Oral Assessment in the Mathematical Sciences Classroom," 2008 – 2010, M. Nelson (Co-PI)
CU-Boulder Outreach Committee: "Colorado Math Circle," 2009 – 2011. C. Li (Co-PI) and S. Chang (Co-PI)

Fornberg, Bengt

NSF-DMS: "Radial Basis Functions," 2006 – 2010,
DOD-ARO: "Training Knowledge and Skills for the Networked Battlefield," 2005 – 2010
NSF-ATM: "Collaborative Research: CMG - Freedom from Coordinate Systems and Spectral Accuracy with Local Refinement: Radial Basis Functions for Climate and Space-Weather Prediction," 2006 – 2010

Julien, Keith

NSF: "Colorado Advantage", 2006 – 2010.
NSF-DMS: "Opportunities for Research Collaborations between the Mathematical Sciences and Geosciences," 2007 – 2009.
NASA Physical Oceanography: "Langmuir Circulations: Observing and Modeling on Global Scales," 2009 – 2012, PI: Fox

Kemper, ATOC
NSF-CMG Collaborative Research: "Multiscale Modeling of the Coupling between Langmuir Turbulence and Submesoscale Variability in the Oceanic Mixed Layer" 2009 – 2013
NASA Solar Heliospheric: "Modeling Magneto-Inertial-Gravity waves in the Lower Convection Zone"
NASA Living with a Star Program. Guest Investigator Program: "Community Hounds and Hares Exercises in Local Helioseismology"
FRG: "Collaborative Research: Models of Balanced Multiscale Ocean Physics for Simulation and Parameterization"

Li, Congming

University of Minnesota: "Complex Fluids and Complex Flows," 2009 – 2010
CU-Boulder Outreach Committee: "Colorado Math Circle," 2009 – 2011. A. Dougherty (Co-PI) and S. Chang (Co-PI)
NSF-ARRA: "CMG Research: Multiscale Nonlinear Domain Decomposition Method for Modeling the Impact of Climate Change on Groundwater Resources," 2009 – 2012

Lladser, Manuel

NIH: "Scientific Computation for RNA Catalysis of Translational Reactions," 2007 – 2010, PI: M. Yarus
NSF: "AMC-SS: Markovian Embeddings for the Analysis and Computation of Patterns in non-Markovian Random Sequences," 2008 – 2010
NIH: "New Tools for Understanding the Composition and Dynamics of Microbial Communities in Human Body Habitats," 2008 – 2011, PI: R. Knight

Manteuffel, Tom

DOE: "First-order system least-squares (FOSLS) for nonlinear systems arising from DOE applications," 2006 – 2009, Co-PI: Steve McCormick
NSF: "CMG: Modelling River Basin Dynamics: Parallel Computing and Advanced Numerical Methods," 2006 – 2010, Co-PI: Scott Peckham, Co-PI: Steve McCormick, Co-PI: Greg Tucker
DOE: "Towards Optimal Petascale Simulation (TOPS)," 2006 – 2011, PI: Steve McCormick, Co-PI: X.C. Cai
NSF: "Petascale Multilevel Quantum Chromodynamics," 2008 – 2011, PI: Steve McCormick
NSF: "Enhanced Least-Squares Methods for PIV Analysis," 2008 – 2011

Martinsson, Per-Gunnar
NSF-DMS: "CAREER: Fast Direct Solvers for Differential and Integral Equations," 2009 – 2013
CDI-Type I: "Geometrical Image Processing with Fast Randomized Algorithms," 2009 – 2012, Co-PI: Francois Meyer

McCormick, Stephen

DOE: "First-order system least-squares (FOSLS) for nonlinear systems arising from DOE applications," 2006 – 2009, Co-PI: T. Manteuffel
NSF: "CMG: Modelling River Basin Dynamics: Parallel Computing and Advanced Numerical Methods," 2006 – 2010, Co-PI: Scott Peckham, Co-PI: T. Manteuffel, Co-PI: Greg Tucker
DOE: "Towards Optimal Petascale Simulation (TOPS)," 2006 – 2011, Co-PI: T. Manteuffel, Co-PI: X.C. Cai
LLNL: "Geometric and Algebraic Multigrid Methods for QCD, MHD, Elasticity, Transport, and Other DOE Applications," 2007 – 2010
NSF: "Multigrid QCD at the Petascale," 2007 – 2011
NSF: "Enhanced Least-Squares Methods for PIV Analysis," 2008 – 2011
NSF: "Petascale Multilevel Quantum Chromodynamics," 2008 – 2011, Co-PI: T. Manteuffel

