Final Program

2013 SIAM ANNUAL MEETING

July 8-12, 2013

Town and Country Resort & Convention Center
San Diego, California USA

SIAM Conference on CONTROL & Its APPLICATIONS

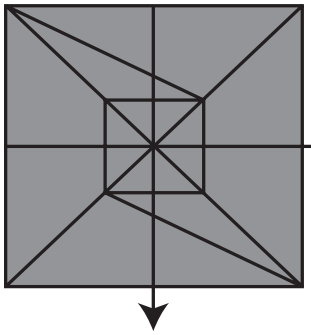

Figure courtesy Fabio Fagnani.

July 8-10, 2013
Town and Country Resort
& Convention Center
San Diego, California USA

The SIAM Conference on Control and Its Applications is sponsored by the SIAM Activity Group on Control and Systems Theory (SIAG/CST)

The SIAM Activity Group on Control and Systems Theory fosters collaboration and interaction among mathematicians, engineers, and other scientists in those areas of research related to the theory of systems and their control. It seeks to promote the development of theory and methods related to modeling, control, estimation, and approximation of complex biological, physical, and engineering systems. The SIAG organizes a biennial conference, sponsors minisymposia at SIAM meetings and periodic conferences, and maintains a member directory and an electronic discussion group. Every two years, the activity group also awards the SIAG/Control and Systems Theory Prize to a young researcher for outstanding research contributions to mathematical control or systems theory and the SIAG/CST Best SICON Paper Prize to the author(s) of the two most outstanding papers published in the SIAM Journal on Control and Optimization (SICON).

siam.

Society for Industrial and Applied Mathematics

3600 Market Street, 6th Floor

Philadelphia, PA 19104-2688 USA

Telephone: +1-215-382-9800 Fax: +1-215- 386-7999

Conference E-mail: meetings@siam.org

Conference Web: www.siam.org/meetings/

Membership and Customer Service: (800) 447-7426 (US & Canada) or +1-215-382-9800 (worldwide)

2013 is designated as the year of Math of Planet Earth.
SIAM supports MPE2013.
www.mpe2013.org

SIAM 2013 Mobile App
Scan the QR code to the right with any QR reader and download the TripBuilder ® EventMobile app to your iPHONE, iPAD, iTOUCH, ANDROID or BLACKBERRY mobile device. You can also visit *www.tripbuilder.net/mobileweb/apps/siam2013*

General Information

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Annual Meeting Organizing Committee

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Sandia National Laboratories, USA

Hinke M. Osinga
University of Auckland, New Zealand

Organizing Committee

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(AN13 liaison)

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Fudan University, China

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Virginia Tech, USA

SIAM Registration Desk

The SIAM registration desk is located in the Atlas Foyer of the Town and Country Resort & Convention Center. It is open during the following hours:

Sunday, July 7
7:00 AM - 8:00 PM

Monday, July 8
7:30 AM - 4:30 PM

Tuesday, July 9
8:00 AM - 4:30 PM

Wednesday, July 10
8:00 AM - 4:30 PM

Thursday, July 11
8:00 AM - 4:30 PM

Friday, July 12
8:00 AM - 4:30 PM

Conference Location

Technical sessions for both conferences will be held at the Town and Country Resort & Convention Center.

Town and Country Resort & Convention Center

500 Hotel Circle North

San Diego, California 92108

Phone Number: +1-619-291-7131

Toll Free Reservations: (800)-772-8527 (USA and Canada)

Fax: +1-619-294-4681

Hotel Website: *http://www.towncountry.com/*

Hotel Telephone Number

To reach an attendee or to leave a message, call +1-619-291-7131. The hotel operator can either connect you with the SIAM registration desk or to the attendee's room. Messages taken at the SIAM registration desk will be posted to the message board located in the registration area.

Check-in and Check-out Times for the Town and Country

Check-in time is 3:00 PM.

Check-out time is 11:00 PM.

Childcare

For local childcare information, please contact the concierge at the Town and Country Resort & Convention Center at +1-619-291-7131.

SIAM Corporate Members & Sponsors

SIAM corporate members provide their employees with knowledge about, access to, and contacts in the applied mathematics and computational sciences community through their membership benefits. Corporate membership is more than just a bundle of tangible products and services; it is an expression of support for SIAM and its programs. SIAM is pleased to acknowledge its corporate members and sponsors. In recognition of their support, non-member attendees who are employed by the following organizations are entitled to the SIAM member registration rate.

Corporate/Institutional Members

The Aerospace Corporation

Air Force Office of Scientific Research

AT&T Laboratories - Research

Bechtel Marine Propulsion Laboratory

The Boeing Company

CEA/DAM

DSTO- Defence Science and Technology Organisation

Hewlett-Packard

IBM Corporation

IDA Center for Communications Research, La Jolla

IDA Center for Communications Research, Princeton

Institute for Defense Analyses, Center for Computing Sciences

Lawrence Berkeley National Laboratory

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Mathematical Sciences Research Institute

Max-Planck-Institute for Dynamics of Complex Technical Systems

Mentor Graphics

The MITRE Corporation

National Institute of Standards and Technology (NIST)

National Security Agency (DIRNSA)

Naval Surface Warfare Center, Dahlgren Division

NEC Laboratories America, Inc.

Oak Ridge National Laboratory, managed by UT-Battelle for the Department of Energy

PETROLEO BRASILEIRO S.A. – PETROBRAS

Philips Research

Sandia National Laboratories

Schlumberger-Doll Research

Tech X Corporation

Texas Instruments Incorporated

U.S. Army Corps of Engineers, Engineer Research and Development Center

United States Department of Energy

List current May 2013.

Funding Agency

SIAM and the Conference Organizing Committee wish to extend their thanks and appreciation to the U.S. National Science Foundation. The U.S. National Science Foundation supports the SIAM Conference on Control and Its Applications and the Workshop Celebrating Diversity (WCD). Both events are being held in conjunction with the 2013 SIAM Annual Meeting.

Leading the applied mathematics community . . .

Join SIAM and save!

SIAM members save $130 on full registration for the 2013 SIAM Annual Meeting and SIAM Conference on Control and Its Applications! Join your peers in supporting the premier professional society for applied mathematicians and computational scientists. SIAM members receive subscriptions to *SIAM Review, SIAM News*, and *Unwrapped,* and enjoy substantial discounts on SIAM books, journal subscriptions, and conference registrations.

If you are not a SIAM member and paid the *Non-Member* or *Non-Member Mini Speaker/Organizer* rate to attend the conference, you can apply the difference between what you paid and what a member would have paid ($130 for a *Non-Member* and $65 for a *Non-Member Mini Speaker/Organizer*) towards a SIAM membership. Contact SIAM Customer Service for details or join at the conference registration desk.

If you've already paid the *Non-Member* registration fee for the conference, we'll deduct the $130 member discount from your dues – join for 18 months of membership through 2014 for $78, or join for the rest of 2013 for just $9.

If you've already paid the *Non-Member Mini Speaker/Organizer* registration fee for the conference, we'll deduct the $65 member discount from your dues – join for 18 months of membership through 2014 for $143, or join for the rest of 2013 for just $74.

Free Student Memberships are available to students who attend an institution that is an Academic Member of SIAM *www.siam.org/membership/acadlist.htm*, are members of Student Chapters of SIAM, or are nominated by a Regular Member of SIAM.

Join onsite at the registration desk, go to *www.siam.org/joinsiam* to join online or download an application form, or contact SIAM Customer Service

Telephone: +1-215-382-9800 (worldwide); or 800-447-7426 (U.S. and Canada only)

Fax: +1-215-386-7999

E-mail: membership@siam.org

Postal mail: Society for Industrial and Applied Mathematics, 3600 Market Street, 6th floor, Philadelphia, PA 19104-2688 USA

Standard Audio/Visual Set-Up in Meeting Rooms

SIAM does not provide computers for any speaker. When giving an electronic presentation, speakers must provide their own computers. SIAM is not responsible for the safety and security of speakers' computers.

The Plenary and Topical Session Rooms will have two (2) screens, one (1) data projector and one (1) overhead projector. Cables or adaptors for Apple computers are not supplied, as they vary for each model. Please bring your own cable/adaptor if using a Mac computer.

All other concurrent/breakout rooms will have one (1) screen and one (1) data projector. Cables or adaptors for Apple computers are not supplied, as they vary for each model. Please bring your own cable/adaptor if using a Mac computer. Overhead projectors will be provided only when requested.

If you have questions regarding availability of equipment in the meeting room of your presentation, or to request an overhead projector for your session, please see a SIAM staff member at the registration desk.

E-mail Access

Attendees staying within the SIAM room block at the Town and Country Resort & Convention Center will have guest room Internet access at a discounted rate of $5.00 per 24 hours. Additionally, complimentary wireless Internet access will be available in the conference meeting space. This service is being provided at no additional cost to attendees.

For those without their own computers, an Internet café will also be available in the exhibit area.

Registration Fee Includes

- Access to email facilities
- Admission to all technical sessions
- Coffee breaks daily
- Exhibit Hall Admission
- Poster and Dessert Reception
- Room set-ups and audio/visual equipment
- SIAG/CST Business Meeting *(for SIAG/CST members)*
- SIAM Business Meeting *(for SIAM members)*
- Welcome Reception

In addition, the following events are available to attendees at no additional cost. The events are subsidized by SIAM and are not covered by the registration fees.

- Career Fair, Graduate Student Reception, and Industry Member Reception
- Community Reception
- Prizes and Awards Luncheon
- Professional Development Evening

Job Postings

Please check with the SIAM registration desk regarding the location of the job postings board or visit *http://jobs.siam.org*.

Important Notice to Poster Presenters

The poster session is scheduled for Tuesday, July 9 at 8:00 PM. Poster presenters may set up their poster material on the provided 4' x 8' poster boards in the Exhibit Hall beginning Sunday, July 7 at 3:00 PM. All materials must be posted by 8:00 PM on Tuesday, July 8, the official start time of the session. Posters will remain on display through Thursday, July 11. Poster displays must be removed by 3:30 PM. Posters remaining after this time will be discarded. SIAM is not responsible for discarded posters.

SIAM Books and Journals

Display copies of books and complimentary copies of journals are available on site. SIAM books are available at a discounted price during the conference. If a SIAM books representative is not available, completed order forms and payment (credit cards are preferred) may be taken to the SIAM registration desk. The books table will close at 4:00 PM on Thursday, July 11.

Conference Sponsor

IBM Research

Name Badges

A space for emergency contact information is provided on the back of your name badge. Help us help you in the event of an emergency!

Comments?

Comments about SIAM meetings are encouraged! Please send to:

Sven Leyffer, SIAM Vice President for Programs (vpp@siam.org).

Special Events

- Welcome Reception
  Sunday, July 7
- Career Fair, Graduate Student Reception, and Industry Member Reception
  Monday, July 8
- Prizes and Awards Luncheon
  Tuesday, July 9
- SIAG/CST Business Meeting
  (for SIAG/CST members)
  Complimentary beer and wine will be served.
  Tuesday, July 9
- SIAM Business Meeting
  (for SIAM members)
  Complimentary beer and wine will be served.
  Tuesday, July 9
- Poster Session and Dessert Reception
  Tuesday, July 9
- Community Reception
  Wednesday, July 10
- Professional Development Evening
  Thursday, July 11

(See page 17 for additional details about these Special Events)

General Information

Please Note

SIAM is not responsible for the safety and security of attendees' computers. Do not leave your laptop computers unattended. Please remember to turn off your cell phones, pagers, etc. during sessions.

Recording of Presentations

Audio and video recording of presentations at SIAM meetings is prohibited without the written permission of the presenter and SIAM.

Social Media

SIAM is promoting the use of social media, such as Facebook and Twitter, in order to enhance scientific discussion at its meetings and enable attendees to connect with each other prior to, during and after conferences. If you are tweeting about a conference, please use the designated hashtag to enable other attendees to keep up with the Twitter conversation and to allow better archiving of our conference discussions. The hashtag for the 2013 SIAM Annual Meeting is #SIAMAN13. The hashtag for the SIAM Conference on Control and Its Applications is #SIAMCT13.

The SIAM 2013 Mobile App Powered by TripBuilder®

To enhance your conference experience, we're providing a state-of-the-art mobile app to give you important conference information right at your fingertips. With this TripBuilder Event Mobile app, you can:

- Create your own custom schedule
- View Sessions, Speakers, Exhibitors and more
- Take notes and export them to your email
- View Award-Winning TripBuilder Recommendations for San Diego
- Get instant Alerts about important conference info

SIAM 2013 Mobile App
Scan the QR code to the right with any QR reader and download the TripBuilder ® EventMobile app to your iPHONE, iPAD, iTOUCH, ANDROID or BLACKBERRY mobile device. You can also visit ***www.tripbuilder.net/mobileweb/apps/siam2013***

Exhibitor Information

Visit the Exhibits

Please talk to company representatives about products and services that are important to you! Enjoy free coffee during coffee breaks. Visit the exhibits during these hours:

Monday 9:30 AM-4:30 PM
Tuesday 9:30 AM-4:30 PM
Wednesday 9:30 AM-4:30 PM
Thursday 9:30 AM-4:30 PM

AMS
Booth#1

The American Mathematical Society was founded in 1888 to further the interests of mathematical research and scholarship. *This year we celebrate our 125th anniversary*. The AMS serves over 30,000 individual members worldwide through meetings, programs, and professional services designed to foster communication, collaboration, and public awareness of the mathematical sciences. The AMS publishes books, journals (electronic and print), and MathSciNet-the Mathematical Reviews Database. Our top-tier research publications span the entire spectrum of pure and applied mathematics for professionals, graduate students, and advanced undergraduates. For more information go to www.ams.org.

CRC Press-Taylor & Francis
Booth#10

CRC Press/Taylor & Francis is a premier books and journals publisher. Stop by our booth to browse our books at a discount of up to 50%, to pick up a journal sample copy, or to meet with our editor Bob Ross if you are interested in developing a new book project.

Cambridge University Press
Booth#11

Cambridge's publishing in books and journals combines state-of-the-art content with the highest standards of scholarship, writing and production.

Visit our stand to browse new titles, available at a 20% discount, and to pick up sample issues of our journals. Visit our website to see everything we do: www.cambridge.org/us/.

Elsevier
Booth#9

Elsevier publishes world-class mathematics and statistics content, from journals and books to online solutions. Stop by booth #9, to find out about our publications and to meet and interact with our publishers.

MathWorks
Booth#3

The MATLAB and Simulink product families are fundamental computational tools at the world's educational institutions. Adopted by more than 5,000 universities and colleges, MathWorks products accelerate the pace of learning, teaching, and research in engineering and science. MathWorks products also help prepare students for careers in industry worldwide, where the tools are widely used for collaborative new product development. For more information, visit www.mathworks.com/academia.

