

SIAM CSU HAPPENINGS

EDITION: SUMMER 2011

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CSU Starts SIAM Student Chapter

-Justin Marks

Colorado State University joined Colorado School of Mines, University of Colorado at Boulder, University of Colorado at Denver, and University of Colorado at Colorado Springs with the formation of a Society for Industrial and Applied Mathematics (SIAM) Student Chapter this academic year. We are eagerly anticipating years of enriching activities within our University, as well as fruitful collaborations with other Colorado chapters. Our SIAM chapter has, and will, provide an interdisciplinary networking environment for the departments of Mathematics, Statistics, Computer Science, Engineering, and many others.

Due to the generous financial support of SIAM, the Department of Mathematics, and Associated Students of Colorado State University (ASCSU), we are able to send students to SIAM meetings, explore professional opportunities through field trips, and host renowned guest speakers from universities and industries.



Some of the SIAM CSU Members on a field trip to the National Center for Atmospheric Research.

A strong SIAM chapter begins with an enthusiastic and dedicated team of officers. We

held elections in December, 2010, and are proud to introduce our current CSU SIAM Chapter Officers:

- President: Lori Ziegelmeier
- Vice President: Sarah Hamilton
- Treasurer: Justin Marks
- Secretary: Eric Hanson
- Liaison Officer: Ryan Croke
- Webmaster: Nate Burch

The membership of our SIAM chapter is growing, and currently consists of twenty-five students and one faculty member. The mathematics department contributes the majority of the members, but we have involvement from the departments of computer science and engineering as well. If you are interested in becoming a chapter member, please contact chapter secretary Eric Hanson at hanson@math.colostate.edu and visit our website (www.math.colostate.edu/~siamcsu/)

SIAM CSU Spring 2011 Speaker Series:

Professor Leonid Kunyansky: Acousto-electric Tomography with Synthetic Focusing

-Sarah Hamilton

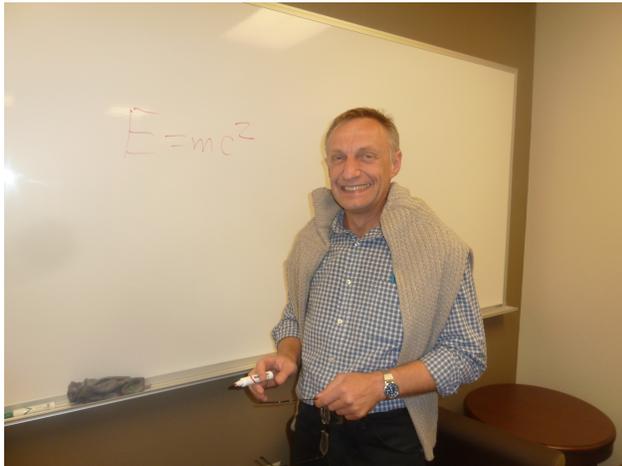
The first speaker brought to the university by the new SIAM Student Chapter at CSU was Dr. Leonid Kunyansky, a professor of mathematics at the University of Arizona. On Friday April 22, 2011 at 4pm around 50 professors, graduate students, and undergraduates attended his lecture entitled "Acousto-electric Tomography with Synthetic Focusing". In his lecture, Dr. Kunyansky described how we can use mathematics to improve current as well as future

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Kunyansky (Continued)
imaging modalities by forming new “hybrid methods”. The aim is to combine two different imaging techniques that have different deficiencies, i.e. one that has amazing resolution but poor contrast with another that has poor resolution but strong contrast.



On April 22, Dr. Kunyansky spoke on his current research with Dr. Peter Kuchment, a mathematics professor at the Texas A&M University, in which they are using acoustic waves, which provide detailed resolution in ultrasound imaging, to stabilize the high contrast, but poor resolution, electrical impedance tomography (EIT). This new imaging technique is called Acousto-Electric Tomography (AET) and through the use of synthetic focusing they have been able to produce reconstructions that appear perfect even with up to 50% noise.

For anyone familiar with the field of Inverse Problems this is incredible. EIT is a severely ill-posed problem that a wide range of promising medical and geophysical applications ranging from breast cancer detection to detection of contaminated underwater ground flow. With the addition of the synthetic focusing presented by Dr. Kunyansky, the EIT problem can be

effectively stabilized and produce high resolution and high contrast AET images.

Dr. Kunyansky brought a fresh approach to his lecture style maintaining the interest of the audience and drawing many thoughtful questions at the end of his talk. For the undergraduate and graduate students, it was refreshing to see such a clear example of how mathematics is used in real world applications straddling multiple disciplines. A great first lecture in our series!

Dr. Timothy Wildey: Multiscale Mortar Methods for Flow and Mechanics in Porous Media

-Nathanial Burch

On May 2nd and 3rd, the CSU SIAM Student Chapter hosted Dr. Timothy Wildey from Sandia National Laboratories. Dr. Wildey and many of the faculty shared research interests and ideas during several one-on-one meetings. On May 2nd, Dr. Wildey delivered a colloquium, "Multiscale Mortar Methods for Flow and Mechanics in Porous Media", to interested individuals across several departments.



Dinner with Dr. Wildey in Old Town Fort Collins

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The SIAM officers took Dr. Wildey out to dinner following his colloquium. On May 3rd, Dr. Wildey met with several of the graduate students to discuss his viewpoints and suggestions on starting a career in mathematics research. In particular, the students were interested in advice for finding appropriate postdoctoral positions and were curious about Dr. Wildey's experience doing research in mathematics at a government laboratory.

SIAM Annual Student Day

-Lori Ziegelmeier

The annual SIAM Student Day was held on Wednesday, March 2nd in Reno, Nevada during the 2011 SIAM Conference on Computational Science & Engineering (CS&E). The CS&E conference is interdisciplinary by nature with goals of examining complex systems, analyzing physical applications, and optimizing processes and plans.

The Student Day consisted of many student presentations and an organized luncheon where student representatives and faculty advisors of various SIAM chapters met with members of the SIAM Board, Council, and Education Committee to discuss any matters related to improving student chapters and services that SIAM provides to students. This afforded a valuable networking opportunity where individuals presented what has worked for their chapter, what needs to be improved, and helped other chapters with questions and concerns.

Representing the SIAM Chapter at CSU, was the chapter president, Lori Ziegelmeier. As a newly established chapter, attendance and representation at the SIAM Student Day was

extremely beneficial to gain perspectives from more experienced chapters as well as SIAM administrators.

FRAM Conference

-Chaun Zhang

The seventh annual Front Range Applied Mathematics (FRAM) Student Conference was held on the University of Colorado at Denver campus on March 5th. Twenty-seven graduate students from UC Boulder, UC Denver, Colorado School of Mines and UC Colo. Springs reported on their research, and many other individuals, including students from the SIAM Chapter at CSU, attended. The main topics covered in the presentations were image processing, solving nonlinear partial differential equations, pattern formation, and dynamics of complex networks.

The most exciting event at the conference was the invited talk given by the esteemed professor Edward Ott from Maryland University. During the one-hour plenary session, professor Ott systematically overviewed his research on how global macroscopic behavior emerges from large systems of coupled dynamical units. With vivid examples, neat and sometimes humorous words, professor Ott sketched the picture of his research results obtained in the last 10 years clearly in the one-hour talk.

In summary, the FRAM conference not only showed the audience the latest progress in applied mathematics being done in universities around Colorado but also provided a valuable opportunity for graduate students to share their inspiring ideas.

Newsletter Editing and Preparation by Eric Hanson, Lori Ziegelmeier, and Justin Marks.