Meiss, Jim

NSF: "Mentoring Through Critical Transition Points (MCTP)", 2006--2011, Co-PI: J. Curry, Co-PI: A. Doughterty, Co-PI: K. Julien
NSF-DMS: "Chaos and Bifurcations in Volume-Preserving Dynamics", 2007 – 2012

Nelson, Mary

NSF: "Course Curriculum and Laboratory Improvement (CCLI) Phase II; Colorado Momentum: Oral Assessment in the Mathematical Sciences Classroom," 2008 – 2010, M. Nelson (Co-PI)

Restrepo, Juan

NSF-DMS: "Adaptation and percolation in complex networks"

Segur, Harvey

NSF-DMS: "Collaborative Research: Nonlinear Dispersive Waves with Weak Dissipation" 2007-- 2010
NSF-DMS: "MCTP: Colorado Advantage" 2006--2009
NSF-DUE: "CCLI-Phase 2: Colorado Momentum: Oral Assessment in the Mathematical Sciences Classroom" 2008--2010, co-PI: A. Dougherty

Publications

Ablowitz, Mark

Ablowitz, MJ; Ablowitz, SA; Antar, N. "Damping of periodic waves in physically significant wave systems" Stud. Appl. Math. 121 (2008): 313-335.

Ablowitz, MJ; Haut, TS. "Spectral formulation of the two fluid Euler equations with a free surface and long wave reductions" Analysis and Applications 6 (2008): 323-348.

Ablowitz, MJ; Horikis, TP. "Pulse dynamics and solitons in mode-locked lasers" Phys. Rev. A, 78 (2008): 011802.
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Beylkin, G; Cheruvu, V; Perez, F. "Fast adaptive algorithms in the non-standard form for multidimensional problems" Applied and Computational Harmonic Analysis 24 (2008): 354-377

Beylkin, G; Kurcz, C; Monzon, L. "Fast algorithms for Helmholtz Green's functions" <u>Proceedings of the Royal Society A</u> 464 (2008): 3301-3326

Beylkin, G; Mohlenkamp, MJ; Perez, F. "Approximating a Wavefunction as an Unconstrained Sum of Slater Determinants" <u>Journal of Mathematical Physics</u> 49 (2008)

Bortz, David

Bortz, DM; Christlieb, AJ. "Random numerical discretizations" <u>Abstracts of the International Conference Inverse Problems: Modeling and Simulation</u> Banks, HT; Hasanov, A; Kabanikhin, SI; Kappel, F. editors, 2008, pages 29–30.

Bortz, DM; Jackson, TL; Taylor, KA; Thompson, AP; Younger, JG. "Klebsiella pneumoniae flocculation dynamics" <u>Bulletin of Mathematical Biology</u> 70.3 (2008):745–768

Chung, HM; Cartwright, MM; Bortz, DM; Jackson, TL; Younger, JG. "Dynamical system analysis of Staphylococcus epidermidis bloodstream infection" <u>SHOCK</u> 30.**5** (2008): 518-526

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Tucker, Kris; Curry, Jim; Dougherty, Anne; Martin, Jim. "A Cluster-Based Information Retrieval Technique Employing Diffusion Maps" (2008)

Dougherty, Anne

Corotis, RB; Dougherty, AM; Xu, Wei. "Extreme value index and tail probability estimates for mixed distributions" <u>Probabilistic Engineering Mechanics</u> 23 (2008): 385-392

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Tucker, Kris; Curry, Jim; Dougherty, Anne; Martin, Jim. "A Cluster-Based Information Retrieval Technique Employing Diffusion Maps" (2008)

Fornberg, Bengt

Elcrat, A; Fornberg, B; Miller, K. "Steady axisymmetric vortex flows with swirl and shear" <u>J. Fluid. Mech.</u> 613 (2008): 395-410.