Oxford University Press
Booth#13

New and classic titles in mathematics are available including Data-Driven Modeling & Scientific Computation Methods for Complex Systems & Big Data by Nathan Kutz and the Numerical Mathematics and Scientific Computation series. Our journals include those of the Institute of Mathematics and its Applications (IMA). Visit www.oup.com/us for more information.

Princeton University Press
Booth#2

New books by perennial favorites include *The 5 Elements of Effective Thinking* by Burger and Starbird, *The Logician and the Engineer* by Nahin, and *Guesstimation 2.0* by Weinstein. We recently released *Wind Wizard* by Roberts and *Invisible in the Storm*, a history of weather prediction, by Roulstone and Norbury. *The Golden Ticket*, on the P, NP problem, by Fortnow will be at the Princeton booth as will a sneak peek at Martin Gardner's autobiography. Adoption copies of textbooks are available.

SIAM
Booths #14, 15, 16, 17, 18

Visit the SIAM booth to check out our many recently published titles along with a large assortment of other acclaimed SIAM books, all available with generous member and attendee discounts. You'll also find sample issues of SIAM's renowned journals, along with information and applications for anyone interested in becoming a SIAM member. Coffee and tea are available at the SIAM booth all day, not just during coffee breaks. And don't forget to pick up a copy of SIAM News for the road! Be sure to visit SIAM on the Web, too, at www.siam.org.

Springer Science + Business Media, LLC
Booth#12

Come see Springer & Birkhäuser's key applied mathematics titles! Learn about our innovative publishing model, including Open Access. Follow SpringerMath on Twitter or like our Facebook page to receive the latest updates.

Tabletop Display

Association of Women in Mathematics

This exhibitor list is current at press time.

Visit the Exhibits!

Town and Country Resort & Convention Center, San Diego, California, USA

Exhibit Hours

Monday, July 8
9:30 AM–4:30 PM

Tuesday, July 9
9:30 AM–4:30 PM

Wednesday, July 10
9:30 AM–4:30 PM

Thursday, July 11
9:30 AM–4:30 PM

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SIAM Conference on
CONTROL &
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Figure courtesy Fabio Fagnani.

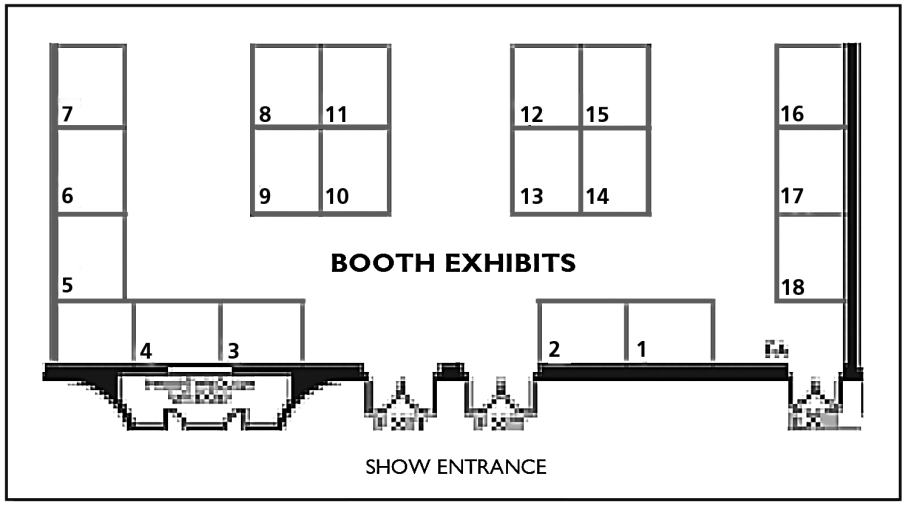
Booth Exhibitors	Booth #
American Mathematical Society	1
CRC Press-Taylor & Francis Group LLC	10
Cambridge University Press	11
Elsevier	9
MathWorks	3
Oxford University Press	13
Princeton University Press	2
SIAM	14, 15, 16, 17, 18
Springer Science & Business Media, LLC	12

Tabletop Exhibitor

Association for Women in Mathematics (AWM)

Coffee breaks will be served in the exhibit hall.

EXHIBIT HALL



Association for Women in Mathematics (AWM) Workshop

Monday, July 8-Tuesday, July 9

Association for Women in Mathematics (AWM) Workshop for Women Graduate Students and Recent PhDs

Held in conjunction with the 2013 SIAM Annual Meeting

The Association for Women in Mathematics (AWM) plans a workshop from Monday mid-day through Tuesday, July 9, 2013. AWM and SIAM welcome your participation. There is NO additional registration fee for this AWM workshop. The minisymposia, poster session and award lecture are open to all SIAM meeting attendees.

AWM is grateful to SIAM and their Conference Department for all their efforts on behalf of the workshop and all AWM activities. AWM also wishes to express its gratitude to the Department of Energy (DOE) for the support of the AWM workshop.

Monday, July 8

MS9: AWM Career Panel - Part I of II

10:30 AM - 12:30 PM

Room: Royal Palm 3

Organizers: Hoa Nguyen, *Trinity University, USA*

Sigal Gottlieb, *University of Massachusetts, Dartmouth, USA*

SP1: AWM-SIAM Sonia Kovalevsky Lecture:
Introduction to Radar Imaging

2:45 PM - 3:30 PM

Room: Town & Country

Presenter: Margaret Cheney, *Colorado State University and Naval Postgraduate School, USA*

MS22: AWM Career Panel - Part II of II

4:00 PM - 6:00 PM

Room: Royal Palm 3

Organizers: Hoa Nguyen, *Trinity University, USA*

Sigal Gottlieb, *University of Massachusetts, Dartmouth, USA*

Association for Women in Mathematics (AWM) Workshop

Tuesday, July 9

MS35: AWM - Workshop: Research Talks by Recent Ph.D.s

10:30 AM - 12:30 PM

Room: Royal Palm 3

Organizers: Maria Emelianenk, *George Mason University, USA*

Mette S. Olufsen, *North Carolina State University, USA*

MS48: AWM - Workshop: Mathematics of Planet Earth (MPE) Research Talks by Recent Ph.D.s

4:00 PM - 6:00 PM

Room: Royal Palm 3

Organizers: Elebeoba May, *University of Houston, USA*

Holly Gaff, *Old Dominion University, USA*

PP1: Poster and Dessert Reception

(in conjunction with AN13 and CT13 Poster and Dessert Reception)

8:00 PM - 10:00 PM

Room: Exhibit Hall

Workshop Celebrating Diversity

Organizers:
Illya Hicks, Rice University, USA
Cristina Villalobos, University of Texas-Pan American, USA
Stephen Wirkus, Arizona State University, USA

This annual event provides a chance for students to listen to technical talks presented by minority graduate students. The workshop is intended to accomplish several goals:

- To send a clear, explicit message of enthusiastic welcome and support from SIAM to members of under-represented groups. The workshop is deliberately held as part of a regular SIAM meeting so that the participants can combine the experiences of attending a regular scientific meeting and a special occasion dedicated to them.
- To bring together a mixture of people from different levels of age and professional experience, ranging from undergraduate students to senior scientists.
- To provide an opportunity for minority graduate students to present their research.
- To provide an informal, comfortable setting (a lunch) where all the students can meet applied and computational mathematicians with a wide variety of jobs in academia, national laboratories, industry, and government.

Tuesday, July 9
MS34 Computational Science
10:30 AM - 12:30 PM
Room: Royal Palm 2
Organizers: Josef Sifuentes, Texas A&M University, USA
Illya Hicks, Rice University, USA
Cristina Villalobos, University of Texas - Pan American, USA
Stephen Wirkus, Arizona State University, USA

MS47 Combinatorial Optimization
4:00 PM - 6:00 PM
Room: Royal Palm 2
Organizer: Illya Hicks, Rice University, USA

Wednesday, July 10
MS60 Mathematical and Theoretical Ecology
10:30 AM - 12:30 PM
Room: Royal Palm 2
Organizers: Paul J. Hurtado, Ohio State University, USA
Illya Hicks, Rice University, USA
Cristina Villalobos, University of Texas - Pan American, USA
Stephen Wirkus, Arizona State University, USA

Workshop Celebrating Diversity

Wednesday, July 10
MS68 Mathematical Modeling of Public Health Problems
4:00 PM - 6:00 PM
Room: Royal Palm 2
Organizers: Kamuela E. Yong, Arizona State University, USA
Anuj Mubayi, Northeastern Illinois University, USA
Illya Hicks, Rice University, USA
Cristina Villalobos, University of Texas - Pan American, USA
Stephen Wirkus, Arizona State University, USA

Thursday, July 11
MS86 Computational Approaches to Mathematical Modeling and Analysis of Biological Systems
10:30 AM - 12:30 PM
Room: Royal Palm 2
Organizers: Anael Verdugo, Virginia Tech, USA
Illya Hicks, Rice University, USA
Cristina Villalobos, University of Texas - Pan American, USA
Stephen Wirkus, Arizona State University, USA

MS102 Numerical Models in Applied Problems
4:00 PM - 6:00 PM
Room: Royal Palm 2
Organizers: Cristina Villalobos, University of Texas - Pan American, USA
Illya Hicks, Rice University, USA
Stephen Wirkus, Arizona State University, USA

Student Days

Students - Activities just for you at the 2013 SIAM Annual Meeting in San Diego

Student Days at the 2013 SIAM Annual Meeting is a day for students and about students. Organizers have got it all covered this year, with activities and sessions where students can meet with both peers and professionals in their field, participate in a career fair, attend an information session on hot areas for jobs and research, and network with SIAM Student Chapters from all over the world.

Goals

Organized by the SIAM Education Committee (Chaired by Peter Turner, Clarkson University), Student Days are designed to encourage student participation in SIAM, to help students learn more about applied mathematics and computational science as both fields of study and as careers, and to provide a forum for emerging mathematicians to learn about their field from the professionals who know the answers. Organizers also hope to encourage those in the learning community to establish new student chapters of SIAM and to promote interaction between students and SIAM leadership.

Events and Happenings

Student Days sessions include presentations by student chapter representatives and the winners of the SIAM Award in the Mathematical Contest in Modeling (MCM) and the SIAM Student Paper Prizes. In addition, students can attend plenary sessions from the SIAM Annual Meeting (AN13) or the SIAM Conference on Control and Its Applications (CT13). Other activities that will enhance the meeting for students include a special orientation prior to Sunday's Welcome Reception, a Student Lounge, and a session for students with selected conference invited speakers. Other activities that will be of interest to students include the industrial panel and career fair on Monday, the Poster Session and Dessert Reception on Tuesday, the community lecture on Wednesday, and the book giveaway and professional development activities on Thursday.

Meeting with Leaders and Influencing SIAM (by invitation only)

Student Days 2013 will also feature the Student Chapter Meeting with SIAM Leadership. This meeting gives faculty advisors and student chapter representatives the opportunity to meet with key decision makers to discuss ideas for improving student chapters and ways that SIAM can meet the needs of current and future student members all over the world. Each chapter selects one student to attend the event as its chapter representative.

Finding Jobs for You

Monday, July 8, features events to help you find a job and develop your career. An Industry Panel organized by SIAM Vice President for Industry, Thomas Grandine, will offer insights into what it's like to work in industry. The panel will be followed by a Career Fair and a reception for industry representatives and graduate students. The Career Fair provides students the opportunity to interact with prospective employers from government and industry who are specifically interested in SIAM's unique community. Find out what prospective employers are looking for and what each has to offer. A Career Fair student guide will be available online in the spring. Professional Development Evening is Thursday, July 11. In addition to a panel discussion, there will be an opportunity to network with professionals in the field. You might also be interested in attending the Association for Women in Mathematics (AWM) workshop for graduate students and recent PhD's.

Student Days Schedule

…and other activities of interest to students

Sunday, July 7

5:00 PM - 6:00 PM	**Student Orientation**
6:00 PM - 8:00 PM	**Welcome Reception**

Monday, July 8

9:30 AM - 4:30 PM	**Visit the student lounge in the Exhibit Hall**
4:00 PM - 6:00 PM	**SIAM Student Chapter Presentations (see MS20)**
6:15 PM - 7:15 PM	**Industry Panel**
7:15 PM - 9:15 PM	**Career Fair, Graduate Student Reception**

Tuesday, July 9

7:00 AM - 8:15 AM	**Student Chapter meeting with SIAM Leadership (by invitation only)**
8:30 AM - 10:00 AM	**AN13 and CT13 Invited Speaker sessions**
9:30 AM - 4:30 PM	**Visit the student lounge in the Exhibit Hall**
10:00 AM - 10:30 AM	**Coffee break**
10:30 AM - 12:30 PM	**SIAM Student Chapter Presentations (see MS33)**
12:30 PM - 2:30 PM	**Prizes and Awards Luncheon**
2:30 PM - 3:30 PM	**John von Neumann Lecture**
3:30 PM - 4:00 PM	**Coffee break**
4:00 PM - 6:00 PM	**Students informal meeting with Invited Speakers (see MS46)**
8:00 PM - 10:00 PM	**Joint Poster Session (AN13, AWM, CT13) and Dessert Reception**

Student Days

Wednesday, July 10

8:30 AM - 10:00 AM	AN13 and CT13 Invited Speaker sessions
9:30 AM - 4:30 PM	Visit the student lounge in the Exhibit Hall
10:00 AM - 10:30 AM	Coffee break
10:30 AM - 12:30 PM	2013 SIAM Student Paper Prize winners' presentations (see MS59)
12:30 PM - 2:00 PM	Lunch break
2:00 PM - 3:00 PM	Past President's Lecture
3:00 PM - 3:30 PM	Reid Prize Lecture
3:30 PM - 4:00 PM	Coffee break
4:00 PM - 5:00 PM	2013 SIAM/MCM Award winners' presentations (see MS72)
6:15 PM - 7:15 PM	I.E. Block Community Lecture
7:15 PM - 8:15 PM	Community Reception

Thursday, July 11

4:00 PM – 4:30 PM	SIAM Book Giveaway - Exhibit Hall STUDENTS ONLY
6:15 PM - 9:15 PM	Professional Development Evening

Special Events

Sunday, July 7

5:00 PM - 6:00 PM **Student Orientation**

Tiki Pavilion

This event on the Annual Meeting calendar is intended to enhance students' experience at the meeting by providing an introduction to some of the meeting organizers, to San Diego, and to the program. There are several new events and facilities to help students get the fullest benefit from the meeting. A few very short presentations will be followed by an opportunity to network with both fellow students and other attendees prior to the general welcome reception.

