

DEPARTMENT OF MATHEMATICS NEWSLETTER

PROFESSOR DONALD J. ESTEP NAMED
INTERDISCIPLINARY RESEARCH SCHOLAR BY THE
OFFICE OF THE VICE PRESIDENT OF RESEARCH



Donald J. Estep

Donald Estep, professor in the Mathematics and Statistics departments, has been named the inaugural *Interdisciplinary Research Scholar* as part of CSU's emphasis on research that benefits society. Awarded by the Office of the Vice President for Research to professors who have obtained national and international prominence for their efforts to conduct research across disciplines. "Professor Estep has truly helped the university reach real progress in how we foster, promote and celebrate interdisciplinary research," said Interim Provost Rick Miranda. "In particular, he should be lauded for his work on a graduate program that spans many programs, including mathematics, biology, biochemistry, statistics, computer science and the NREL." Joining CSU in 2000, Estep is known for his research in numerical analysis and partial differential equations in both the mathematical and engineering communities as well as for several textbooks. His research includes active interactions with a number of national laboratories and companies and as the director of both CIMS and PRIMES. He has received the Oliver P. Penrock Distinguished Service Award and several teaching awards from the University. Estep serves on the editorial boards of several journals and is active in SIAM. He is on the Advisory Board for the Center for Advanced Modeling and Simulation at Idaho National Laboratory and on the Governing Board of the National Science Foundation Statistical and Applied Mathematical Sciences Institute (SAMSI). He is also the department associate chair in mathematics.

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SPECIAL RECOGNITION

Celebrating CSU Milestones

A special All-University gathering was held in May to honor faculty and staff retirements and to recognize those who have reached 10, 15, 20, 25, 30, 35, 40, and 45 years of service and dedication to CSU. Congratulations to the following individuals recognized from the Dept of Mathematics:

- Richard Darst
Retirement after 37 years
- Paul DuChateau
35 years of service
- Annette Gonzales
10 years of service

GRADUATE STUDENT ALAN VON HERRMANN
HONORED WITH 2009 BEST TEACHER AWARD



The Colorado State University Alumni Association and the Student Alumni Connection announced the winners of the 2009 Best Teacher Awards at a ceremony and dinner held in April of 2009. We are proud to announce that PhD mathematics graduate student Alan Von Herrmann was one of the elite six honored. This is the 14th year that Colorado State has given out these awards. The committee reviewed a total of 173 nominations before making their final selection.

Alan Von Herrmann has overcome significant obstacles his entire life. Born with a severe hearing loss in both ears, he learned to communicate using only American sign language. His late father, also a mathematician, discovered a mathematical algorithm to make hearing aids clear for Alan's particular type of hearing loss. Thus, at age 23, Alan could hear and speak for the first time in his life. At that time, he was enjoying a successful career in electrical engineering. With improved communication skills, Alan was able to pursue his graduate studies in mathematics at the University of Arizona and Colorado State. Upon graduating with his PhD this summer from Colorado State, Alan will begin his professional career as a tenure track assistant professor at Adrian College in Michigan. As a founding member of the MIAA, the nation's oldest athletic association, Adrian College has a history of academic & athletic All-Americans.

DEPARTMENTAL NATIONAL SCIENCE FOUNDATION GRANT NEWS



Prof Bates

A grant proposed by Dr. Daniel Bates has been recommended for funding by the National Science Foundation with final approval expected this summer.

The project is titled "*Reality, exactness, and computation in numerical algebraic geometry*" and involves three distinct but related projects.

First, Bates will work with Frank Sottile of Texas A&M to develop new numerical schemes to find real (rather than complex) solutions of polynomial systems. Standard numerical methods (so-called homotopy methods) necessarily finds all complex solutions, even if only the real solutions are sought.

Bates will also work with CSU professor Chris Peterson and University of Notre Dame Professor Andrew Sommese to recover exact polynomials from numerical approximations of solutions. This could lead to new methods for computing ideal decompositions by replacing costly symbolic algorithms with more efficient numerical schemes. He will also continue development of the Bertini software package with Sommese, Charles Wampler from General Motors, and Jon Hauenstein from the Fields Institute/Texas A&M. All of these projects depend to some extent on the participation of graduate students and post-docs.

Dr. Bates joined the Department of Mathematics in 2008. A PhD graduate from the University of Notre Dame, Dr. Bates was a postdoctoral fellow at IMA, Institute for Mathematics and its Applications at the University of Minnesota in Minneapolis.



Prof Kirby

A research project proposed by Dr. Michael Kirby entitled "*Mathematical Algorithms for Characterizing Spectral Signatures*" was recently recommended for funding by the National Science Foundation. The project is scheduled to start August 15, 2009.

The research is interdisciplinary in nature and will be done in collaboration with chemists from Physical Sciences, INC in Boston and CSU graduate students in the Pattern Analysis Lab. The investigation will involve integrating geometric and statistical techniques for representing characteristic structures in Raman spectra.



Prof Peterson

A research project proposed by Chris Peterson entitled "*Algebraic Geometry of Tensors*" was recently recommended for funding by the National Science Foundation. The project is scheduled to start August 15, 2009.

The research will be carried out in collaboration with Hirotachi Abo, University of Idaho, and Giorgio Ottaviani, University of Firenze.

