

SIAM CSU Annual Newsletter



Letter from the President

Hello members and supporters of the SIAM student chapter at CSU. Thanks to everyone who helped make this year another great success in the legacy of our young chapter. I would particularly like to thank Professor Louis Scharf for his continued support of our activities, and Prof. Jiangguo "James" Liu and Prof. Jennifer Mueller for the work they do as our faculty sponsors. We hosted and participated in a plethora of successful events including technical workshops, invited speakers, social events, a field trip and the Front Range Applied Math conference.

It is wonderful to host so many events that benefit our chapter directly, but in my opinion, our greatest asset as a chapter is our ability to bring young researchers together, and share our talents. In this light I would like to draw particular attention to the FRAM conference and the visit day that we had with the SIAM chapter from Colorado College. The Front Range Applied math conference is hosted annually by the University of Colorado at Denver, and supported by each of the SIAM chapters along the front range. This conference offers the rare opportunity for graduate students and undergrads to present original research to their peers. The setting creates a comfortable, casual atmosphere that encourages people to push their comfort limits in presenting their work, and provides the opportunity for students to see what other advances are being made in their fields from students just like them. This event can be a catalyst for collaboration and often inspires students to try out new ideas on problems that had previously been difficult to approach.

In a similar vein, the SIAM student chapter at CSU hosted our sister chapter from Colorado College. This visit gave us the opportunity to share our work and experiences in graduate school with the next generation of mathematicians. By sharing our enthusiasm for math research, we can hopefully inspire these intelligent, young students to further their academic careers and potentially be our collaborators in years to come. By expanding the reach of our SIAM chapter outside the walls of CSU, we help ourselves to get context and exposure for our work, and we help others to see the creativity and enthusiasm that our work contains. In my opinion, this has been a wonderful year for the SIAM student chapter at CSU, and with the results of our most recent officer election I can only see things getting better in the future. It is my pleasure then to introduce the SIAM officers for 2014-2015 academic year.

President: Farrah Sadre-Marandi
 Vice President: Mike Mikucki
 Secretary: Rashmi Murthy

Treasurer: Melody Dodd
 Community Liason: George Borleske
 Webmaster: Rachel Neville

Congratulations to all the newly elected officers! I look forward to the enthusiasm and fresh perspective that these students bring to our productive group. I would also like to draw special attention to George Borleske, who was selected from a group of highly qualified candidates to represent our chapter at this year's SIAM annual meeting in Chicago, IL. Congratulations to George, and thanks to all those who applied. For anyone who is interested in joining our active SIAM chapter, or would like to see what other conference funding opportunities are available through us, please visit our website <http://www.math.colostate.edu/~siamcsu/>.

Sincerely,
 Tim Marrinan
 SIAM Student Chapter President

2013 - 2014 SIAM Visiting Speakers

by FARRAH SADRE-MARANDI & TIM MARRINAN

Dr. Guang Lin

Pacific Northwest National Laboratory

In November, the chapter was happy to host Dr. Guang Lin, a senior research scientist at Pacific Northwest National Laboratory. Dr. Lin gave two presentations: one during our graduate student seminar, Greenslopes, on how to search and apply to positions at PNNL and another during the Applied Math Seminar on multiscale modeling of complex systems.

The first talk focused on an overview of PNNL, from its mission and vision to research areas of interest to our department. Dr. Lin gave much appreciated advice on applying to national labs, what abilities PNNL scientists are looking for and discussed what the day-to-day life of a research scientist is like. Additionally, Dr. Lin joined many chapter members for lunch to discuss job opportunities and answer remaining questions about Pacific Northwest National Laboratory.

Dr. Lin's second talk was on how to address the uncertainties that arise when quantifying the performance of complex systems. Because these uncertainties can have a large effect on a system, it is important they are treated as a core element in modeling. Dr. Lin discussed multiple ways to account for these issues and showed a new formulation for quantifying both numerical and modeling errors.

Dr. Ken Ho

Pacific Northwest National Laboratory



Brent Davis presents Dr. Ken Ho with one of our SIAM Student Chapter t-shirts following his presentation.

During the week of March 3rd, Dr. Ken L. Ho from Stanford University visited CSU campus. His trip was a joint venture between the Numerical Algebraic Geometry Lab (NAGLab) headed by Professor Dan Bates and the SIAM student chapter. During his stay, Dr. Ho worked on collaborative projects with members of the NAGLab, many of whom are SIAM members, and he gave a lec-

ture during the applied math seminar sponsored by the SIAM student chapter.