6:00 PM - 8:00 PM **Welcome Reception**

Grand Plaza Fountain Court

The welcome reception is open to all attendees and their guests. Light hors d'oeuvres will be served. One "free drink" ticket is included with each registration. A cash bar will be available for those who wish to purchase additional beverages.

Monday, July 8

6:15 PM - 7:15 PM **Industry Panel: Developing and Expanding Your Sphere of Influence**

Town & Country

7:15 PM - 9:15 PM **Career Fair, Graduate Student Reception and Industry Reception**

Atlas Foyer

The SIAM Applied Mathematics and Computational Science Career Fair* is an informational and interactive event at which employers and prospective employees can discuss careers. It is a great opportunity for prospective employees to meet government and industry representatives and discuss what they are looking for and what each employer has to offer. Complimentary light hors d'oeuvres, beer and wine will be served.

SIAM is pleased to announce the following organizations are participating in the **Career Fair*:**

Argonne National Laboratory

MathWorks, Inc.

National Institute of Standards and Technology

Oak Ridge National Laboratory

Quantlab Financial, LLC

University of Science Technology of China

Graduate Student Reception*

Graduate students and new PhDs are especially urged to attend this event.

Industry Member Reception*

This reception is scheduled as a networking opportunity for attendees from industry.

**These three events are designed to be interactive.*

Special Events

Tuesday, July 9

12:30 PM - 2:30 PM **Prizes and Awards Luncheon**
Golden Ballroom

This luncheon will recognize and honor this year's award recipients. The luncheon is open to all meeting attendees and is included in the registration fee, however, a reservation is required in advance. If you do not have a ticket, please see a SIAM representative at the registration desk. Tickets can be obtained through noon on Monday. See page 27 for the list of prizes and awards being presented.

6:15 PM - 7:15 PM **SIAM Business Meeting**
Town & Country *(open to SIAM members; complimentary beer and wine will be served)*

7:30 PM - 8:00 PM **SIAG/CST Business Meeting**
San Diego *(open to all SIAG/CST Members; complimentary beer and wine will be served)*

8:00 PM - 10:00 PM **AN13/AWM/CT13 Joint Poster and Dessert Reception**
Exhibit Hall
The 2013 SIAM Annual Meeting, AWM Workshop, Student Days and SIAM Conference on Control and Its Applications all have contributed to the posters on display. Presentations are in an informal setting, allowing presenters to discuss their research with individual attendees.

Wednesday, July 10

6:15 PM - 8:15 PM **I. E. Block Community Lecture and Reception**
Lecture - Town & Country, Reception – Grand Plaza Fountain Court
This event is open to all attendees, their guests and the local community.

Anette Hosoi, Massachusetts Institute of Technology, USA, will deliver the community lecture from 6:15 PM to 7:15 PM, followed by the Community Reception from 7:15 PM to 8:15 PM. Complimentary light hors d'oeuvres, beer and wine will be served.

Special Events

Thursday, July 11

6:15 PM - 9:15 PM **Professional Development Evening**
Careers: Backward and Forward
Join us for an evening devoted to developing a successful career in the mathematical sciences. Several professionals from academia, government, and industry will share their work experiences and give advice on how to develop a career in the mathematical sciences. The target audience for this event includes early career professionals (i.e., less than five years past last degree), postdocs, and students. However, we are also encouraging participation from the senior professional community during the networking session.

Organizers: Christopher Siefert, Sandia National Laboratories, USA
Maria Emelianenko, George Mason University, USA
Cammey Cole Manning, Meredith College, USA

6:15 PM **Panel Discussion: Looking Backward**
Panelists:
Tony Drummond, Lawrence Berkeley National Laboratory, USA
Katie Gurski, Howard University, USA
Michele Joyner, East Tennessee State University, USA
Ben Santer, Lawrence Livermore National Laboratory, USA

7:15 PM **Networking Reception**

8:15 PM **Panel Discussion: Looking Forward**
Panelists:
Bruce Hendrickson, Sandia National Laboratories, USA
Hans Kaper, Argonne National Laboratory, Georgetown University, USA
and University of Illinois at Urbana-Champaign, USA
Deborah Lockhart, National Science Foundation, USA

Invited Speakers
2013 SIAM Annual Meeting

Monday, July 8

8:30 AM - 9:15 AM

IC1 Social Networks as Information Filters

Lada Adamic, *University of Michigan, Ann Arbor, USA*

Town & Country

9:15 AM - 10:00 AM

IC2 Cost-Minimizing Regulations for a Wholesale Electricity Market

Alejandro Jofré, *Universidad de Chile, Chile*

Town & Country

2:00 PM - 2:45 PM

JP1 Applied and Computational Mathematics for Energy Efficient Systems

John A. Burns, *Virginia Tech, USA*

Joint speaker with the Conference on Control and Its Applications

Town & Country

Tuesday, July 9

8:30 AM - 9:15 AM

IC3 Keeping Ford Green with Mathematics

Erica Klampfl, *Ford Motor Company, USA*

Town & Country

9:15 AM - 10:00 AM

IC4 Traffic Jams of Self-driven Particles

Katsuhiro Nishinari, *University of Tokyo, Japan*

Town & Country

Invited Speakers
2013 SIAM Annual Meeting

Wednesday, July 10
8:30 AM - 9:15 AM
IC5 Stochastic Multiscale Modeling
George E. Karniadakis, *Brown University, USA*
Town & Country

9:15 AM - 10:00 AM
IC6 The Mathematics of Conservation Decision Making
Hugh P. Possingham, *University of Queensland, Australia*
Town & Country

Thursday, July 11
8:30 AM - 9:15 AM
IC7 Nonlinear Waves and Patterns: Two Examples
Mariana Haragus, *Universite de Franche-Comte, France*
Town & Country

8:30 AM - 9:15 AM
IC8 Orthogonal Polynomials and Cubature Rules
Yuan Xu, *University of Oregon, USA*
San Diego

9:15 AM - 10:00 AM
IP1 Likelihood-based Climate Model Evaluation
Amy Braverman, *Jet Propulsion Laboratory, California Institute of Technology, USA*
Town & Country

2:00 PM - 2:45 PM
IP2 Correlation and Causality
George Sugihara, *University of California, San Diego, USA*
Town & Country

Invited Speakers 2013
SIAM Annual Meeting

Friday, July 12

8:30 AM - 9:15 AM

IC9 Photoacoustic Tomography:
Ultrasonically Breaking through Optical Diffusion and Diffraction Limits

Lihong Wang, *Washington University, St. Louis, USA*

Town & Country

8:30 AM - 9:15 AM

IC10 Dynamics of Near Parallel Vortex Filaments

Walter Craig, *McMaster University, Canada*

San Diego

9:15 AM - 10:00 AM

IP3 AMS Invited Presentation:
On the Geometry and Complexity of Solving Systems of Polynomial Equations

Michael Shub, *IMAS, CONICET, Argentina and Graduate School of CUNY, USA*

American Mathematical Society (AMS) Invited Presentation

Town & Country

2:00 PM - 2:45 PM

IP4 Short-Term Renewable Energy Forecasting:
Current Status, Challenges and Opportunities

John Zack, *MESO, Inc., USA*

Town & Country

2:45 PM - 3:30 PM

IP5 The Search for a Human Fingerprint
in the Changing Thermal Structure of the Atmosphere

Benjamin Santer, *Lawrence Livermore National Laboratory, USA*

Town & Country

Invited Speakers
SIAM Conference on Control and Its Applications

Monday, July 8

8:30 AM - 9:15 AM

IC1 Simplicial Nonlinear Principal Component Analysis

Arthur J. Krener, *Naval Postgraduate School, USA*

San Diego

9:15 AM - 10:00 AM

IC2 Fast Distributed Optimization Methods over Networks

Asu Ozdaglar, *Massachusetts Institute of Technology, USA*

San Diego

2:00 PM - 2:45 PM

JP1 Applied and Computational Mathematics for Energy Efficient Systems

John A. Burns, *Virginia Tech, USA*

Joint speaker with the 2013 SIAM Annual Meeting

Town & Country

Tuesday, July 9

8:30 AM - 9:15 AM

IC3 Control of Some Partial Differential Equations and Nonlinearity

Jean-Michel Coron, *Université Pierre et Marie Curie, France*

San Diego

Wednesday, July 10

8:30 AM - 9:15 AM

IC4 Role Of Scientific Computation In Next Generation Innovation – An Aerospace Perspective

Nazareth Bedrossian, *Halliburton, USA*

San Diego

Prizes and Special Lectures
2013 SIAM Annual Meeting

Monday, July 8

2:45 PM - 3:30 PM

AWM-SIAM Sonia Kovalevsky Lecture

Introduction to Radar Imaging

Margaret Cheney, *Colorado State University and Naval Postgraduate School, USA*

Town & Country

Tuesday, July 9

2:30 PM - 3:30 PM

The John von Neumann Lecture

What Sparsity and l1 Optimization Can Do For You

Stanley J. Osher, *University of California, Los Angeles, USA*

Town & Country

Wednesday, July 10

2:00 PM - 3:00 PM

Past President's Address

Chebfun

Nick Trefethen, *Oxford University, United Kingdom*

Town & Country

3:00 PM - 3:30 PM

W. T. and Idalia Reid Prize in Mathematics Lecture

Solvability for Stochastic Control Problems

Tyrone E. Duncan, *University of Kansas, USA*

Town & Country

6:15 PM - 7:15 PM

I. E. Block Community Lecture

From Razor Clams to Robots:
The Mathematics Behind Biologically Inspired Design

Anette Hosoi, *Massachusetts Institute of Technology, USA*

Town & Country

Prizes and Special Lectures
2013 SIAM Annual Meeting

Thursday, July 11

3:00 PM - 3:30 PM

James H. Wilkinson Prize Lecture

Interpolative Decomposition and Novel Operator Factorizations

Lexing Ying, *Stanford University, USA*

Town & Country

Prizes and Special Lectures
SIAM Conference on Control and Its Applications

Tuesday, July 9

9:20 AM - 9:40 AM

2011 SICON Paper Prize Lecture #1

Feedback Stabilization of a Fluid-Structure Model

Jean-Pierre Raymond, *Universite Paul Sabatier, France*

Hampton

9:20 AM - 9:40 AM

2013 SICON Paper Prize Lecture #1

Gossip Coverage Control for Robotic Networks: Dynamical Systems on the Space of Partitions

Ruggero Carli, *University of California Santa Barbara, USA*

Sheffield

9:45 AM - 10:05 AM

2011 SICON Paper Prize Lecture #2

Optimal Stopping Problem for Stochastic Differential Equations with Random Coefficients

Jiongmin Yong, *University of Central Florida, USA*

Hampton

9:45 AM - 10:05 AM

2013 SICON Paper Prize Lecture #2

The Total *s*-Energy of a Multiagent System

Bernard Chazelle, *Princeton University, USA*

Sheffield

Wednesday, July 10

9:15 AM - 10:00 AM

SIAG/CST Prize Lecture

Feedback Control of Hybrid Dynamical Systems: From Cells to Power Networks

Ricardo G. Sanfelice, *University of Arizona, USA*

San Diego

Prizes and Awards Luncheon

The Prizes and Awards Luncheon will be held in the Golden Ballroom at the Town and Country Resort & Convention Center. The luncheon begins at 12:30 PM and the awards ceremony shortly thereafter. Please be sure to bring the ticket provided in your registration packet.

If you do not have a ticket but wish to attend the luncheon, be sure to see a SIAM staff member at the registration desk no later than noon on Monday, July 8.

The following Prizes, Awards and Fellows will be recognized:

I. E. Block Community Lecture

Anette Hosoi, Massachusetts Institute of Technology, USA

The John von Neumann Lecture

Stanley J. Osher, University of California, Los Angeles, USA

AWM-SIAM Sonia Kovalevsky Lecture

Margaret Cheney, Colorado State University and Naval Postgraduate School, USA

W. T. and Idalia Reid Prize in Mathematics Lecture

Tyrone Duncan, University of Kansas, USA

James H. Wilkinson Prize

Lexing Ying, Stanford University, USA

Ralph E. Kleinman Prize

Anna C. Gilbert, University of Michigan, USA

SIAM Award in the Mathematical Contest in Modeling

University of Colorado at Boulder, USA

Students: **Christopher V. Aicher, Tracy Babb, Fiona Pigott**

Faculty Advisor: Professor Anne Dougherty

Tsinghua University, Beijing, P.R. China

Students: **Pengfei Gao, Boshuo He, Tianxin Zou**

Faculty Advisor: Professor Hao Wu

Prizes and Awards Luncheon

SIAM Student Paper Prize

Joscha Gedicke, *Humboldt University of Berlin, Germany*

Keiichi Morikuni, *The Graduate University for Advanced Studies (Sokendai), Japan*

Vladislav Voroninski, *University of California Berkeley, USA*

SIAM Prize for Distinguished Service to the Profession

Douglas N. Arnold, *University of Minnesota, USA*

SIAM Outstanding Paper Prizes

A Primer of Swarm Equilibria

Andrew J. Bernoff, *Harvey Mudd College, USA and* **Chad M. Topaz,** *Macalester College, USA*

Krylov Subspace Methods for Linear Systems with Tensor Product Structure

Daniel Kressner, *École Polytechnique Fédérale de Lausanne, Switzerland and* **Christine Tobler,** *École Polytechnique Fédérale de Lausanne, Switzerland*

Consistent Energy-Based Atomistic/Continuum Coupling for Two-Body Potentials in One and Two Dimensions

Alexander V. Shapeev, *University of Minnesota, USA*

SIAM/ACM Prize in CS&E

Linda R. Petzold, *University of California, Santa Barbara, USA*

SIAM Fellows Class of 2013

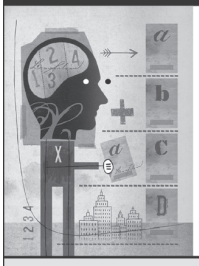
(See next page)

Prizes and Awards Luncheon

The Class of 2013 Fellows will be recognized during the Prizes and Awards Luncheon:

Randolph E. Bank, University of California, San Diego
Kaushik Bhattacharya, California Institute of Technology
Jerry L. Bona, University of Illinois at Chicago
Oscar P. Bruno, California Institute of Technology
John A. Burns, Virginia Polytechnic Institute and State University
Raymond Honfu Chan, The Chinese University of Hong Kong
Andrew R. Conn, IBM T. J. Watson Research Center
Benoit Couet, Schlumberger-Doll Research Center
Timothy A. Davis, University of Florida
Qiang Du, Penn State University
Michael C. Ferris, University of Wisconsin-Madison
Christodoulos A. Floudas, Princeton University
Michel X. Goemans, Massachusetts Institute of Technology
Andrew V. Goldberg, Microsoft Research
Alan Hastings, University of California, Davis
Sze-Bi Hsu, National Tsing Hua University
Shi Jin, Shanghai Jiao Tong University and University of Wisconsin-Madison
David Kinderlehrer, Carnegie Mellon University
Edgar Knobloch, University of California, Berkeley
C. David Levermore, University of Maryland, College Park
Marc Mangel, University of California, Santa Cruz
Hans G. Othmer, University of Minnesota
Haesun Park, Georgia Institute of Technology
Robert J. Plemmons, Wake Forest University
John Rinzel, New York University
Björn Sandstede, Brown University
Guillermo Sapiro, Duke University
Michael A. Saunders, Stanford University
Larry L. Schumaker, Vanderbilt University
Horst D. Simon, Lawrence Berkeley National Laboratory
Peter R. Turner, Clarkson University
Pauline van den Driessche, University of Victoria
James A. Yorke, University of Maryland, College Park

What's Your Problem?



