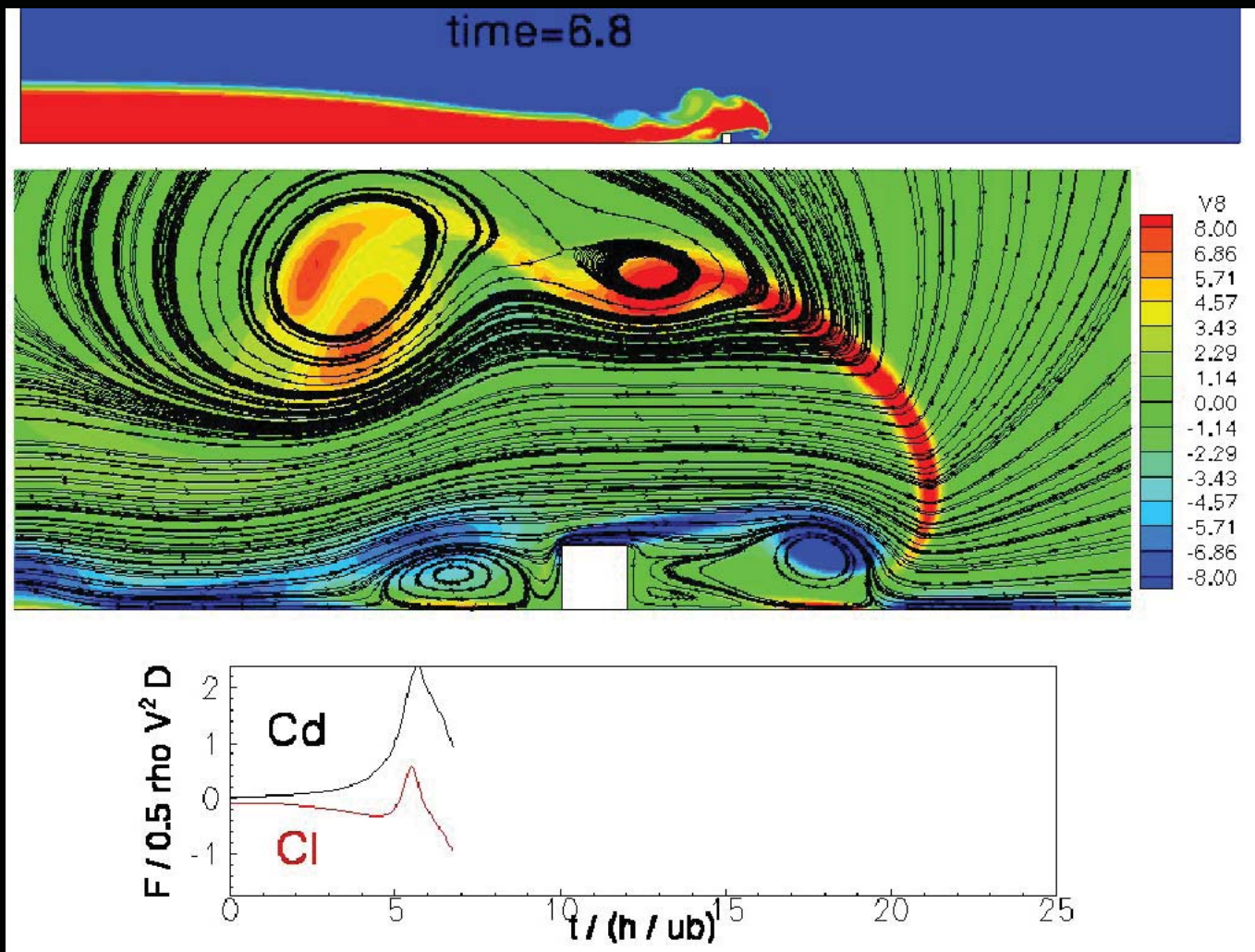


CSE IGERT

COMPUTATIONAL SCIENCE AND ENGINEERING IGERT QUARTERLY NEWSLETTER



Impact of a partial-depth ($h/H=0.2$) low Reynolds number ($Re=2,000$) gravity current on a square ridge ($G/h=0$, $D/h=0.15$).
Figure provided by Estaban Gonzalez, UCSB Department of Mechanical Engineering

Class of 2008
Up Close and Personal
Pfizer and UCSB form Partnership
Welcome to CSE IGERT

WE'RE BACK!

It's been sometime since our last edition of CSE IGERT, and we have been very busy. 2008 was a year of movement and change for our CSE IGERT trainees and associates. There were a total of eight PhD graduates from the fields of computer science, mechanical engineering, chemical engineering, and mathematics. In addition, two of our trainees and 2008 graduates, Matthew Buoni and Stephanie Taylor, welcomed new additions to their families. Our IGERT trainees and associates have worked hard, and their dedication has paid off. We applaud them for their success and accomplishments! 2009 will be no different. Our students are active, interdisciplinary, problem solvers. Our program's greatest success has been in the spirit of the students involved, their focus and dedication to multidisciplinary teamwork and their contributions to the scientific community.