The investigation will involve tensor decompositions and tensor approximations motivated by ideas from algebraic geometry.

MAA 2010 ROCKY MOUNTAIN SECTION MEETING

The Department of Mathematics at Colorado State will host the MAA 2010 Rocky Mountain Section Meeting on April 17-18. The Rocky Mountain Section has 56 member institutions from Colorado, Wyoming, Montana, North Dakota and South Dakota. Currently, 29 sectional MAA meetings are held annually across both the United States and Canada. The mission statement of the Rocky Mountain section of the MAA is to promote excellence in mathematics education especially at the collegiate level.

Complete information and registration details will be on line in the fall semester. Departmental organizers for this event are Simon Tavener, Alexander Hulpke, and Kelly Chappell. Email them with questions at: Tavener@math.colostate.edu Hulpke@math.colostate.edu Chappell@math.coloradostate.edu

DEPT EXECUTIVE COMMITTEE FOR 2009-10 ELECTED

The 2009–2010 faculty members of the Department of Mathematics Executive Committee were elected in May. Newly elected members include Donald Estep, Alexander Hulpke, Timothy Penttila and Daniel Rudolph. Chair of the Executive Committee is Simon Tavener, Department Chair.

FALL DEPARTMENTAL MEETING

Faculty, staff and graduate students should plan to attend the department meeting hosted by Department Chair Simon Tavener to kick off the 2009-10 academic year. The meeting is scheduled for Wednesday, August 19th, in the Hammond Auditorium (Engineering 120) beginning at 1:00pm. Fall 2009 semester classes begin August 24th, ending December 18th. Spring 2010 semester classes will begin on January 19th, running through May 14th.

2009 ARNE MAGNUS LECTURE SERIES HELD IN APRIL

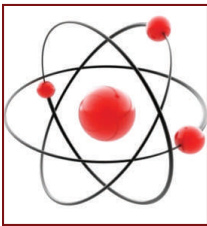


Dr. Roland Glowinski

Cullen Professor of Mathematics and Mechanical Engineering

The Department of Mathematics held the Annual Arne Magnus Lecture Series from April 22-24. Dr. Glowinski's public lecture was entitled "Adventures in Computing." The main goal of this lecture was to present real life situations where Applied & Computational Mathematics can significantly contribute. Illustrated examples, particularly in cardio-vascular medicine, have progressed to the benefit of society. Two seminars were also held for faculty and graduate students entitled "Particle clustering in rotating cylinders" and "A least-squares/fictitious domain method for linear elliptic boundary value problems with Neumann or Robin Boundary Conditions: A Virtual Control Approach."

RESEARCH STUDY SHOWS: ATOMIC VIBRATIONS LEAD TO ATOM MANIPULATIONS



A new study from Colorado State University [mathematics](#) graduate student Byungsoo Kim and associate professor of mathematics [Vakhtang Putkaradze](#) reveals that scientists can extract and replace a single atom. Collaborating on the research is Professor Takashi Hikiyara from the Department of Electrical Engineering at [Kyoto University](#) in Japan.

By using the tip of an atomic force microscope, a device that resembles a long needle that probes atoms, researchers were able to show that an atom could be extracted from a lattice structure without damaging surrounding atoms. Further, the extracted atom could be deposited back into the hole that was created or where a neighboring atom once was located.



Prof Putkaradze

"The impact of this research could result in smaller, faster and more energy efficient electrical devices, such as computers and cell phones," said Putkaradze. "There is the potential that current computers or cell phones could be 100 times faster as a result of smaller transistors and microchips. The devices would also be more energy efficient in the process."

The extraction and deposition of single atoms using the atomic force microscope tip is also a promising technique for building nanostructures. Nanotechnology is the science of creating electronic circuits and devices that are designed and built from single atoms and molecules on a scale of nanometers. One nanometer is one billionth of one meter; the size of one human hair is about 1,000 nanometers.

The study was published in the May 29, 2009, edition of [Physical Review Letters](#).

DR. OLEG EMANOUILOV PROMOTED TO FULL PROFESSOR



Prof Emanouilov

Congratulations to Dr. Oleg Emanouilov on his promotion to full professor. Dr. Emanouilov joined the Department of Mathematics at CSU in 2005. He previously held an academic position at Iowa State University in Ames after acquiring his MS and PhD from Moscow State University in Russia. Professor Emanouilov's research is in the area of mathematical theory of inverse problems and optimal control of physical systems modeled by nonlinear partial differential equations, e.g. the Navier-Stokes equations modeling fluid flow.

DEPARTMENT OF MATHEMATICS BIRTH ANNOUNCEMENTS

Oleg & Elena Emanouilov

January 9th—twin sons

Max and Alexander

Anton Betten & Ja Kyung Kim

April 2nd—daughter

Caroline

Vakhtang & Natasa Putkaradze

April 6th—son

Michael

Brian & Karena Topf

April 8th—daughter

Genevieve Iris

Rachel Pries & Jeff Achter

April 16th—twins, daughter & son

Naomi Evelyn and Lev Katahdin

Josh Thompson

April 24th—daughter

Berkeley Rose

Kelly Chappell & Bill Jones

May 25th—daughter

Elizabeth (Elis)