Problem Ideas Being Sought for High School Math Modeling Competition

CHALLENGE WEEKEND: MARCH 8-9, 2014

Moody's Mega Math Challenge
$125,000 iN SCHOLARSHiP PRiZES!

Helping to challenge the next generation of mathematicians is critical, and that is what Moody's Mega Math (M^3) Challenge aims to do. You can help and impact thousands!

In 2013, nearly 6,000 high school students in the eastern U.S. participated in and submitted solutions to an open-ended, realistic, math-modeling problem presented to them in the M^3 Challenge, an Internet-based, applied math contest that occurs annually in March. Organized by SIAM, the contest poses a problem that students, working independently in teams of 3–5, must solve in just 14 hours. In 2014, 46 states will eligible to participate, with more growth to follow.

Coming up with great problem ideas year after year is not easy, and that's where we're hoping you can help.

SIAM is looking for ideas for problems to be used in upcoming M^3 Challenges

Required problem characteristics:

- Accessibility to 11th and 12th graders
- Suitability for solution in 14 hours
- Possibility for significant mathematical modeling
- Topic of current interest involving interdisciplinary problem solving and critical thinking skills (e.g., humanitarian or environmental concerns, social media or online community challenges, economic or financial problems)
- Availability of enough data for a variety of approaches and depth of solutions (without easy answers found on the web)
- Problem broken down into parts with some simpler than others so that all teams can make some progress
- References identified to help get students started

Problem structure

Within the problem statement, there should be three questions for teams to answer:

- Question One: The warm up — every serious team can answer.
- Question Two: The guts — framed so that every team can have some success and many teams can cover it well.
- Question Three: The discriminator — many teams can do something, while only a few will have striking results.

Please submit problem statement idea in the format of previous Challenge problems.

Previous problems

2006: Solving the Social Security Stalemate
2007: Beat the Street!
2008: Energy Independence Meets the Law of Unintended Consequences
2009: $787 Billion: Will the Stimulus Act Stimulate the Economy?
2010: Making Sense of the 2010 Census
2011: Colorado River Water: Good to the Last Acre-Foot
2012: All Aboard: Can High Speed Rail Get Back on Track?
2013: Waste Not, Want Not: Putting Recyclables in their Place

Future topics

We are open to any topic!

Of particular interest are problems based on timely, relevant, big issues facing the U.S. and the rest of the world.

Honoraria

$

- Problems found suitable to add to the M^3 problem reserve "bank" receive $150.
- Problems selected to be used as "the" Challenge problem get an additional sum, up to $1,000.

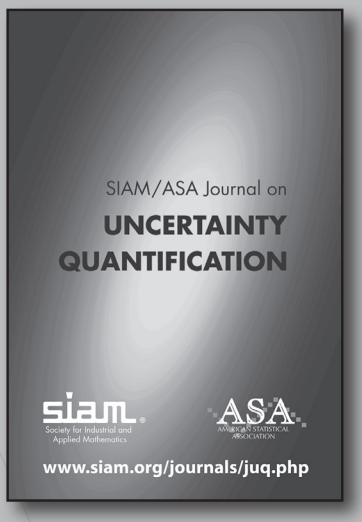
Submit problem statements via uploaded file at *m3challenge.siam.org/problem/submitproblems.php* or via email to Michelle Montgomery at *montgomery@siam.org*.

The Moody's Foundation

http://m3challenge.siam.org

siam Society for Industrial and Applied Mathematics

SIAM/ASA Journal on Uncertainty Quantification launches



Offered jointly by SIAM and the American Statistical Association, the journal publishes research articles presenting significant mathematical, statistical, algorithmic, and application advances in uncertainty quantification. Under the leadership of Senior Editor Max Gunzburger, Editors-in-Chief James Berger and Donald Estep, and more than 35 others composing the editorial board, the journal will feature continuous electronic publication at SIAM Journals Online (*http://epubs.siam.org*), with complimentary access in 2013. Covering the analysis and quantification of uncertainty in areas as divergent as finance, disaster preparedness, and porous media flows, the first few articles indicate what's to come for JUQ: great depth and breadth of coverage in uncertainty quantification research.

The first papers have published online in Volume 1.

At right are some of the interesting topics you will read about in JUQ's maiden volume.

Access all articles at *http://epubs.siam.org/journal/SJUQA3*.

Authors are encouraged to submit their uncertainty quantification work for consideration for publication at *http://juq.siam.org*.

siam Society for Industrial and Applied Mathematics

ASA AMERICAN STATISTICAL ASSOCIATION

For more information on *SIAM/ASA Journal on Uncertainty Quantification*, go to: www.siam.org/journals/juq.php

Recently Posted Papers

"Mean Exit Times and the Multilevel Monte Carlo Method" by Desmond J. Higham, Xuerong Mao, Mikolaj Roj, Qingshuo Song, and George Yin proposes a method to reduce the computational complexity of a simple and widely used algorithm, Euler/Monte Carlo simulation for a mean exit time.

In "Variance Components and Generalized Sobol' Indices," author Art B. Owen describes Sobol' indices, which are used to determine and quantify the importance of variables used in modeling and simulation.

"Formulating Natural Hazard Policies under Uncertainty" by Jerome L. and Seth Stein present a general stochastic model to minimize expected damage from natural disasters.

"A Nonstationary Space-Time Gaussian Process Model for Partially Converged Simulations" by Victor Picheny and David Ginsbourger proposes fitting a Gaussian process model to partially converged simulation data for computational efficiency.

In "Reduced Basis Methods for Parameterized Partial Differential Equations with Stochastic Influences Using the Karhunen–Loève Expansion," authors Bernard Haasdonk, Karsten Urban, and Bernhard Wieland consider parametric partial differential equations (PPDEs) with stochastic influences that are used to model various problems in science and engineering.

"A Practical Method to Estimate Information Content in the Context of 4D-Var Data Assimilation" by K. Singh, A. Sandu, M. Jardak, K. W. Bowman, and M. Lee uses computationally feasible approaches to assess the information content of observations in the context of a data assimilation framework.

In "A Posteriori Estimates for Backward SDEs," Christian Bender and Jessica Steiner propose a method for approximation of backward stochastic differential equations (BSDEs).

SIAM extends its thanks to the following authors who have helped maintain the Student Travel Fund through the generous donation of all or part of their royalties.

Total royalties donated to the fund through 12/31/2012 are $213,694.

Anonymous
Uri M. Ascher
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Venkataramanan Balakrishnan
Michael Baldea
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Joos Vandewalle
Sabine Van Huffel
Charles Van Loan
Andreas Varga
Kexin Wang
Edward C. Way

AN13 Program

2013 SIAM ANNUAL MEETING

July 8-12, 2013

Town and Country Resort & Convention Center
San Diego, California USA

Sunday, July 7

Registration
7:00 AM-8:00 PM

Room:Atlas Foyer

SIAM Workshop on Network Science (July 7-8, 2013 -- separate fees apply)
8:00 AM-5:00 PM

Room: Sunrise

Student Orientation
5:00 PM-6:00 PM

Room: Tiki Pavilion

Welcome Reception
6:00 PM-8:00 PM

Room: Grand Plaza Fountain Court

Monday, July 8

Committee on Committees and Appointments
7:00 AM-8:30 AM

Room:Board Room

Registration
7:30 AM-4:30 PM

Room:Atlas Foyer

Opening Remarks
8:15 AM-8:30 AM

Room:Town & Country

Monday, July 8

IC1

Social Networks as Information Filters
8:30 AM-9:15 AM

Room:Town & Country

Chair: Ali Pinar, Sandia National Laboratories, USA

Social networks, especially online social networks, are driven by information sharing. But just how much information sharing is influenced by social networks? A large-scale experiment measured the effect of the social network on the quantity and diversity of information being shared within Facebook. While strong ties were found to be individually more influential, collectively it is the weak ties that wield more influence and provide more diverse information exposure. This sharing behavior not only generates large cascades, but can also cause information to evolve. Joint speaker with the SIAM Workshop on Network Science.

Lada Adamic
University of Michigan, Ann Arbor, USA

Monday, July 8

IC2

Cost-Minimizing Regulations for a Wholesale Electricity Market

9:15 AM-10:00 AM

Room:Town & Country

Chair: Andrzej Banaszuk, United Technologies Research Center, USA

We consider a wholesale electricity market model with generators interacting strategically and general networks including externalities such as transmission losses. Previous work shows how mechanisms such as the case when prices correspond to the Lagrange multipliers of a centralized cost minimization program allow the producers to charge significantly more than marginal price. This situation originates a important regulatory problem. In this presentation we consider an incomplete information setting where the cost structure of a producer is unknown to both its competitor and the regulator. We derive an optimal regulation mechanism and compare its performance to the "price equal to Lagrange multiplier".

Alejandro Jofré
Universidad de Chile, Chile

Exhibit Hall Open

9:30 AM-4:30 PM

Room:Golden West/California

Coffee Break

10:00 AM-10:30 AM

Room:Golden West/California

Monday, July 8

MS1

Fast Algorithms and Structured Matrices

10:30 AM-12:30 PM

Room:Town & Country

The field of fast algorithms for structured matrices has continued to see rapid growth, and this minisymposium tries to present some of the latest results. Both traditional algebraic structures (like those exploited in the FFT) and the more recent analytic structures (like those exploited in the the FMM) will be used. Applications can range from the classical root finding problems to fast solvers and pre-conditioner for PDEs.

Organizer: Shivkumar Chandrasekaran
University of California, Santa Barbara, USA

Organizer: Ming Gu
University of California, Berkeley, USA

10:30-10:55 Title Not Available at Time of Publication
Ming Gu, University of California, Berkeley, USA

11:00-11:25 Randomized Sparse Direct Solvers with Applications
Jianlin Xia and Yuanzhe Xi, Purdue University, USA

11:30-11:55 Title Not Available at Time of Publication
Lexing Ying, Stanford University, USA

12:00-12:25 Fast Direct Solvers for Integral Equations
Gunnar Martinsson, University of Colorado Boulder, USA

Monday, July 8

MS2

SIAM-NSF Minisymposium on Modeling Across the Curriculum

10:30 AM-12:30 PM

Room:San Diego

The recent SIAM-NSF Workshop on Modeling across the curriculum (August, 2012) will be described, and an introduction to the report will be presented, together with some more recent progress. The meeting proposal pre-dated but responded to the PCAST "Engage to Excel" report and its call for one million new college STEM graduates in the next decade. The meeting had three primary themes: bringing coordinated STEM curriculum content into K-12 schools within the framework of the common core state standards; undergraduate curricula in modeling and computational applied mathematics as the heart of a STEM undergraduate experience; and readiness for college STEM education on graduation from High School.

Organizer: Peter R. Turner
Clarkson University, USA

10:30-10:55 SIAM-NSF Workshop on Modeling Across the Curriculum: Introduction
Peter R. Turner, Clarkson University, USA

11:00-11:25 Coursework in Applied and Computational Mathematics at the High School Level
Katherine Socha, Math for America, USA

11:30-11:55 Coursework and Programs in Applied and Computational Mathematics at the University Level
Jeff Humpherys, Brigham Young University, USA

12:00-12:25 Examples of Good Practice in Mathematical Modeling Education
Rachel Levy, Harvey Mudd College, USA

Monday, July 8

MS3

Analysis and Numerical Approximations of Partial Differential Equations Defined on Surfaces - Part I of II

10:30 AM-12:30 PM

Room:Pacific Salon 2

For Part 2 see MS18

This minisymposium brings together world leading researchers to present cutting-edge results on mathematical modeling, analysis and simulation of systems of nonlinear PDEs on surfaces (both stationary or evolving). By using techniques in mathematics such as linear stability theory (for autonomous systems), Lyapunov theory (for non-autonomous systems), etc. results on local and global stability of solutions of systems of nonlinear pdes will be presented. In numerical analysis, novel numerical methods for treating systems on nonlinear PDEs will be presented (for example, surface finite elements, radially projected finite elements, closet-point methods, particle methods, etc.).

Organizer: Necibe Tuncer

University of Tulsa, USA

Organizer: Anotida Madzvamuse

University of Sussex, United Kingdom

10:30-10:55 Mathematical Modelling and Numerical Simulations of Actin Dynamics in the Eukaryotic Cell

Anotida Madzvamuse, University of Sussex, United Kingdom; Uduak George, University of Wisconsin, USA; Angelique Stephanou, Laboratoire TIMC-IMAG, France

11:00-11:25 Modelling Cell Motility with the Evolving Surface Finite Element Method

Chandrashekar Venkataraman, Charles Elliott, and Bjorn Stinner, University of Warwick, United Kingdom

11:30-11:55 Finite Elements on "Spheroidal" Surfaces, Mapped Finite Elements - The Basics

Amnon J. Meir, Auburn University, USA; Necibe Tuncer, University of Tulsa, USA

12:00-12:25 An Efficient Algorithm for Simulating the Evolution of Multiple Elastically Stressed Precipitates

Amlan Barua, Shuwang Li, *Hualong Feng*, and Xiaofan Li, Illinois Institute of Technology, USA; John Lowengrub, University of California, Irvine, USA

Monday, July 8

MS4

Numerical Methods for Incompressible Fluid Flows - Part I of III

10:30 AM-12:30 PM

Room:Pacific Salon 3

For Part 2 see MS19

The aim of this minisymposium is to broadly cover some of recent advances in the computational methods for PDEs in fluid mechanics and related areas. We bring together experts studying various applications of fluids, including non-Newtonian fluids, turbulence flows and multiphase flows. The discussion will address mathematical modeling, numerical analysis, computational algorithms and physical issues arising in the study and modeling of such problems.