CSE IGERT Class of 2008



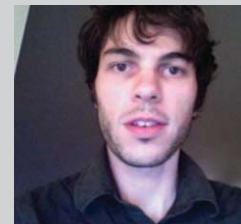
*Matthew Buoni,
Mechanical Engineering
Assistant Researcher,
UCSB*

*Hong Li,
Computer Science
Assistant Researcher
UCSB*



*Allison Kolpas,
Mathematics
Postdoctoral Researcher
UCSB*

*George Mohler,
Mathematics
Asst. Adjunct Professor
UCLA*



*Sotiria Lampoudi,
Computer Science
Postdoctoral Scholar
UCSD*

*Robert Sentinella,
Mathematics
Quantitative Analyst
Thomson Reuters*



*Erin Lennon,
Chemical Engineering
Postdoctoral Scholar
Northwestern University*

*Stephaine Taylor,
Computer Science
Assistant Professor
Colby College*



OUR GRADUATES UP CLOSE AND PERSONAL

Hong Li attended the 2008 Society for Industrial and Applied Mathematics (SIAM) conference in San Diego, CA. SIAM's goal is to build bridges between the scientific and mathematics communities. Hong presented her work, "Efficient Parallel Simulation for Stochastic Simulation of Biochemical Systems on Graphics Processing Units". Using the Stochastic Simulation Algorithm (SSA), Hong is able to capture the inherent randomness of some reactant species in biological systems. SSA simulations require many stochastic realizations to obtain accurate probability density functions. This carries a very high computational cost. Hong addresses the computational demands of the SSA via both faster algorithms and efficient use of high-performance computing architectures.



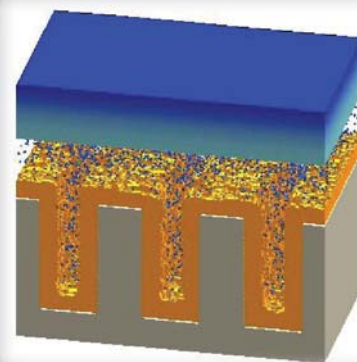
You can learn more about Hong's work by visiting her homepage, <http://www.cs.ucsb.edu/~hongli/>.

Allison Kolpas' research field is in mathematical ecology. Allison's work addresses the fascinating question: Why do fish school? Her work makes use of an individual-based model of fish movement which incorporates a tendency for each fish to align. Allison has worked with Hong Li in implementing the fish school model on NVIDIA GPUs. Harnessing the tremendous computational power of the GPU has enabled the simulation of many more scenarios than was previously possible.



Erin Lennon was on the team that made a major contribution to the field of nanotechnology. The team was led by Professor Craig Hawker, Director of the Materials Research Laboratory and Professor of Chemistry, Biochemistry and Materials, and includes Erin and her advisor Professor Glenn Fredrickson. Their efforts are leading the way in making computers smaller, faster and more efficient. The new process is called co-polymer lithography and could make its way into integrated circuit chips by 2011. The team has developed a technique for making square nanoscale patterns usable in the manufacturing process.

Matthew Buoni developed a multiscale method for simulation of the electrodeposition of copper interconnects on computer chips. The new method is several orders of magnitude faster than previous methods, as well as more accurate. A key challenge in Matthew's work is the simulation of the complex role that trace quantities of solution additives play on nucleation, growth and shape evolution of deposits. Matthew's work will be featured on the new IGERT Resource Center website. "The IGERT Resource Center will provide a web-based infrastructure that will enable projects to share and learn from each other's experience and resources", says its creator Dr. Joni Falk, TERC Inc. The website is currently under construction and will not be available until May 2009.



OUR GRADUATES UP CLOSE AND PERSONAL

Stephanie Taylor was appointed by the Henry Luce Foundation to be Clare Boothe Luce Assistant Professor of Computer Science at Colby College, a highly selective liberal arts college in Central Maine. Stephanie received her PhD in Computer Science, and worked with Professors Linda Petzold and Frank Doyle in the field of Systems Biology.



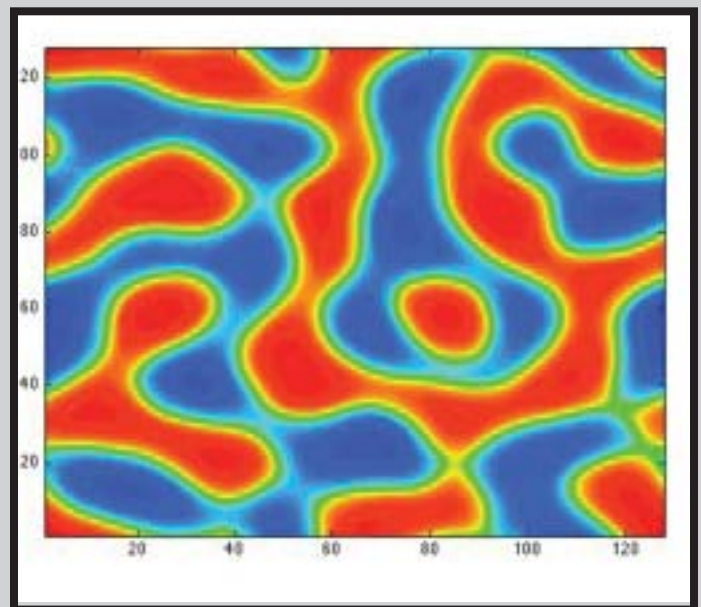
In announcing the award, the Program Officer said, "We are proud to include her in the fine group of women scientists and engineers who are Clare Boothe Luce Professors." Stephanie's research focus is on the phase sensitivity of oscillatory systems, specifically of the circadian clock. Her appointment involves both teaching and research and began September 1, 2008. The Henry Luce Foundation was established in 1936 by Henry R. Luce, the co-founder and editor-in-chief of Time Inc. The foundation is a tribute to his parents who were missionary educators in China. His wife Clare Boothe Luce left the majority of her estate to the Henry Luce Foundation, insisting that her contribution should benefit women in areas where they are underrepresented such as science, mathematics