Elcrat, A; Miller, K; Fornberg, B. "Steady vortex flow past a cylinder or sphere" <u>5th conference on Frontiers in Applied and Computational Mathematics (FACM 08)</u> World Scientific Publishing Company (2008).
Fornberg, B; Flyer, N; Hovde, S; Piret, C. "Locality properties of radial basis function expansion coefficients for equispaced interpolation" <u>IMA Journal of Numerical Analysis</u> 28 (2008): 121-142

Fornberg, B; Piret, C. "On choosing a radial basis function and a shape parameter when solving a convective PDE on a sphere", <u>Journal of Computational Physics</u> 227 (2008): 2758-2780

Raymond, WD; Fornberg, B; Buck-Gengler, CJ; Healy, AF; Bourne, LE. "Matlab optimization of an IMPRINT model of human behavior" <u>Proceedings of the Seventeenth Conference on Behavior Representation in Modeling and Simulation,</u>

Orlando, FL: Simulation Interoperability Standards Organization (2008), 26-34.

Xiong, JY; Colice, M; Schlottau, F; Wagner, K; Fornberg, B. "Numerical solutions to 2D Maxwell-Bloch equations" Optical and Quantum Electronics 40(2008): 447-453.

Julien, Keith

Jamroz, B; Julien, K; Knobloch, E. "Saturation of the Magnetorotational Instability at Large Elssaser number" Astonomische Nachricten 329**.6** (2008): 675-687

Jamroz, B; Julien, K; Knobloch, E. "An Asymptotically Exact Reduced PDE Model for the Magnetorotational Instability: Derivation and Numerical Simulation" Physica Scripta 6 (2008)

Mullowney, P; Julien, K; Meiss, JD. "Chaotic Advection and the Emergence of Tori in the Kuppers-Lortz State" Chaos 18 (2008)

Vasil, GM; Brummell, NH; Julien, K. "A New Method for Fast Transforms in Parity Mixed PDE's: Part I. Numerical Techniques and Analysis" Journal of Computational Physics, 227**.**17 (2008): 7999-8016

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Li, Congming

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Hou, T; Li, C. "Dynamic Stability of the 3D Axi-Symmetric Navier-Stokes Equations with Swirl" Comm. Pure Appl. Math. 61.5 (2008): 661-697

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Li, C; Ma, L. "Uniqueness of positive bound states to Shrodinger systems with critical exponents", **S**IAM J. Math. Analysis 40.3 (2008): 1049-1057

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Manteuffel, Tom

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McCormick, Stephen

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McCormick, S; Brannick, J; Clark, MA; Brower, RC; Manteuffel, T; Osborn, JC; Rebbi, C. "The removal of critical slowing down" <u>Procs. XXVI Int'l Symp. On Lattice Field Theory</u>, July 14-19, 2008

Meiss, Jim

Dullin, HR; Meiss, JD. "Nilpotent Normal form for Divergence Free Vector Fields and Volume-Preserving Maps,"
<u>Physica D</u> 237.2 (2008) 156-166

Lomeli, HE; Meiss, JD; Ramirez-Ros, R. "Canonical Melnikov Theory for Diffeomorphisms," <u>Nonlinearity</u> 21 (2008): 485-508

Meiss, J.D. "Visual Explorations of Dynamics: the Standard Mapping," <u>Pramana</u>, Indian Academy of Sciences 70 (2008): 965-988

Mullowney, P; Julien, K; Meiss, JD. "Chaotic Advection and the Emergence of Tori in the Kuppers-Lortz State" <u>Chaos</u> 18 (2008)

Simpson, DJW; Meiss, JD. "Unfolding a Codimension-Two Discontinuous Hopf Bifurcation," <u>Chaos</u> 18 (2008): 033125

Simpson, DJW; Meiss, JD. "Neimark-Sacker Bifurcations in Planar, Piecewise Smooth, Continuous Maps," <u>SIAM J. Appl. Dyn. Sys.</u> 7.3 (2008): 795-824