Organizer: Hyesuk Lee

Clemson University, USA

Organizer: Leo Rebholz

Clemson University, USA

10:30-10:55 Least Squares Approach for Optimization Based Domain Decomposition

Hyesuk Lee, Clemson University, USA

11:00-11:25 Can a Defect Correction Method Be Viewed As a Turbulence Model?

Alexander Labovsky, Michigan Technological University, USA

11:30-11:55 Adaptive Least-Squares Methods for Viscoelastic Flows

Tsu-Fen Chen, National Chung Cheng University, Taiwan

12:00-12:25 On Robust Discretizations for Coupled Flow Problems

Alexander Linke, Weierstrass Institute for Applied Analysis and Stochastics, Germany

Monday, July 8

MS5

Eigenvalue Computations: Theory and Practice

10:30 AM-12:30 PM

Room:Royal Palm 1

Eigenvalue computations for real and complex matrices are prevalent in many areas of science and engineering. This minisymposium highlights the many different aspects of eigenvalue computations, ranging from deep analysis to large-scale practical applications. This includes, among others, sharp error bounds in terms of subspace angles when eigenvalues are approximated by Raleigh quotients; fast eigenvalue computation for 3D Laplacians based on multigrid preconditioning of conjugate gradient methods; subspace projection methods for nonlinear eigenvalue problems; and high accuracy computations based on exploiting structure in tridiagonal matrices.

Organizer: Ilse Ipsen

North Carolina State University, USA

10:30-10:55 Nonsymmetric Multigrid Preconditioning for Conjugate Gradient Methods

Henricus M. Bouwmeester, Andrew Dougherty, and *Andrew Knyazev*, University of Colorado, Denver, USA

11:00-11:25 Bounds for the Rayleigh Quotient and the Spectrum of Self-Adjoint Operators

Peizhen Zhu, Merico Argentati, and Andrew Knyazev, University of Colorado, Denver, USA

11:30-11:55 Recent Development of the Nonlinear QR Algorithm for Genuine Nonlinear Eigenvalue Problems

Zhaojun Bai, University of California, Davis, USA; Yangfeng Su and Ding Lu, Fudan University, China

12:00-12:25 Structured Backward Relative Error Bounds for Eigenvalues of Tridiagonal Matrices

Beresford N. Parlett, University of California, USA; Froilan Dopico, Universidad Carlos III de Madrid, Spain; Carla Ferreira, Universidade Nova de Lisboa, Portugal

Monday, July 8

MS6

Implicitly Constituted Fluids and Solids: Modelling and Analysis

10:30 AM-12:30 PM

Room:Royal Palm 2

The objective of the minisymposium is to:
* introduce the implicit constitutive theory which is a new framework for developing material models in continuum mechanics
* show that the new framework leads to systems of partial differential equations that have very interesting structure and present some recent results concerning large data existence theory,
* focus on convergence properties of finite element discretizations of relevant initial and boundary value problems, apriori and aposteriori error analysis including various types of errors
* discuss challenging mathematical issues related to analysis of newly developed models.

Organizer: Josef Malek

Charles University, Prague, Czech Republic

10:30-10:55 Fluids and Solids Described by Implicit Constitutive Theories
K. R. Rajagopal, Texas A&M University, USA

11:00-11:25 On Unsteady Flows of Implicitly Constituted Incompressible Fluids Subject to Implicitly Constituted Boundary Conditions
Josef Malek, Charles University, Prague, Czech Republic

11:30-11:55 Finite Element Approximation of Steady Flows of Incompressible Fluids with Implicit Power-Law-Like Rheology
Christian Kreuzer, Ruhr-Universitat Bochum, Germany

12:00-12:25 On Spatial Distribution of the Discretization and Algebraic Error in Numerical Solution of Partial Differential Equations
Jan Papez, Charles University, Prague, Czech Republic; Zdenek Strakos, Academy of Sciences of the Czech Republic, Prague, Czech Republic

Monday, July 8

MS9

AWM Workshop Career Panel - Part I of II

10:30 AM-12:00 PM

Room:Royal Palm 3

For Part 2 see MS22
This panel presents women who have careers in the mathematical sciences. You will have an opportunity to hear their career experiences and to ask questions. In particular, there will be open discussion of issues that affect women in mathematics.

Organizer: Hoa Nguyen

Trinity University, USA

Organizer: Sigal Gottlieb

University of Massachusetts, Dartmouth, USA

10:30-10:55 Adventures at Convergence of the Mathematical and Biological Sciences
Sarah D. Olson, Worcester Polytechnic Institute, USA

11:00-11:25 Experiences As a Program Officer
Karen I. Pao, U.S. Department of Energy, USA

11:30-11:55 Some Lessons I Learned
Anne Gelb, Arizona State University, USA

Monday, July 8

MS10

Advances in Radial Basis Function and Other Meshfree Methods - Part I of III

10:30 AM-12:30 PM

Room:Royal Palm 5

For Part 2 see MS24
Meshfree methods have many desirable properties for approximation problems and the numerical solution of differential equations. These include the ability to handle geometrically complex domains, achieve high-accuracy, provide non-uniform resolution, and preserve certain intrinsic physical properties. This minisymposium focuses primarily on kernel-based methods, such as radial basis functions. The talks will address recent computational and theoretical advances of these methods, as well as their application to problems in the biological and geosciences. Of particular interest are recent advances that enable their use in large-scale computations.

Organizer: Rodrigo B. Platte

Arizona State University, USA

Organizer: Grady B. Wright

Boise State University, USA

10:30-10:55 A Comparison Between the RBF-Finite Difference and the RBF-Partition of Unity Methods for Shallow Water Flows on the Sphere
Grady B. Wright, Boise State University, USA

11:00-11:25 The Hilbert-Schmidt SVD: An Alternative Interpretation for the RBF-QR Method
Gregory Fasshauer, Illinois Institute of Technology, USA

11:30-11:55 On a New Stable Basis for Rbf Interpolation
Stefano De Marchi and Gabriele Santin, University of Padova, Italy

12:00-12:25 High-order Vector Decomposition with Radial Basis Functions
Edward Fuselier, High Point University, USA

Monday, July 8

MS11

General Environmental Coastal Ocean Modeling - Part I of II

10:30 AM-12:30 PM

Room:Garden Salon I

For Part 2 see MS25

The General Curvilinear Environmental Model (GCEM) is a High Resolution system composed of the General Curvilinear Coastal Ocean Model (GCCOM) and the General Curvilinear Atmospheric Model (GCAM). Both modules are capable of reading a general curvilinear grid, orthogonal or non-orthogonal in all three directions. These two modules are weekly coupled using the distributed coupling toolkit (DCT) and users are able to interact with the model and run it using a web based computational environment. Some test cases will be presented to demonstrate the capabilities of our system as well as to highlight the main differences with currently used systems.

Organizer: José E. Castillo

San Diego State University, USA

10:30-10:55 Stochastic Differential Equation Modeling of Precipitation in Convection

Kimberly Leung, San Diego State University, USA; Aneesh Subramanian, University of California, San Diego, USA; Guang Zhang, Scripps Institution of Oceanography, USA; Samuel S. Shen, San Diego State University, USA

11:00-11:25 Data Assimilation for Hydrodynamical Modeling of San Quintin Bay, Ensenada, B.C., Mexico

Mariangel Garcia, INTEVEP, Venezuela

11:30-11:55 Application of a Shallow Water Hydrodynamics Model to Study Circulation Patterns in Lake Valencia, Venezuela

Juan Guevara, *Maira Valera-López*, José León, Reinaldo García, and Ivan Saavedra, Universidad Central de Venezuela, Venezuela

12:00-12:25 Mimetic Curvilinear Environmental Model: Harnessing the Power of Gpu's

Mohammad Abouali and Jose Castillo, San Diego State University, USA

Monday, July 8

MS12

Laplacian Spectra for Shape Optimization, Classification, Recognition, and Beyond - Part I of IV

10:30 AM-12:30 PM

Room:Garden Salon II

For Part 2 see MS26

The investigation of spectra of the Laplace and related operators on a bounded domain or manifold is a subject with a history of more than two hundred years. In this minisymposium, we want to focus on the geometric aspects of such spectra, in particular, shape optimization, shape classification and recognition. Significant progress has been made on such problems in recent years due to both theoretical and computational developments in numerical optimization methods, sensitivity analysis, and methods for modeling free interfaces. This minisymposium aims to bring together mathematicians and scientists working in this field to share new results and exchange ideas.

Organizer: Chiu-Yen Kao

Claremont McKenna College, USA

Organizer: Braxton Osting

University of California, Los Angeles, USA

Organizer: Naoki Saito

University of California, Davis, USA

10:30-10:55 A Natural Extension of Laplacian Eigenfunctions from Interior to Exterior and its Application

Naoki Saito, University of California, Davis, USA

11:00-11:25 Spectral Shape Analysis with Applications in Medical Imaging

Martin Reuter, Massachusetts General Hospital and Harvard Medical School, USA

11:30-11:55 Numerical Optimization of Laplacian Eigenvalues of 4D Domains

Pedro R. Antunes, University of Lisbon, Portugal

12:00-12:25 Minimal Convex Combinations of Sequential Laplace-Dirichlet Eigenvalues

Chiu-Yen Kao, Claremont McKenna College, USA; Braxton Osting, University of California, Los Angeles, USA

Monday, July 8

MS13

Distance Transforms Beyond Eikonal

10:30 AM-12:30 PM

Room:Royal Palm 6

Distance Transforms are proven to be a powerful tool in geometric image processing with applications ranging from shape knowledge based segmentation to fast inpainting. Even though the classical formulation is based Eikonal PDE, variants governed by elliptic or parabolic PDEs are becoming more and more commonplace. These new variants are better capturing local and global interactions within the transformed domain and suggesting alternative computational mechanisms of integrating layers of visual processing. In this minisymposium, expert researchers on this topic will present novel distance transforms, alternative formulations, applications to geometric image processing, and connections to vision science.

Organizer: Sibel Tari

Middle East Technical University, Turkey

Organizer: Luminita A. Vese

University of California, Los Angeles, USA

10:30-10:55 Fluctuating Distance Fields with Connections to Modica-Mortola, Eigenspaces of Positive Definite Operators and Discrete Algorithms

Sibel Tari, Middle East Technical University, Turkey

11:00-11:25 The Implicit Closest Point Method for the Numerical Solution of Partial Differential Equations on Surfaces

Steven Ruuth, Simon Fraser University, Canada; Colin McDonald, Oxford University, United Kingdom; Jeremy Brandman, Courant Institute of Mathematical Sciences, New York University, USA

11:30-11:55 Schrödinger Distance Transforms, Gradient Density Estimation and Application to Vision Problems

Anand Rangarajan, University of Florida, USA

12:00-12:25 On Integral Kernels with Applications to Shape Problems

Byung-Woo Hong, Chung-Ang University, Korea; Stefano Soatto, University of California, Los Angeles, USA

Monday, July 8

MS14

Industry Days

From Research to the Commercialization – Examples of Some Concepts that Worked and Others that didn't and Lessons Learned

10:30 AM-1:00 PM

Room:Royal Palm 4

Organized by the SIAM Industry Committee

Certain mathematical ideas (models, algorithms, etc) that originate in research in an industry make it to commercialization. Some ideas prove feasibility of concept, some others reduce risk or uncertainty of ideas that may be implemented. In this panel, we will discuss a few concepts that have made it successfully from research to commercialization and some concepts that did not. Lessons learned will be shared.

Organizer: Lalitha Venkataramanan

Schlumberger-Doll Research, USA

Organizer: Amr El-Bakry

ExxonMobil Upstream Research Company, USA

10:30-10:55 Models and Products, Processes, and Measurements
John Abbott, Corning Incorporated, USA

11:00-11:25 Comfort Estimation and Incentive Design for Energy Efficiency
Alberto Speranzon, *Tuhin Sahai*, and Andrzej Banaszuk, United Technologies Research Center, USA

11:30-11:55 Mathematics in the Development of Biomarkers and Therapeutics
Jeffrey Saltzman, AstraZeneca, USA

12:00-12:25 The Messy Art of Balancing the Elegant and the Practical in Industrial Software
Richard Carter, GL Group, USA

12:30-12:55 Computational Sciences for Oil and Gas Exploration and Production Research
Thomas C. Halsey, ExxonMobil Research, USA

Monday, July 8

CP1

Ordinary Differential Equations

10:30 AM-12:30 PM

Room:Pacific Salon 6

Chair: Dmitry A. Altshuller, Dassault Systèmes SolidWorks Corporation, USA

10:30-10:45 On the Robust Stability of the Hill Equation with a Delay Term: A Frequency-Domain Approach
Dmitry A. Altshuller, Dassault Systèmes SolidWorks Corporation, USA

10:50-11:05 Numerical Simulation of A Singularly Perturbed Harmonic Oscillator
Weiqun Zhang, Wright State University, USA

11:10-11:25 A New Class of Split Exponential Propagation Iterative Methods of Runge-Kutta Type (sEPIRK) for Semilinear Systems of ODEs
Greg Rainwater and Mayya Tokman, University of California, Merced, USA

11:30-11:45 Global Dynamics of SEIR Model with Holling Type II Incidence Function
Salisu M. Garba, University of Pretoria, South Africa

11:50-12:05 Exponential Splitting for Cocycles over Multivalued Non-Autonomous Dynamical Systems in Banach Spaces
Codruta S. Stoica, Aurel Vlaicu University of Arad, Romania

12:10-12:25 A Robust Numerical Method for Solving Hiv-Malaria Co-Infection Model with a Distributed Delay
Kailash C. Patidar, University of the Western Cape, South Africa

Monday, July 8

CP2

Machine Learning

10:30 AM-12:50 PM

Room:Pacific Salon 7

Chair: Chelsea Weaver, University of California, Davis, USA

10:30-10:45 Randomized Dimensionality Reduction in Machine Learning
Christos Boutsidis, IBM T.J. Watson Research Center, USA

10:50-11:05 Determining Number of Motifs in Wind Generation Time Series Data
Ya Ju Fan and Chandrika Kamath, Lawrence Livermore National Laboratory, USA

11:10-11:25 Analysis of Multivariable Longitudinal Data by Frequency of Change of Variables
Maria Vivien Visaya and David Sherwell, University of the Witwatersrand, Johannesburg, South Africa

11:30-11:45 A Deeper Look at the ℓ^1-Graph
Chelsea Weaver and Naoki Saito, University of California, Davis, USA

11:50-12:05 Classification and Recognition of Light Scattering Patterns from Airborne Particles
Giovanni F. Crosta and Caterina Casati, University of Milan, Italy; Yong-Le Pan, U.S. Army Research Laboratory, USA; Gorden Videen, U.S. Army Engineer Research and Development Center, USA; Kevin Aptowicz, West Chester University, USA; Richard Chang, Yale University, USA

12:10-12:25 Convergence and Stability of the Split-Step $\ominus$-Milstein Method for Stochastic Delay Differential Equations
Qian Guo and Wenwen Xie, Shanghai Normal University, China; Taketomo Mitsui, Doshisha University, Japan

12:30-12:45 An Integrated ANN Approach to Identify the Types of Disturbances for An SPC/EPC System
Yuehjen E. Shao, Fu Jen Catholic University, Taiwan

Lunch Break

12:30 PM-2:00 PM

Attendees on their own

Monday, July 8

SICON Editorial Board

12:30 PM-2:00 PM

Room:Pacific Salon I

Major Awards Committee

12:30 PM-2:00 PM

Room:Galleria II

JP1

Applied and Computational Mathematics for Energy Efficient Systems

2:00 PM-2:45 PM

Room:Town & Country

Chair: Fariba Fahroo, Air Force Office of Scientific Research, USA

Recent advances in the development of sustainable energy sources have led to an emphasis on energy-supply technologies and the corresponding mathematical sciences needed for these technologies. However, energy efficient end-use technologies may also be viewed as an energy resource. Since buildings are responsible for 32% of energy consumption and for 26% of end-use C02 emissions, optimizing the efficiency of a whole building system is a "grand challenge control" problem with huge payoffs in the global energy sector. We discuss mathematical challenges and opportunities that occur in designing practical controllers for energy efficient buildings. Examples are presented to illustrate the ideas.