and engineering. Her gift is the largest private source of funding for women in STEM fields. Colby College is one of thirteen educational institutions designated in Mrs. Luce's will.

Teri Lampoudi answers key questions in the study of two component signal transduction systems during her poster session at the 2008 Q-Bio Conference in Santa Fe. Teri's work focuses on the BvgAS phosphorelay, an unorthodox two-component system which regulates virulence in *Bordetella Pertussis* (whooping cough). Two-component single transduction systems are typically comprised of a sensor kinase protein and a response regulator protein. Teri worked with Professors Linda Petzold, Computer Science and Peggy Cottter, Molecular, Cellular and Developmental Biology.

Robert Sentinella is now working in the financial industry at Thomson Reuters. Robert was a member of the IGERT Complex Fluids Research Group. His research area is Multiscale Modeling of complex fluids. Robert was an Outstanding Teaching Assistant nominee and recipient in 2006 and 2004, respectively.

George Mohler has many research interests, including spatial point models of crime, polymer field theory and stochastic differential equations. George worked with Professors Hector Ceniceros and Glenn Frederickson and was a member of the Complex Fluids Research Group He is now an Assistant Adjunct Professor in the Mathematics Department of UCLA.



Pfizer and UCSB form Partnership

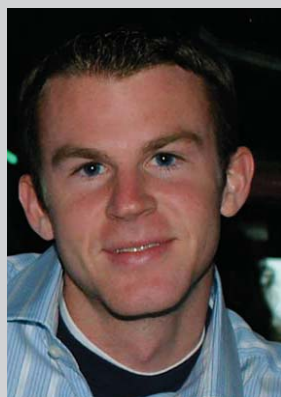
Pfizer and UCSB, along with three other universities, are working together to examine the link between diabetes and obesity with a goal of discovering new drugs to treat the disease. There are 23.6 million children and adults in the United States, or 7.8% of the population, who have diabetes. IGERT Fellow Kevin Sanft is working on this new project led by IGERT Professor Frank Doyle, Chemical Engineering. Kevin will be developing mathematical models and computational methods of insulin signaling pathways. Kevin is a member of the CSE research group led by Professor Linda Petzold.



Kevin is a third year Computational Science and Engineering graduate student in the Department of Computer Science.

LOOK WHO JOINED US

CSE IGERT welcomes chemical engineering graduate student Ryan DePuit. Ryan received his bachelor's of science degree in chemical engineering from Washington University in St. Louis in 2005. Ryan joined the Complex Fluids Research Focus Group and is working with Professor Todd Squires.



Michael Lawson is a third year Biomolecular Science and Engineering graduate student. He received his bachelor's of science degree in mechanical engineering from Tufts University in 2004. Michael works with Professors Mustafa Khammash and Linda Petzold.



SEMINARS

Systems Biology Meets Weekly

The research goal of the systems biology IGERT team is to achieve a systems level understanding of biological networks using system theoretic concepts and related computational tools.

Complex Fluids Meets Bi-weekly

The IGERT team on complex fluids focuses on mathematical and computational methods for simulation of both dynamic and equilibrium properties.

To be added to the distribution list
contact

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The CSE Emphasis

Computational Science and Engineering is a broad multidisciplinary area, connecting the sciences, engineering, mathematics, and computer science. Computation is an equal and indispensable partner, along with theory and experiment, in the advancement of scientific knowledge and engineering practice. CSE focuses on the development of problem-solving methodologies and robust tools for the solution of scientific and engineering problems. Moving from application to computational results requires domain expertise, mathematical modeling, numerical analysis, algorithm development, software implementation, program execution, and validation and analysis of results. CSE IGERT involves all of this. Our fellows and associates are collaborating on projects that include electrodeposition of copper, unfolded protein response, circadian rhythm, fish schooling, yeast mating and insulin resistance pathways. We invite you to visit the CSE IGERT website at www.cse.ucsb.edu/IGERT for more details about our research.



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IGERT Education Coordinator and Newsletter Editor: Roxanne Defendini
<http://www.cse.ucsb.edu>