His lecture, titled, "Hierarchical interpolative factorization," discussed a fast direct solver for discretized elliptical partial differential equations. When coupled with a good preconditioner, the method achieved linear or nearly linear complexity, and has high practical efficiency. The method was based on the tools of block elimination, interpolative decomposition, and skeletonization.

The lecture was very well received by students and faculty alike. Both in thanks for a wonderful visit and in an effort to pick his brain, SIAM chapter members took Dr. Ho to lunch and dinner during his stay. As active collaboration is already happening between Dr. Ho and members of our NAGLab, the conversations were relevant and interesting.

10th annual SIAM Front Range Applied Mathematics Conference

by FARRAH SADRE-MARANDI



Members of the SIAM Student Chapter pause for a photo at the NREL Education Center in Golden, CO.

The 10th annual SIAM front range applied mathematics student conference (FRAM) was held on March 1st at the University of Colorado-Denver this year. Many of our CSU chapter members gave talks this year, accounting for one fourth of the total speakers, and many more came to support their fellow graduate students. Speakers included Brent Davis, George Borleske, Farrah Sadre-Marandi, Mike Mikucki, Melody Dodd, Tim Hodges, Rachel Neville, and Tim Marrinan. Most of the members at the conference also served at the registration desk and chaired some of the sessions.

The plenary address this year was given by Dr. Stephan Sain, from the Computational and Information

System Laboratory as a part of the National Center for Atmospheric Research. His lecture *Solving the Earth's Equations: Mathematics and Statistics at the National Center for Atmospheric Research* gave an overview of the various mathematical and statistical projects at NCAR. Current work focuses on the analysis of climate models, which comes with many big data challenges, as well as the design and analysis of computer experiments. This research brings together many aspects of applied mathematics and statistics, which makes it an interesting problem for anyone perusing mathematics to work on.

Not only were there interesting talks, but the adventure started when leaving CSU early in the morning. A heavy snow storm set in as we were leaving campus, causing many delays along the drive down to Denver. We were thankful our chapter members made it safely to the conference and were able to present their research to the other Front Range SIAM chapters.

We look forward to being apart of the SIAM conference again in March of 2015. All students are encouraged to participate; a call for presentations is expected mid February 2015.

SIAM CSU Visits the National Renewable Energy Laboratory

by BRUCE EMERSON, PHYSICS PROFESSOR VISITING CSU



Members of the SIAM Student Chapter pause for a photo at the NREL Education Center in Golden, CO.

The CSU chapter of SIAM took a “field trip” to the National Renewable Energy Lab (NREL) in Golden, CO on Friday May 9th. NREL is a government research lab that works on a broad range of problems associated with the various technologies in renewable energy. Jim Bosch met the CSU SIAM chapter at the Education Center at NREL and shared a broad overview of the operations

and primary research efforts at the center. Nine CSU students, graduate and undergraduate, from math and science were probably a different audience than usually visits NREL but Jim did a great job of sharing with us a sense of where the skills of our members might be put to great use in the work of the center. We learned about mathematical modeling of turbulent wind flows, the supercomputer facility that supports large data analysis and modeling, the development of a wide range of photovoltaic chemistries, and the many novel building techniques that reduce energy use at the facility. Jim clearly felt that there were a range of possible careers for math and science students, particularly at the Master’s level or above, at NREL. SIAM members had many questions about career possibilities as well as specific directions of the research which provided additional insight into life and work at NREL.



On the same day as the field trip to the National Renewable Energy Lab, SIAM chapter members stopped off at the Denver Museum of Nature and Science for some educational fun.

Spring Student Chapter Meeting

by MELISSA ADKINS

Along with many activities throughout the year SIAM also holds its regular semester meetings. Our spring semester meeting was held the morning of May 2nd. SIAM provided biscuits, gravy, fruit, coffee, and orange juice for all the attending members. While enjoying these delicious snacks we nominated new officers for the 2014-2015 school year, read a proposed change to our club bylaws, and discussed our upcoming trip to NREL and the science museum in Denver, CO. The meeting was deemed successful as we had nominations for every office and were able to wrap up the semester with SIAM activities!