John A. Burns
Virginia Tech, USA

Monday, July 8

SP1

AWM-SIAM Sonia Kovalevsky Lecture: Introduction to Radar Imaging

2:45 PM-3:30 PM

Room:Town & Country

Chair: Jill Pipher, Brown University, USA

Radar imaging is a technology that has been developed, very successfully, within the engineering community during the last 50 years. Radar systems on satellites now make beautiful images of regions of our earth and of other planets such as Venus. One of the key components of this impressive technology is mathematics, and many of the open problems are mathematical ones.

This lecture will explain, from first principles, some of the basics of radar and the mathematics involved in producing high-resolution radar images.

Margaret Cheney
Colorado State University and Naval Postgraduate School, USA

Coffee Break

3:30 PM-4:00 PM

Room:Golden West/California

SIAM Presents

Since 2008, SIAM has recorded many Invited Lectures, Prize Lectures, and selected Minisymposia from various conferences. These are available by visiting SIAM Presents (http://www.siam.org/meetings/presents.php).

Monday, July 8

MS15

Parallel Graph Algorithms on Emerging Architectures

4:00 PM-6:00 PM

Room:Town & Country

Parallel graph algorithms are fundamental to solving various problems in computational science and engineering, parallel computing and sparse matrix computations. With the disruptive changes in architectures, it is important for graph algorithms to adopt to these architectures quickly. This set of talks will focus on methods for fundamental graph algorithms to exploit the massive parallelism available in modern architectures. The methods include exploiting task-based programming models, exploiting architecture specific features and rethinking existing algorithms. The speakers will present recent results on adapting or implementing new graph algorithms on modern manycore and GPU based systems.

Organizer: Sivasankaran Rajamanickam
Sandia National Laboratories, USA

Organizer: Erik G. Boman
Sandia National Laboratories, USA

4:00-4:25 Parallel Algorithms for Matching Graphs on Multicore Computers
Alex Pothen and Arif Khan, Purdue University, USA; Mahantesh Halappanavar, Pacific Northwest National Laboratory, USA

4:30-4:55 Computing Strongly Connected Components in Modern Architectures
Sivasankaran Rajamanickam and Erik G. Boman, Sandia National Laboratories, USA

5:00-5:25 Matrix Transversals on GPUs
Mehmet Deveci and Kamer Kaya, Ohio State University, USA; Bora Ucar, LIP-ENS Lyon, France; Umit V. Catalyurek, The Ohio State University, USA

5:30-5:55 Investigating Graph Operations on Gpu Architectures
Steven Dalton and Luke Olson, University of Illinois at Urbana-Champaign, USA

Monday, July 8

MS16

Recent Algorithms and Applications for the Truncated Singular Value Decomposition

4:00 PM-6:00 PM

Room:San Diego

The singular value decomposition is often used for reducing the dimension of large systems or data sets, such as in model reduction of dynamical systems, signal processing, and computer vision. Such applications use only a relative few singular vectors and values of a given matrix or tensor, and therefore there is significant interest in methods which more efficiently compute a so-called truncated decomposition. We will discuss recent algorithms for computing these decompositions and their application, with particular emphasis on problems not amenable to traditional approaches due to size or structure.

Organizer: Christopher G. Baker
Oak Ridge National Laboratory, USA

Organizer: Mili Shah
Loyola College, Maryland, USA

4:00-4:25 An Incremental SVD for Feature Extraction from Fluid Flow
Christopher G. Baker, Oak Ridge National Laboratory, USA; Lionel Mathelin, LIMSI-CNRS, France; Kyle Gallivan, Florida State University, USA

4:30-4:55 Randomized SVD Methods in Hyperspectral Imaging
Jennifer Erway, Wake Forest University, USA; Jiani Zhang, Tufts University, USA; Xiaofei Hu, Qiang Zhang, and Robert Plemmons, Wake Forest University, USA

5:00-5:25 Applications of a Symmetry Preserving SVD
Mili Shah, Loyola College, Maryland, USA; Danny C. Sorensen, Rice University, USA

5:30-5:55 Truncated Tensor-SVD Methods for Facial Recognition
Ning Hao and *Misha E. Kilmer*, Tufts University, USA; Karen S. Braman and Randy Hoover, South Dakota School of Mines & Technology, USA

Monday, July 8

MS17

Uncertainty Quantification in Climate Modeling and Prediction - Part I of III

4:00 PM-6:00 PM

Room:Pacific Salon 1

For Part 2 see MS30
Uncertainty quantification (UQ) of climate system forecasts presents challenges in mathematics, intertwined with limitations in observations and understanding of the system. Our goal is to provide a forum for this diverse community to discuss ideas for advancing the science of UQ in climate modeling and many of its components. Topics of interest include UQ in a hierarchical set of climate models, representing uncertainties in coupled climate system models, risk assessment strategies, use of new approaches such as information theoretic metrics/simplified stochastic models for UQ, assimilation and calibration for UQ of initial and forcing fields.

Organizer: Aneesh Subramanian
University of California, San Diego, USA

Organizer: Ibrahim Hoteit
King Abdullah University of Science & Technology (KAUST), Saudi Arabia

Organizer: Charles Jackson
University of Texas at Austin, USA

4:00-4:25 Uncertainty Predictions, Non-Gaussian Data Assimilation and Bayesian Inference of Dynamical Model Equations
Pierre Lermusiaux, Massachusetts Institute of Technology, USA

4:30-4:55 Bayesian Hierarchical Model Applications in Ocean Forecasting
Ralph F. Milliff, University of Colorado, USA; Christopher Wikle, University of Missouri, USA; Polly Smith and Andrew M. Moore, University of California, Santa Cruz, USA; Nadia Pinardi, Istituto Nazionale di Geofisica e Vulcanologia, Italy; Christopher Edwards, University of California, Santa Cruz, USA

5:00-5:25 Uncertainty Quantification in Ocean State Estimation
Alex Kalmikov and Patrick Heimbach, Massachusetts Institute of Technology, USA

5:30-5:55 Hierarchical Structure and Predictability of the Madden Julian Oscillation from Infrared Brightness Temperature Data
Dimitris Giannakis, New York University, USA

Monday, July 8

MS18

Analysis and Numerical Approximations of Partial Differential Equations Defined on Surfaces - Part II of II

4:00 PM-5:30 PM

Room:Pacific Salon 2

For Part 1 see MS3
This minisymposium brings together world leading researchers to present cutting-edge results on mathematical modeling, analysis and simulation of systems of nonlinear PDEs on surfaces (both stationary or evolving). By using techniques in mathematics such as linear stability theory (for autonomous systems), Lyapunov theory (for non-autonomous systems), etc. results on local and global stability of solutions of systems of nonlinear pdes will be presented. In numerical analysis, novel numerical methods for treating systems on nonlinear PDEs will be presented (for example, surface finite elements, radially projected finite elements, closet-point methods, particle methods, etc.).

Organizer: Necibe Tuncer
University of Tulsa, USA

Organizer: Anotida Madzvamuse
University of Sussex, United Kingdom

4:00-4:25 Diffusion Driven Instabilities on Evolving Surfaces
Necibe Tuncer, University of Tulsa, USA

4:30-4:55 A Phenomenological Model for Cell Migration and Deformation: Application to the Immunity Response
Fred J. Vermolen, Delft University of Technology, Netherlands

5:00-5:25 Particles at Fluid-Fluid Interfaces: A New Navier-Stokes-Cahn-Hilliard Surface Phase-Field Crystal Model
John Lowengrub, University of California, Irvine, USA; Sebastian Aland and Axel Voigt, TU Dresden, Germany

Monday, July 8

MS19

Numerical Methods for Incompressible Fluid Flows - Part II of III

4:00 PM-5:30 PM

Room:Pacific Salon 3

For Part 1 see MS4
For Part 3 see MS32

The aim of this minisymposium is to broadly cover some of recent advances in the computational methods for PDEs in fluid mechanics and related areas. We bring together experts studying various applications of fluids, including non-Newtonian fluids, turbulence flows and multiphase flows. The discussion will address mathematical modeling, numerical analysis, computational algorithms and physical issues arising in the study and modeling of such problems.

Organizer: Hyesuk Lee
Clemson University, USA

Organizer: Leo Rebholz
Clemson University, USA

4:00-4:25 Consistent Vorticity Boundary Conditions for a Velocity-Vorticity Splitting Method
Leo Rebholz, Clemson University, USA; Maxim A. Olshanskii, University of Houston, USA

4:30-4:55 A Domain Decomposition Method for Pdes with Random Inputs
Jeehyun Lee, Yonsei University, South Korea

5:00-5:25 Parametric Model Reduction for Bousinesq Equations
Jeff Borggaard, Virginia Tech, USA

Monday, July 8

MS20

Student Days: SIAM Student Chapter Presentations

4:00 PM-6:00 PM

Room:Royal Palm 1

For Part 2 see MS33

Organized by the SIAM Education Committee

SIAM Student Chapter presentations.

Organizer: Peter R. Turner
Clarkson University, USA

4:00-4:15 Survival Analysis on Patients with Chronic Hepatitis B: Modeling the Onset of Liver Cancer
James Stinecipher, California State University, Fresno, USA; Lin Han, Stony Brook University, USA

4:20-4:35 Modeling and Computations for Multi-scale Eddy Current Problems
Xue Jiang and Weiying Zheng, Chinese Academy of Sciences, China

4:40-4:55 Humans Make Suboptimal Decisions in Face of Structured Input
Manisha Bhardwaj, University of Houston, USA; Ronald van den Berg, University of Cambridge, United Kingdom; Wei Ji Ma, Baylor College of Medicine, USA; Kresimir Josic, University of Houston, USA

5:00-5:15 Parallel and Approximate Methods for Solving Eikonal Equations
Adam Dante Chacon, Zachary D. Clawson, and Alexander Vladimirsky, Cornell University, USA

5:20-5:35 A Study of the Cochlea Using the Immersed Boundary Method
Will Ko and John Stockie, Simon Fraser University, Canada

5:40-5:55 Finite Element Methods for the Evolution Problem in General Relativity
Vincent Quenneville-Belair, University of Minnesota, USA

Monday, July 8

MS21

Algebraic Multigrid Methods for High Performance Computing Systems

4:00 PM-6:00 PM

Room:Royal Palm 2

Algebraic multigrid (AMG) methods have been successfully applied to a wide variety of problem types. Challenges remain, however, in fundamental problem categories and effectively using AMG on emerging computer architectures. This minisymposium focuses on advances in AMG and their implementation on high performance systems. In particular, topics covered are AMG for Helmholtz systems, parallel energy minimization methods, reducing communication in parallel AMG, and preconditioning for embedded uncertainty quantification.

Organizer: Jonathan J. Hu
Sandia National Laboratories, USA

Organizer: Andrey Prokopenko
Sandia National Laboratories, USA

4:00-4:25 On Parallelization of an Energy Minimizing Multigrid
Andrey Prokopenko, Jeremie Gaidamour, Jonathan J. Hu, and Raymond S. Tuminaro, Sandia National Laboratories, USA

4:30-4:55 Reducing Communication in Algebraic Multigrid
Ulrike Meier Yang, Lawrence Livermore National Laboratory, USA

5:00-5:25 AMG Shifted Laplacian Preconditioners Viewed Through Chebyshev Polynomials
Paul Tsuji, Sandia National Laboratories, USA

5:30-5:55 AMG Preconditioning for Embedded Uncertainty Quantification
Jonathan J. Hu, Sandia National Laboratories, USA

Monday, July 8

MS22

AWM Workshop Career Panel - Part II of II

4:00 PM-6:00 PM

Room:Royal Palm 3

For Part 1 see MS9

This panel presents women who have careers in the mathematical sciences. You will have an opportunity to hear their career experiences and to ask questions. In particular, there will be open discussion of issues that affect women in mathematics.

Organizer: Hoa Nguyen

Trinity University, USA

Organizer: Sigal Gottlieb

University of Massachusetts, Dartmouth, USA

4:00-4:25 More Than Survive-We Want to Thrive!

Anita T. Layton, Duke University, USA

4:30-4:55 Your Career Trajectory

Bettye Anne Case, Florida State University, USA

5:00-5:25 My Life as a Mathematician

Sarah Ann Fleming, Belmont University, USA

5:30-5:55 Sometimes Good Things Happen

Sigal Gottlieb, University of Massachusetts, Dartmouth, USA

Monday, July 8

MS23

Industry Days

The Impact of Mathematics and Computational Science in the Aerospace Industry

4:00 PM-6:00 PM

Room:Royal Palm 4

Organized by the SIAM Industry Committee

This minisymposium illustrates the contributions of applied mathematics and computational science toward solving many critical complex problems in the aerospace industry. The award winning first talk describes how one team of engineers and mathematicians literally saved a satellite. The next two talks involve research and development of a unique synthetic aperture radar system that led to joint work with JPL on lunar imaging. Finally, the impact of the evolution of cloud computing is highlighted. We hope these talks will inspire the audience by showing the enduring impact of this work, involving creative thinking, the development of new algorithms and mathematics, and state of the art computational science.