Restrepo, Juan

Restrepo, JG; Weiss, JN; Karma, A. "Calsequestrin Mediated Mechanism for Cellular Calcium Transient Alternans" <u>Biophysical Journal</u> 85 (2008): 3767

Segur, Harvey

Segur, H. "Integrable models of waves in shallow water" <u>Probability, Geometry and Integrability</u> 55 (2008): 307-333

Segur, H. "Explosive instability due to 3-wave or 4-wave mixing, with or without dissipation", <u>Analysis & Applications</u> 6 (2008): 413-428

Segur, H; Henderson, D. "Stable deep-water waves propagating in one and two dimensions" <u>Proc. in Appl. Math. & Mech.</u> 8 (2008)

Tong, Tiejun

Chen, L; Tong, T; Zhao, H. "Considering Dependence Among Genes and Markers for False Discovery Control in eQTL Mapping." <u>Bioinformatics</u> 24 (2008): 2015-2022.

Tong, T; Hongyu, Z. "Practical Guidelines for Assessing Power and False Discovery Rate for a Fixed Sample Size in Microarray Experiments." <u>Statistics in Medicine</u> 27 (2008): 1960-1972

Tong, T; Liu, A; Wang Y. "Relative Errors of Di_erence- based Variance Estimators in Nonparametric Regression." <u>Communications in Statistics - Theory and Methods</u> 37 (2008): 2890-2902.

Invited Lectures and Meetings Attended

Ablowitz, Mark

<u>Nonlinear waves: Theory and application</u>, Beijing, China, June 9-12, 2008: "Solitons and dynamics in mode-locked lasers", June 11, 2008.

<u>Nonlinear Physics Theory and Experiment</u>, Gallipoli, Italy, June 13-16, 2008: "Reformulation and asymptotic reductions of interfacial waves", June 14, 2008.

Department of Physics, University of Naples, Naples, Italy: "Dispersive Shock Waves", June 23, 2008.

<u>AFOSR Workshop: Nonlinear Optics</u>, Dayton Ohio, September 10-11, 2008, "Pulses, properties and dynamics in mode locked lasers", September 10, 2008.
<u>International conference on magnetics and applications</u>, Colorado State University, September 12-14, 2008: "Pulses, properties and dynamics in mode locked lasers", September 13, 2008.

<p style="text-align:center">30</p>

Department of Physics, Colorado State University, "Nonlinear waves in optics and fluid dynamics", November 17, 2008.

Beylkin, Greg

IPAM, "Algorithms and Challenges of Electron Microscope Tomography", January 29, 2008

Great Lakes Section SIAM Meeting: Snapshots of Applied Mathematics, U. of Michigan, "Fast algorithms for adaptive application of integral operators in high dimensions", April 12, 2008

SIAM Annual Meeting, San Diego, "Separated representations and algorithms for multidimensional operators", July 10, 2008 and with Lucas Monzon, "On multi-variable representations with sums of exponentials", July 11, 2008

Integral Geometry and Tomography, Conference dedicated to Jan Boman's 75th birthday, Stockholm University, Sweden, "Nonlinear inversion of band-limited Fourier transform", August 15, 2008

KTH, Stockholm, Sweden, "Discrete transforms for bandlimited functions in a disk", and "Separated representations and algorithms for multidimensional operators", August 20, 2008

International conference in honor of Jean Morlet, CIRM, Campus de Luminy, Marseille, "On approximation by Gaussians and its applications", October 28, 2008

COSI Seminar, University of Colorado at Boulder, Boulder, CO, "Discrete transforms for bandlimited functions in a disk", December 1, 2008

Bortz, David

Department of Mathematics, Pennsylvania State University, University Park, PA, Feb. 4, 2008.

Pikes Peak Regional Undergraduate Math. Conf., Colorado Springs, CO, Feb. 23, 2008.

Bioinformatics Supergroup, University of Colorado, Boulder, CO, Mar. 1, 2008.

SIAM Chapter, University of Colorado, Boulder, CO, Mar. 13, 2008.

National Renewable Energy Laboratory, Golden, CO, Mar. 20, 2008.

Atlantic Coast Symp. on the Math. Sci. in Biol. & Biomed. Raleigh, NC, Apr. 26, 2008.