SIAM Technical Workshop Series

by TIM MARRINAN

Continuing on the success of last year's technical workshop series, members of the SIAM student chapter proposed and executed two new workshops during this academic year. The goal of these days is to share insights between graduate students on technical topics that we all encounter during our time at Colorado State. By sharing our successes, we hope that the coming generations of students can build on them and avoid reinventing the wheel in math research and the more bureaucratic aspects of grad school.

Academic Website Working Day

It has become common to the point of being expected that PhD students hoping to get a job in academia will have an academic website to showcase their research, teaching, and service. A personal, academic website provides a convenient platform for potential employers to get a hint at your activities during graduate school, but is passive and thus does not inconvenience them the way that sending lengthy hard copies of all your work would. Additionally, it provides easy exposure for a student's research papers all in one place.

In light of these benefits, the SIAM student chapter hosted an "academic website working day" in December. Attended by an enthusiastic 10 or so students, the working day was aimed at getting pages up and running for the uninitiated. Some students learned how to create and upload more traditional html pages, and find resources for maintaining them, while others opted for the clean usability of Wordpress sites and the like. All the students who attended walked away with at least a homepage, and an idea of how to create and maintain the other pages they may need in their academic lives.

\LaTeX Thesis/Dissertation Template Workshop

The second workshop hosted by the SIAM student chapter was the " \LaTeX thesis template workshop." The formatting standards of the Graduate School at Colorado State are notoriously inconsistent and difficult to meet on the first attempt. With this in mind, one of the SIAM group's collaborators in the physics department, Leif Anderson, created a latex document class that automatically formats documents to meet these standards. However, since the Graduate School seems to change their formatting requirements every year, there is a need to update and maintain this template regularly.

This workshop was aimed at discussing recent changes to the formatting requirements put in place by the Graduate School, fixing bugs in the template from lesser used portions, and creating solutions for formatting

scenarios that had not previously been encountered. The workshop was attended by 8 students including 2 from physics, 1 from computer science and 1 from statistics. Thrilling discussions about spacing after headers, small caps vs. uppercase in titles, and numbering in theorem environments led to the most recent version of the template. As of now, theses that used the latest version of the template were accepted by the graduate school without formatting revisions. Though it is a humble goal, it seems like a major success to the many students who have previously toiled for hours to meet these requirements. For future graduates, the up-to-date code is currently hosted on this Google site <https://code.google.com/p/csu-thesis/>, but it may migrate to the SIAM chapter's website for easier maintenance now that Dr. Anderson has graduated. Stay tuned for more details.

SIAM CSU hosts Colorado College's SIAM Student Chapter

by TIM MARRINAN



Professor Beth Malmskog and her students heard research presentations from members of the CSU SIAM student chapter on the first of hopefully annual visits between the chapters.

In early May, the SIAM student chapter at CSU had the pleasure of hosting one of our alumna, Professor Beth Malmskog, along with members of the SIAM student chapter that she is the faculty sponsor for at Colorado College. Being a newly formed chapter, the purpose of the visit was twofold; to learn what types of activities have been successful in the early years of our chapter, and to give the Colorado College undergrads a taste of what graduate school life and research are like.

The visit began with an hour of coffee and refreshments where the Colorado College students were able to meet a few professors and casually chat about CSU and

the process of applying to graduate schools. From there, the group listened to research presentations from SIAM chapter members Tim Marrinan, Farrah Sadre-Marandi, and Eric Hanson. The research presentations generally presented current research, but we delivered at a more general level so as to be approachable by the younger students.

After an hour and a half of research talks the entire group was ready to relax, so the visit ended with a casual dinner on the back patio of the local pub, Avogradro's Number. The visit was thoroughly enjoyed by both chapters, and although Dr. Malmskog is moving on from Colorado College, the students expressed interest in making the visit an annual event.



Eric Hanson presents on recent advances in numerical algebraic geometry to the Colorado College SIAM chapter.

SIAM Bowling Night

by BHAUDIN HASHMI

The SIAM Student Chapter at CSU had a get together to relax and have fun for a night of bowling. Organized by the chapter president, Tim Marrinan, the event was held as a platform for students from different departments to get to learn more about the SIAM student chapter at CSU. Keeping in mind the spirit of Halloween most members showed up all dressed up for the occasion. With about a dozen people showing up, the bowling prowess of CSUs hardened mathematicians were on full display. After a grueling two hours of bowling, the chapter members called it a night to end another successful event to expand the reach the SIAM student chapter at CSU.