Organizer: Kathryn Brenan

The Aerospace Corporation, USA

4:00-4:25 Design of the Advanced EHF-1 Orbit Transfer

David Garza, The Aerospace Corporation, USA

4:30-4:55 Lunar Imaging with Synthetic Aperture Radar

Lawrence Weintraub and Ronald Bloom, The Aerospace Corporation, USA

5:00-5:25 Application of a Comprehensive Second-Order Near-Field Interferometric Sar (insar) Model to the Terrain Retrieval Problem at W-Band (with Lidar Validation)

Ronald Bloom and Lawrence Weintraub, The Aerospace Corporation, USA

5:30-5:55 Cloud Benchmarking: The Ongoing Evolution of Computer System Evaluation

Douglas Enright, Andrew Brethorst, Jacob Everist, Ronald Scrofano, and Larry Wang, The Aerospace Corporation, USA

Monday, July 8

MS24

Advances in Radial Basis Function and Other Meshfree Methods - Part II of III

4:00 PM-6:00 PM

Room:Royal Palm 5

For Part 1 see MS10
For Part 3 see MS37

Meshfree methods have many desirable properties for approximation problems and the numerical solution of differential equations. These include the ability to handle geometrically complex domains, achieve high-accuracy, provide non-uniform resolution, and preserve certain intrinsic physical properties. This minisymposium focuses primarily on kernel-based methods, such as radial basis functions. The talks will address recent computational and theoretical advances of these methods, as well as their application to problems in the biological and geosciences. Of particular interest are recent advances that enable their use in large-scale computations.

Organizer: Rodrigo B. Platte

Arizona State University, USA

Organizer: Grady B. Wright

Boise State University, USA

4:00-4:25 A Radial Basis Functions Method for Solving Fractional Diffusion Equations

Cecile M. Piret and Emmanuel Hanert, Universite Catholique de Louvain, Belgium

4:30-4:55 Application of Fredholm Integral Equations Inverse Theory to the Radial Basis Function Approximation Problem

Rosemary A. Renaut, Arizona State University, USA; Shengxin Zhu, Oxford University, United Kingdom

5:00-5:25 An Adaptive RBF-WENO Reconstruction Method

Jae-Hun Jung, State University of New York at Buffalo, USA

5:30-5:55 Numerical Study of Hybrid Block Pseudospectral and Radial Basis Function Method for PDE

Alfa Heryudono, University of Massachusetts, Dartmouth, USA

Monday, July 8

MS25

General Environmental Coastal Ocean Modeling - Part II of II

4:00 PM-5:30 PM

Room:Garden Salon I

For Part 1 see MS11

The General Curvilinear Environmental Model (GCEM) is a High Resolution system composed of the General Curvilinear Coastal Ocean Model (GCCOM) and the General Curvilinear Atmospheric Model (GCAM). Both modules are capable of reading a general curvilinear grid, orthogonal or non-orthogonal in all three directions. These two modules are weekly coupled using the distributed coupling toolkit (DCT) and users are able to interact with the model and run it using a web based computational environment. Some test cases will be presented to demonstrate the capabilities of our system as well as to highlight the main differences with currently used systems.

Organizer: José E. Castillo

San Diego State University, USA

4:00-4:25 A Cyberinfrastructure-Based Computational Environment for General Environment Coastal Ocean (GECOM) Models

Mary Thomas, San Diego State University, USA

4:30-4:55 Distributed Coupling Toolkit

Dany De Cecchis, Universidad de Carabobo, Venezuela

5:00-5:25 Nesting ROMS and UCOAM: A Case Study in Monterey Bay

Paul Choboter, California Polytechnic State University, San Luis Obispo, USA

Monday, July 8

MS26

Laplacian Spectra for Shape Optimization, Classification, Recognition, and Beyond- Part II of IV

4:00 PM-6:00 PM

Room:Garden Salon II

For Part 1 see MS12
For Part 3 see MS52

The investigation of spectra of the Laplace and related operators on a bounded domain or manifold is a subject with a history of more than two hundred years. In this minisymposium, we want to focus on the geometric aspects of such spectra, in particular, shape optimization, shape classification and recognition. Significant progress has been made on such problems in recent years due to both theoretical and computational developments in numerical optimization methods, sensitivity analysis, and methods for modeling free interfaces. This minisymposium aims to bring together mathematicians and scientists working in this field to share new results and exchange ideas.

Organizer: Chiu-Yen Kao

Claremont McKenna College, USA

Organizer: Braxton Osting

University of California, Los Angeles, USA

Organizer: Naoki Saito

University of California, Davis, USA

4:00-4:25 Waves in Honeycomb Structures

Michael I. Weinstein, Columbia University, USA

4:30-4:55 Sharp Estimates on the Magnetic and Pauli Spectra of Plane Domains

Richard S. Laugesen, University of Illinois at Urbana-Champaign, USA; Bartlomiej Siudeja, University of Oregon, USA

5:00-5:25 Adjoint-Based Photonic Design: Optimization for Applications from Super-Scattering to Enhanced Light Extraction

Owen D. Miller and Steven Johnson, Massachusetts Institute of Technology, USA

5:30-5:55 Optimization of Plasmon Resonances of Nanoparticles

Faouzi Triki and Eric Bonnetier, Universite Joseph Fourier, France

Monday, July 8

MS27

Cartesian Treecode Algorithms and Applications in Computational Science

4:00 PM-6:00 PM

Room:Royal Palm 6

Cartesian treecode algorithms are grid free fast summation algorithms originally developed and implemented in astrophysical simulations. This minisymposium will highlight new serial and parallel developments in the field with applications in computational chemistry, biophysical simulations, statistical modeling and computational fluid dynamics.

Organizer: Henry A. Boateng

University of Michigan, USA

4:00-4:25 A Cluster-Cluster Treecode Algorithm

Henry A. Boateng, University of Michigan, USA; Robert Krasny, University of Michigan, Ann Arbor, USA

4:30-4:55 A Treecode for Fast Summation of Matern Covariance Kernels

Lei Wang and Jie Chen, Argonne National Laboratory, USA

5:00-5:25 Gpu and Treecode Accelerated Electrostatics Computation for Implicitly Solved Biomolecules

Weihua Geng, University of Alabama, Tuscaloosa, USA; Robert Krasny, University of Michigan, Ann Arbor, USA

5:30-5:55 A Parallel Adaptive Treecode for Evolution of Microstructure in Elastic Media

Hualong Feng, Amlan Barua, Shuwang Li, and Xiaofan Li, Illinois Institute of Technology, USA

Monday, July 8

CP3

Multiscale Modeling

4:00 PM-5:40 PM

Room:Pacific Salon 7

Chair: David Trebotich, Lawrence Berkeley National Laboratory, USA

4:00-4:15 Upscaling of Microscale Reactive Transport to the Darcy Scale
David Trebotich and Sergi Molins, Lawrence Berkeley National Laboratory, USA

4:20-4:35 Efficient Asymptotic Preserving Schemes for Higly Anisotropic Ellitpic Problems, Application to the Simulation of the Ionospheric Plasma Disturbances
Fabrice Deluzet, Universite de Toulouse, France; Christophe Besse and Anais Crestetto, CNRS, France; Pierre Degond, CNRS & Institut de Mathematiques de Toulouse, France; Alexei Lozinski, Jacek Narski, and Claudia Negulescu, CNRS, France; Chang Yang, University Claude Bernard, Lyon, France

4:40-4:55 Virtual Nuclear Reactor Modeling Using Lime
Russell W. Hooper, Sandia National Laboratories, USA

5:00-5:15 Multiscale Method for Highly Oscillatory Dynamical Systems
Seong Jun Kim, University of Texas at Austin, USA

5:20-5:35 Phase Change at the Nanoscale
Francesc Font Martinez and Timothy Myers, Centre de Recerca Matemàtica, Spain

Monday, July 8

CP4

Real and Complex Analysis

4:00 PM-5:40 PM

Room:Pacific Salon 6

Chair: Paul A. Martin, Colorado School of Mines, USA

4:00-4:15 Radial Basis Function (RBF) Approximation Is Indistinguishable From Hermite Function Interpolation on a Finite Interval: RBFs Without Matrix Inversion
John P. Boyd, University of Michigan, Ann Arbor, USA

4:20-4:35 On the Distinguished Role of the Mittag-Leffler and Wright Functions in Fractional Calculus
Francesco Mainardi, University of Bologna, Italy; Rudolf Gorenflo, Free University of Berlin, Germany

4:40-4:55 On a Representation of Functions of Several Variables As Superposition of Functions of One Variable and Addition by Using An Algebraic Identity
Hideaki Okazaki and Hideo Nakano, Shonan Institute of Technology, Japan

5:00-5:15 *N* Masses on a String
Paul A. Martin, Colorado School of Mines, USA

5:20-5:35 Perturbation of *-Derivations on Fuzzy Banach *-Algebras
Sun Jang, University of Ulsan, South Korea

Intermission

6:00 PM-6:15 PM

Monday, July 8

PD1

Industry Panel: Developing and Expanding Your Sphere of Influence

6:15 PM-7:15 PM

Room:Town & Country

Chair: Thomas A. Grandine, The Boeing Company, USA

Creating industrial value through mathematics requires more than solving hard mathematical problems. It requires effective working relationships with many different facets of the business, a means of accomplishing technology transfer, access to the interesting and important problems of the company, and the earned respect of colleagues and customers alike. The panelists will describe some of the ways in which their careers have benefitted from the development and growth of their own personal spheres of influence. Moreover, they will describe some of the ways in which those spheres of influence have helped them to promote mathematics, both inside and outside their companies.

Panelists

John Abbott, Corning Incorporated, USA
Amr El-Bakry, ExxonMobil Upstream Research Company, USA
Erica Klampfl, Ford Motor Company, USA
Jeffrey Saltzman, AstraZeneca, USA

SINUM Editorial Board

7:15 PM-9:15 PM

Room:Sunrise

Career Fair / Graduate Student Reception / Industry Reception

7:15 PM-9:15 PM

Room: Atlas Foyer

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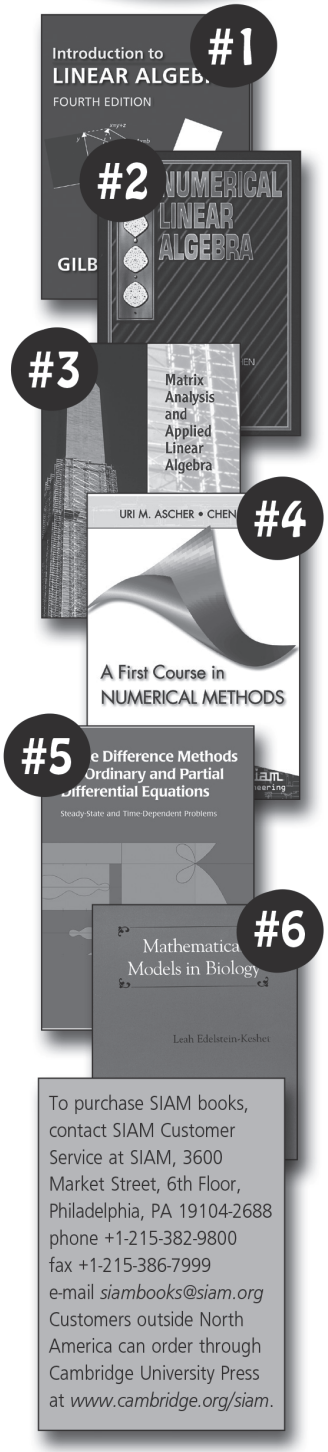

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5/13

Tuesday, July 9

Student Days: Student Chapter Meeting with SIAM Leadership (by invitation only)

7:00 AM-8:15 AM

Room:Tiki Pavillion

Fundamentals of Algorithms Editorial Board

7:00 AM-8:15 AM

Room:Board Room

Registration

8:00 AM-4:30 PM

Room:Atlas Foyer

Remarks

8:25 AM-8:30 AM

Room:Town & Country

SIAM Presents

Since 2008, SIAM has recorded many Invited Lectures, Prize Lectures, and selected Minisymposia from various conferences. These are available by visiting SIAM Presents (http://www.siam.org/meetings/presents.php).

Tuesday, July 9

IC3

Keeping Ford Green with Mathematics

8:30 AM-9:15 AM

Room:Town & Country

Chair: Chai Wu, IBM T.J. Watson Research Center, USA

Scientific societies, universities, research institutes, and foundations all over the world have banded together to dedicate 2013 as a special year for the Mathematics of Planet Earth. In line with this theme, I will describe how Ford's strategic sustainability efforts, as outlined in the Blueprint for Sustainability, are supported by mathematical models. I will present examples of these modeling efforts, such as constructing global energy models, defining CO2 targets over time, helping fleet customers reduce CO2 emissions, and developing a future product and technology portfolio that reduces emissions. Ford is committed to employing sustainable business processes and developing sustainable products: it's not easy being green, but mathematics sure helps!

Erica Klampfl
Ford Motor Company, USA

Tuesday, July 9

IC4

Traffic Jams of Self-driven Particles

9:15 AM-10:00 AM

Room:Town & Country

Chair: Bernd Krauskopf, University of Auckland, New Zealand

Jamming phenomena are seen in various transportation system including cars, buses, pedestrians, ants and molecular motors, which are considered as "self-driven particles". We recently call this interdisciplinary research on jamming of self-driven particles as "jamology". This is based on mathematical physics, and and includes engineering applications as well. In the talk, starting from the backgroud of this research, simple mathematical models, such as the asymmetric simple exclusion process and the Burgers equation, are introduced as basis of all kinds of traffic flow. Then it is extended in order to account various traffic phenomena, and the comparison between theory and experiment is given to show that the models are able to capture fundamental features of observations.

Katsuhiro Nishinari
University of Tokyo, Japan

Exhibit Hall Open

9:30 AM-4:30 PM

Room:Golden West/California

Coffee Break

10:00 AM-10:30 AM

Room:Golden West/California

Tuesday, July 9

MS28

Numerical Optimization in Industry: Recent Trends

10:30 AM-12:30 PM

Room:Town & Country

Numerical optimization is an important part of any modern design process. Recently, with increasingly complex designs and design requirements, the ability to capture and sense an enormous amount of data, and the readily availability of massively parallel computing infrastructures, numerical optimization is undergoing a transformation in industrial applications. The purpose of this minisymposium is to explore recent trends in applying optimization to applications in various domains. This session was organized to complement invited speaker Erica Klampfl's presentation (see IC3).