Inverse Problems: Modeling & Simulation. Fethiye, Turkey, May 26, 2008.

SAMSI Meta-analysis Workshop, Research Triangle Park, NC, Jun. 4, 2008.

SIAM Annual Meeting, San Diego, CA, Jul. 10, 2008.

SIAM Conference on the Life Sciences, Montreal, Canada, Aug. 4, 2008.

Lloyd Roeling Mathematics Conference, Lafayette, LA, Oct. 10, 2008.

Society of Engineering Science Annual Technical Meeting, Champaign, IL, Oct. 14, 2008.

Department of Mathematics, Colorado State University, Fort Collins, CO, Nov. 6, 2008.

Joint Math & Biology Seminar, University of Colorado-Colorado Springs, Colorado Springs, CO, Nov. 20, 2008.

Corcoran, Jem

Department of Mathematics, Whitman College, Walla Walla, WA: "The Effect of Discretization on the Recovery of Bayesian Networks."

Fornberg, Bengt

Department of Psychology, University of Colorado, Boulder, CO

NCAR

University of Wyoming, Laramie, WY

Uppsala University, Uppsala, Sweden

Chonnam National University, Gwangju, South Korea

Max Planck Institute for Plasma Physics, Garching, Germany

University of Goettingen, Goettingen, Germany

Julien, Keith

Theme-of-The-Year Summer School on Geophysical Turbulent Phenomena, IMAGe, NCAR, Boulder, CO, "Generalized Quasi-geostrophy for Spatially Anisotropic Rotationally Constrained Flows", July 2008

Applied Mathematics Colloquium, Department of Mathematics, University of Wisconsin at Madison, Madison, WI, "Rotationally Constrained Rayleigh-Benard Convection", Nov. 2008.

Li, Congming

Colloquium, Dept. of Math., East China Normal University, ShangHai, PRChina, July, 2008

Colloquium, Dept. of Math., HeNan Normal University, XingXiang, Henan, PRChina.

Colloquium, Univ. of Science and Technology of China, HeFei, Anhui, P.R. China, Summer 2008

Lladser, Manuel

Analysis of Algorithms and Combinatorics Workshop, San Francisco, CA, "Markovian embeddings of general random strings", Jan 19, 2008

International Conference of Analysis of Algorithms, Maresias, Brazil, April 2008

Departamento de Educacion Matematica, Universidad Catolica Silva Henriquez, Chile, June 2008

Centro Innovo, Universidad de Santiago de Chile, June 2008

Probability Seminar, Centro de Modelamiento Matematico, Universidad de Chile, June 2008

Bioinformatics Supergroup, University of Colorado, Boulder, CO, October 2008

Manteuffel, Tom

South African Numerical Analysis Conference (SANUM), Stellenbosch University, March 26-28, 2008, "Plenary Address"

DOE Conference on Computational Methods in Transport, Granlibakken Lodge, Tahoe City, CA, September 7-10, 2008

Martinsson, Gunnar

"Fast matrix computations via randomized sampling", Computational Science & Engineering Seminar, Georgia Tech, Dec. 2008.

"Fast matrix computations via randomized sampling", computer science colloquium, University of Toronto, April 2008.

"Randomized methods for the approximation of matrices", applied mathematics seminar, University of Toronto, Jan. 2008.

"Fast numerical methods for solving linear PDEs", mechanical engineering colloquium, University of Pennsylvania, Jan. 2008.

"Fast numerical methods for solving linear PDEs", mathematics colloquium, University of Toronto, Jan. 2008.

McCormick, Steve

10th Copper Mountain Conferece on Iterative Methods, Copper Mountain, Colorado, April 6-11.

AMG Summit, Lake City, CO, September 13-18.

Meiss, Jim

Conference on Undergraduate Research and Teaching, Montclair University, "Visualizing Dynamics: The Standard Mapping", June 5, 2008

International Symposium Hamsys-2008, Guanajuato, MX, "Generating Forms and Flux for Volume Preserving Maps", July 9, 2008,

APS Division of Plasma Physics Meeting, Dallas, TX, "Building on the Legacy of John Greene: The Transition to Chaos in Volume-Preserving Maps", Nov 21, 2008

Dept. of Mathematics, University of Colorado at Boulder, Boulder, CO, "Generating Forms for Volume Preserving Maps", Dec 9, 2008

Nelson, Mary

Joint Mathematics Meeting, San Diego, California, "Calculus I Oral Assessments: Improved Grades, Retention and Calculus II Success", January 2008

NTCM national conference, Reno, Nevada

Graduate Teaching Program, University of Colorado at Boulder, Boulder, CO, "What do we learn at the university that will prepare us for a job?", Spring 2008

Mathematics Department, University of Colorado at Fort Collins, Fort Collins, CO, Dec 11, 2008.

Freeman calculus workshop, Denver, CO

Segur, Harvey

Waves in Fluids workshop, Pacific Institute of Math. Sciences, Vancouver, BC, Canada, "Explosive instability due to 3-wave or 4-wave mixing, with or without dissipation", April 26, 2008

SIAM Conference on Nonlinear Waves and Coherent Structures, Rome, Italy, "Explosive instability due to 3-wave or 4-wave mixing, with or without dissipation", July 21, 2008

NSF-CBMS Regional Conference Howard University, Washington, DC May 13-18, 2008, "Water waves - theory and experiment", a series of 10 lectures.

Spring retreat of CU Presidential Teaching Scholars, Boulder, CO, "Perils in first-semester calculus", May 7, 2008

Tong, Tiejun

Department of Statistics, Colorado State University, Ft. Collins, CO, "Shrinkage Techniques in Microarray Data Analysis.", April 2008.

Eleventh Meeting of New Researchers in Statistics and Probability, Boulder, CO, "Shrinkage Techniques in Microarray Data Analysis.", July 2008.

Joint Statistical Meeting, Denver, CO, "Estimating the Proportion of True Null Hypotheses Using the Pattern of the Observed P-Values.", August 2008.

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.

James Curry

Aligned MCTP funds with Digital Currents and Sophia Math high school outreach programs.

Anne Dougherty

Served an advisory role to the Boulder Partnership for Excellent in Mathematics Education (BPEME) , a joint effort with Boulder Valley School District (BVSD), CU School of Education, the Freudenthal Institute, and Applied Mathemics. It is funded by the state of Colorado from 2006 through summer 2008. The primary goal is to improve student achievement in math, primariy among under-represented groups, through intensive professional development activities for middle school BVSD math teachers, including a two-week summer class.

Together with Applied Math Professor Congming Li, Anne worked with the Colorado Math Circle (CMC). The CMC provides enrichment opportunities for advanced high school and middle school students through math talks and problem-solving sessions. There are 1-2 meetings held each month during the academic year.

Congming Li

Together with Applied Math Senior Instructor Anne Dougherty, Congming worked with the Colorado Math Circle (CMC). The CMC provides enrichment opportunities for advanced high school and middle school students through math talks and problem-solving sessions. There are 1-2 meetings held each month during the academic year.

Mary Nelson

Conducated Oral Examinations at Fairview and Centaurus High Schools. "Orals" administered prior to an exam have been correlated with improved scores in written mathematics exams.

Conducted site visits with multiple focus groups at 5 military bases in order to ascertain if Wounded Warriors and their families are being properly taken care of.

Faculty Service to the University, Department, and Societies

Ablowitz, Mark

Served as chair to the "APPM PDE Prelim", "College Scholar Awards", and "Interdisciplinary Effort in Computational Science and Engineering" committees.

Beylkin, Gregory

Served on the "APPM Undergraduate" and "Biotechnology Initiative" committees.

Bortz, David

Served as one of four departmental student advisors.

Served on the "APPM Undergraduate" and "APPM Assistant Professor Search" committees.

Corcoran, Jem

Acted as Research consultant for CU Denver Department of Psychiatry research project: "Martial Arts as Early Intervention for Teen Drug Abuse". PI: Robert Davies.

Served as one of four departmental student advisors.

Served on the "APPM Undergraduate", "APPM Graduate", and "APPM Instructor Search" committees.

Served as chair to the "Probability and Statistics Preliminary Examination" committee.

Member of the University Council on Research and Creative Work.

Curry, Jim

Acted as Chair to the department.

Dougherty, Anne

Served as Applied Math's representative to several College of Engineering programs: Explore Engineering for Admitted Students, March 8, 2008; Engineering Orientation August 20-21, 2008; and Engineering Sampler and Open House October 11, 2008.

Served as Applied Math's representative to the Undergraduate Education Council in the College of Engineering.

Faculty advisor for the CU Boulder SIAM undergraduate chapter. SIAM is the acronym for the Society for Industrial and Applied Mathematics. (Luis Melara is co-advisor for spring 2008.)

Served as chair for "APPM Undergraduate" Committee

Acted as Associate Chair to the department.

Fornberg, Bengt

Served on the University's IGP (The Innovative Grant Program) review panel for Physical Sciences / Engineering.

Julien, Keith

Acted as Associate Graduate Chair to the department.

Served on "Arts and Science" and "Arts and Science Budget" Committees.

Li, Congming

Served as chair for the "Prelim for Applied Analysis" committee.

Served on "APPM Instructor Search" and "Budget and Compensation" committees.

Lladser, Manuel

Served on "APPM Graduate" committee.

Performed peer evaluation for APPM Instructor Adam Norris.

Aided University Biotech Initiative in recruitment of Alexandros Stamatakis.

Martinsson, Gunnar

Served on "APPM Graduate" and "APPM Assistant Professor Search" committees

Served as Co-chair for the "APPM Colloquium" committee

McCormick, Stephen

Served on the following committees: "APPM Graduate" , "Ad Hoc Executive" , "Post Doc Hiring" , "VIGRE III Proposal"

Meiss, Jim

Served on "APPM Graduate" and "PhD Preliminary Exam" committees

Nelson, Mary

I am contributing to Innovations in Engineering Education, Curriculum and Infrastructure (IEECI) ($500,000) grant with members of the School of Engineering. It is a three year project

 Support the Colorado LAtest effort; interviewing and hiring LAs, counseling prospective K-12 mathematics teachers, supervising the work of APPM learning assistants and assisting in the transformation of classes in Applied Mathematics.

Support DBER (Discipline Based Educational Research) portion of the LATest grant on the Boulder campus. Meet every week with DBER faculty from Physics, Chemistry, Astronomy, Applied Mathematics, Biology, Geology, Mathematics and Education.

Served as a member of the steering committee for PTLC in 2007-8.

Participate in transforming the preparation of K-12 math and science teachers through the NMSI grant.

In Spring 2008 served as mentor and coach to PTLC project participant, Kendra Gale.

Assist on the K-12 tier of the LAtest grant, Visiting the classrooms of practicing teachers who were former LAs; observing and evaluating their teaching. Fall)* I was responsible for Nate Balk and Ian HerManyHorses.

I contribute to the CU Teach program on the Boulder campus. We are trying to improve the preparation of K-12 math and science teachers.

Restrepo, Juan

Served on "APPM Instructor Search" committee

Tong, Tiejun

Served on "Prob/Stat Qualifying" and "Prob/Stat Seminar" Committees

Served as Co-chair for the "APPM Colloquium" committee

Teaching Activities

Undergraduate Courses Taught by Department Faculty

SPRING 2008

Course Number	Instructor	Course Title
APPM 1345-001	Nelson, Mary	Calculus 1B with Algebra
APPM 1345-002	Melara, Luis	Calculus 1B with Algebra
APPM 1345-003	Radulescu, Anca	Calculus 1B with Algebra
APPM 1350-020	Radulescu, Anca	Calculus I for Engineers
APPM 1360-010	Nelson, Mary	Calculus II for Engineers
APPM 1360-020	Li, Congming	Calculus II for Engineers
APPM 2350-010	Norris, Adam	Calculus III for Engineers
APPM 2350-020	Melara, Luis	Calculus III for Engineers
APPM 2360	Martinsson, Gunnar	Introduction to Ordinary Differential Equations with Linear Algebra
APPM 3050	Norris, Adam	Scientific Computing in Matlab
APPM 3310	Dougherty, Anne	Matrix Methods
APPM 3570	Lladser, Manuel	Applied Probability
APPM 4360	Fornberg, Bengt	Complex Variables
APPM 4520	Tong, Tiejun	Introduction to Mathematical Statistics
APPM 4540	Corcoran, Jem	Introduction to Time Series
APPM 4660	Bortz, David M.	Numerical Methods II
HONR 1001	Dougherty, Anne	Honors Calculus Co-Seminar

SUMMER 2008

Course Number	Instructor	Course Title
APPM 4650	Norris, Adam	Intermediate Numerical Analysis 1

FALL 2008

Course Number	Instructor	Course Title
APPM 1350-010	Nelson, Mary	Calculus I for Engineers
APPM 1350-030	Segur, Harvey	Calculus I for Engineers
APPM 1350-050	Bhat, Sujeet	Calculus I for Engineers
APPM 1350-060	Segur, Harvey	Calculus I for Engineers
APPM 1360-010	Nelson, Mary	Calculus II for Engineers
APPM 1360-020	Norris, Adam	Calculus II for Engineers
APPM 1360-030	Norris, Adam	Calculus II for Engineers
APPM 2350-010	Fornberg, Bengt	Calculus III for Engineers
APPM 2350-030	Fornberg, Bengt	Calculus III for Engineers
APPM 2360-020	Radulescu, Anca	Introduction to Ordinary Differential Equations with Linear Algebra
APPM 2360-030	Meiss, James D.	Introduction to Ordinary Differential Equations with Linear Algebra
APPM 2360-040	Restrepo, Juan	Introduction to Ordinary Differential Equations with Linear Algebra
APPM 3170	Lladser, Manuel	Discrete Applied Mathematics
APPM 4350	Ablowitz, Mark J.	Fourier Series and Boundary Value Problems
APPM 4380	Fornberg, Bengt	Mathematical Modeling
APPM 4520	Corcoran, Jem	Introduction to Mathematical Statistics
APPM 4560	Lladser, Manuel	Markov processes, queues, and Monte Carlo simulation

| APPM 4720 | Dougherty, Anne | Applied Analysis 1 |
| HONR 1001 | Dougherty, Anne | Honors Calculus Co-Seminar |

Graduate Courses Taught by Department Faculty

SPRING 2008

Course Number	Instructor	Course Title
APPM 5360	Fornberg, Bengt	Complex Variables
APPM 5380	Fornberg, Bengt	Mathematical Modeling
APPM 5450	Martinsson, Gunnar	Applied Analysis II
APPM 5460	Meiss, James D.	Differential Equations and Dynamical Systems
APPM 5520	Tong, Tiejun	Introduction to Mathematical Statistics
APPM 5540	Corcoran, Jem	Introduction to Time Series
APPM 5610	Beylkin, Gregory	Numerical Analysis II
APPM 7400	Segur, Harvey	Water waves, theory, and experiment
APPM 8000	Manteuffel, Tom	Colloquium
APPM 8100-001	Ablowitz, Mark J.	Seminar in Nonlinear Waves
APPM 8100-002	Meiss, James D.	Seminar in Dynamical Systems
APPM 8600	Manteuffel, Tom	Seminar in Computational Mathematics

FALL 2008

Course Number	Instructor	Course Title
APPM 5350	Ablowitz, Mark J.	Fourier Series and Boundary Value Problems
APPM 5440	Li, Congming	Applied Analysis
APPM 5470	Curry, James H.	Partial Differential Equations
APPM 5520	Corcoran, Jem	Introduction to Mathematical Statistics
APPM 5560	Lladser, Manuel	Markov processes, queues, and Monte Carlo simulation
APPM 5600	Manteuffel, Tom	Numerical Analysis
APPM 7100	Meiss, James D.	Dynamical Systems
APPM 7400-001	Beylkin, Gregory	Wavelets and Imaging
APPM 7400-008	Corcoran, Jem	Stochastic Simulation
APPM 7400-003	Fornberg, Bengt	Radial Basis Functions
APPM 8100	Ablowitz, Mark J.	Seminar in Nonlinear Waves
APPM 8100	Meiss, James D.	Seminar in Dynamical Systems
APPM 8600	Manteuffel, Tom	Seminar in Computational Mathematics

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