Organizer: Chai Wu

IBM T.J. Watson Research Center, USA

10:30-10:55 An Industrial Perspective on Global Optimization

Mark Abramson, Boeing Research & Technology, USA

11:00-11:25 Stochastic Optimization for Model Mis-specification Mitigation

Lior Horesh, IBM T.J. Watson Research Center, USA; Ning Hao and Misha E. Kilmer, Tufts University, USA

11:30-11:55 High-Resolution Bathymetry Using 8-Band Multispectral Imagery from WorldView-2

Brett W. Bader and Grzegorz Miecznik, DigitalGlobe, Inc., USA

12:00-12:25 Improved Estimation of the T2 Distribution from Nmr Measurements

Lalitha Venkataramanan, Fred Gruber, Tarek Habashy, Philip Singer, and Denise Freed, Schlumberger-Doll Research, USA

Tuesday, July 9

MS29

Mathematical Models in Jamology

10:30 AM-12:30 PM

Room:San Diego

In this minisymposium, mathematical models in Jamology, which is the study on jam in various phenomena including traffic flow and pedestrian dynamics,are explained in detail by four presenters. Their targets of the research are similar; however, their approaches vary. Some of them use partial differential equations, whereas others use cellular automata for modeling. Some of them concentrate on theoretical analysis and computer simulation, while others perform real experiments to validate their model. You will know both the major results and the latest research topics in mathematical modeling in Jamology. This session was organized to complement invited speaker Katsuhiro Nishinari's presentation (see IC4).

Organizer: Daichi Yanagisawa

Ibaraki University, Japan

10:30-10:55 Cellular Automata and Pedestrian Dynamics

Daichi Yanagisawa, Ibaraki University, Japan

11:00-11:25 Empirical and Experimental Studies on Uninterrupted Traffic Flow

Rui Jiang, University of Science and Technology of China, China

11:30-11:55 Starting Wave in a Queue of Pedestrians and an Analogy with Compressible Fluid Flow

Akiyasu Tomoeda, Meiji University, Japan

12:00-12:25 A Multi-class Dynamic Assignment Approach to Traffic and Event Management

Karen Giese, PTV Group, USA

Tuesday, July 9

MS30

Uncertainty Quantification in Climate Modeling and Prediction - Part II of III

10:30 AM-12:30 PM

Room:Pacific Salon 1

For Part 1 see MS17
For Part 3 see MS43

Uncertainty quantification (UQ) of climate system forecasts presents challenges in mathematics, intertwined with limitations in observations and understanding of the system. Our goal is to provide a forum for this diverse community to discuss ideas for advancing the science of UQ in climate modeling and many of its components. Topics of interest include UQ in a hierarchical set of climate models, representing uncertainties in coupled climate system models, risk assessment strategies, use of new approaches such as information theoretic metrics/simplified stochastic models for UQ, assimilation and calibration for UQ of initial and forcing fields.

Organizer: Aneesh Subramanian

University of California, San Diego, USA

Organizer: Ibrahim Hoteit

King Abdullah University of Science & Technology (KAUST), Saudi Arabia

Organizer: Charles Jackson

University of Texas at Austin, USA

10:30-10:55 Strategies for Calibration of Large-Scale Climate Models

Dave Higdon, Los Alamos National Laboratory, USA

11:00-11:25 Distilling Regional Climate Model Data from Narccap for Use in Impacts Analysis

Seth McGinnis, National Center for Atmospheric Research, USA

11:30-11:55 Model Error Analysis: Uncertainty Inherent in Model Physics Parameterizations

Derek Posselt, University of Michigan, Ann Arbor, USA

12:00-12:25 Application of Polynomial Chaos Methods to Ocean Modeling

Mohamed Iskandarani, University of Miami, USA

Tuesday, July 9

MS31

Radar Imaging - Part I of II

10:30 AM-12:30 PM

Room:Pacific Salon 2

For Part 2 see MS44

Radar imaging is a technology that has been very successfully developed within the engineering community over the last 60 years. Nevertheless, many mathematical challenges remain. This minisyposium focuses on recent work related to forming and understanding images of both stationary scenes and moving objects.

Organizer: Steven Scarborough

Air Force Research Laboratory, USA

Organizer: Margaret Cheney

Colorado State University and Naval Postgraduate School, USA

10:30-10:55 Challenges in Advanced Moving-Target Processing in Wide-Band Radar

Douglas Page, BAE Systems, USA

11:00-11:25 Interferometric Waveform Inversion

Laurent Demanet, Massachusetts Institute of Technology, USA

11:30-11:55 Geometry of SAR Imagery

Emre Ertin, Ohio State University, USA

12:00-12:25 Waveform-Diverse Moving-Target Synthetic-Aperture Radar

Margaret Cheney, Colorado State University and Naval Postgraduate School, USA

Tuesday, July 9

MS32

Numerical Methods for Incompressible Fluid Flows - Part III of III

10:30 AM-12:30 PM

Room:Pacific Salon 3

For Part 2 see MS19

The aim of this minisymposium is to broadly cover some of recent advances in the computational methods for PDEs in fluid mechanics and related areas. We bring together experts studying various applications of fluids, including non-Newtonian fluids, turbulence flows and multiphase flows. The discussion will address mathematical modeling, numerical analysis, computational algorithms and physical issues arising in the study and modeling of such problems.

Organizer: Hyesuk Lee

Clemson University, USA

Organizer: Leo Rebholz

Clemson University, USA

10:30-10:55 Nonlinear Reduced Order Modeling of Complex Flows

Zhu Wang, University of Minnesota, USA

11:00-11:25 Validation of An Open Source Framework for the Simulation of Blood Flow in Rigid and Deformable Vessels

Tiziano Passerini, Emory University, USA; *Annalisa Quaini*, University of Houston, USA; Umberto E. Villa and Alessandro Veneziani, Emory University, USA; Suncica Canic, University of Houston, USA

11:30-11:55 Deconvolution-Based Indicator Functions in Nonlinear Filters for Regularization Models

Abigail Bowers and Leo Rebholz, Clemson University, USA

12:00-12:25 Efficient Augmented Lagrangian-type Preconditioning using Grad-Div Stabilization

Timo Heister, Texas A&M University, USA

Tuesday, July 9

MS33

Student Days: SIAM Student Chapter Presentations

10:30 AM-12:30 PM

Room:Royal Palm 1

For Part 1 see MS20
For Part 3 see MS46

Organized by the SIAM Education Committee

SIAM Student Chapter presentations.

Organizer: Peter R. Turner

Clarkson University, USA

10:30-10:45 The Flag of Best Fit as a Representative for a Collection of Linear Subspaces of R^n

Tim Marrinan, Bruce Draper, Michael Kirby, and Chris Peterson, Colorado State University, USA

10:50-11:05 Wavelet Frame Based CT Image Reconstructions

Jia Li, National University of Singapore, Singapore; Bin Dong, University of Arizona, USA; Zuowei Shen, National University of Singapore, Singapore; Ge Wang, Rensselaer Polytechnic Institute, USA; Hengyong Yu and Chuang Miao, Wake Forest University, USA

11:10-11:25 Higher Order Fréchet Derivatives of a Matrix Function and Applications

Samuel Relton and Nicholas Higham, University of Manchester, United Kingdom

11:30-11:45 A Hamilton-Jacobi Equation for the Continuum Limit of Non-dominated Sorting

Jeff Calder, Selim Esedoglu, and Alfred O. Hero, University of Michigan, USA

11:50-12:05 Modeling Immunotherapy of the Tumor - Immune Interaction

Joseph Ferrara and Mahbubur Rahman, University of North Florida, USA

12:10-12:25 A Globally Convergent Numerical Method for Optical Tomography Inverse Problem

Pengcheng Xiao and Jianzhong Su, University of Texas at Arlington, USA; Natee Pantong, University of North Carolina, Charlotte, USA

Tuesday, July 9

MS34

Computational Science

10:30 AM-12:30 PM

Room:Royal Palm 2

Part of the SIAM Workshop Celebrating Diversity

This minisymposium offers speakers from diverse backgrounds presenting their work in the computational sciences.

Organizer: Josef Sifuentes
Texas A&M University, USA

Organizer: Illya Hicks
Rice University, USA

Organizer: Cristina Villalobos
University of Texas - Pan American, USA

Organizer: Stephen Wirkus
Arizona State University, USA

10:30-10:55 Data Assimilation for Parameter Estimation in Coastal Ocean Hydrodynamics Modeling
Talea Mayo, University of Texas at Austin, USA

11:00-11:25 Curvature-dependent Surface Tension in Modelling of Fracture
Anna Zemlyanova, Texas A&M University, USA

11:30-11:55 A Spectral Analysis for Linear-Transform based Regularizations
Jorge Castanon, Rice University, USA

12:00-12:25 Optimizing Treatment Regimes to Hinder Antimicrobial Resistance in Pandemic Influenza Across Time Scales
Oscar Patterson Lomba, Arizona State University, USA

Tuesday, July 9

MS35

AWM - Workshop Research Talks by Recent Ph.D.s

10:30 AM-12:30 PM

Room:Royal Palm 3

This minisymposium will feature research talks by women recent Ph.D.s from a variety of mathematical areas. The talks will examine models that look at applications including Thermodynamic modeling, Boussinesq Equations, Force-Based Blended Quasicontinuum Method, and Finite-temperature dynamics.

Organizer: Maria Emelianenko
George Mason University, USA

Organizer: Mette S. Olufsen
North Carolina State University, USA

10:30-10:55 Thermodynamic Modeling and Numerical Simulation of the Flow of Wormlike Micellar Solutions
Natalie Germann, L. Pamela Cook, and Antony N. Beris, University of Delaware, USA

11:00-11:25 Boundary Feedback Control Designs for the Boussinesq Equations with Application to Control of Energy Efficient Building Systems
Weiwei Hu, University of Southern California, USA

11:30-11:55 Formulation and Simulation of the Force-Based Blended Quasicontinuum Method
Xingjie Li, Brown University, USA

12:00-12:25 Finite-Temperature Dynamics of Matter-Wave Dark Solitons in Linear and Periodic Potentials
Yannan Shen, University of Minnesota, USA

Tuesday, July 9

MS36

Industry Days: A Southern California Perspective

10:30 AM-12:30 PM

Room:Royal Palm 4

Organized by the SIAM Industry Committee

As part of Industry Days, a new feature of the SIAM Annual meeting, we have invited SIAM members working in industry from the San Diego region to give presentations on their work and experience in industry. It is our hope that this session along with the other sessions during Industry Days will attract attendees, especially students, and provide a flavor of the challenges and opportunities for mathematical and computational scientists in industry.

Organizer: Thomas A. Grandine
The Boeing Company, USA

Organizer: William G. Kolata
SIAM, USA

10:30-10:55 A Mathematician's Apology
Karl Rudnick, SAIC Corporation, USA

11:00-11:25 Systems Pharmacology: Current Applications of Mathematics in Pharmaceutical R&D
Michael Zager, Pfizer Global Research and Development, USA

11:30-11:55 Polynomial Systems in Receptor Pharmacology
Gilles Gnacadja, Amgen Inc., USA

12:00-12:25 Weather Normalization of Temperature Sensitive Peak Loads
Frank Gonzales, Southern California Edison, USA

Tuesday, July 9

MS37

Advances in Radial Basis Function and Other Meshfree Methods - Part III of III

10:30 AM-12:30 PM

Room:Royal Palm 5

For Part 2 see MS24

Meshfree methods have many desirable properties for approximation problems and the numerical solution of differential equations. These include the ability to handle geometrically complex domains, achieve high-accuracy, provide non-uniform resolution, and preserve certain intrinsic physical properties. This minisymposium focuses primarily on kernel-based methods, such as radial basis functions. The talks will address recent computational and theoretical advances of these methods, as well as their application to problems in the biological and geosciences. Of particular interest are recent advances that enable their use in large-scale computations.

Organizer: Rodrigo B. Platte

Arizona State University, USA

Organizer: Grady B. Wright

Boise State University, USA

10:30-10:55 Kernel Quadrature and Meshless Galerkin Methods on mathbf S^2

Francis J. Narcowich, Stephen Rowe, and Joseph D. Ward, Texas A&M University, USA

11:00-11:25 An RBF-FD Method for the Simulation of Reaction-Diffusion Equations on Stationary Platelets Within the Augmented Forcing Method

Varun Shankar, University of Utah, USA; Grady B. Wright, Boise State University, USA; Aaron L. Fogelson and Robert M. Kirby, University of Utah, USA

11:30-11:55 A Numerical Study of the Accuracy of Divergence-Free Kernel Approximations

Arthur Mitrano, Arizona State University, USA

12:00-12:25 Advances in Smoothed Particle Hydrodynamics

Louis F. Rossi and *Zhenyu He*, University of Delaware, USA

Tuesday, July 9

MS38

Randomized Sketching Algorithms for Numerical Linear Algebra - Part I of II

10:30 AM-12:30 PM

Room:Garden Salon I

For Part 2 see MS51

Randomized algorithms for matrix computations are starting to gain ground for computations with massive datasets in application areas like nuclear engineering, population genomics, and astronomy. These computations include matrix multiplication; least squares and regression problems; low rank approximation and dimensionality reduction (PCA, CUR, subset selection); and preconditioning methods. This minisymposium will focus on randomized algorithms tailored to the above applications, as well as "general-purpose" algorithms for fundamental computations in statistics and machine learning. The common focus is leverage scores. The speakers will illustrate their use for different purposes: importance sampling for low-rank approximations; outlier detection and removal for robust PCA; and sub-sampling strategies for statistical regularization.

Organizer: Ilse Ipsen

North Carolina State University, USA

10:30-10:55 Sketching Algorithms and the Skylark Project

Ken Clarkson, IBM Almaden Research Center, USA

11:00-11:25 Robust PCA for Massive Data

David Lawlor, Duke University, USA

11:30-11:55 Accuracy of a Randomized Algorithm for Computing Leverage Scores

John Holodnak and Ilse Ipsen, North Carolina State University, USA

12:00-12:25 Near-Optimal Column-Based Matrix Reconstruction

Christos Boutsidis, IBM T.J. Watson Research Center, USA

Tuesday, July 9

MS39

Orthogonal Polynomials: Connections and Applications

10:30 AM-12:30 PM

Room:Garden Salon II

Organized by SIAG/OPSF

Orthogonal polynomials turned out to play a central role in the rapid development of many areas, such as the Random Matrix Theory, Laplacian growth, Toeplitz and Hankel operators, Spectral Theory, Mathematical Physics, as well as in more traditional fields, like Harmonic Analysis, Special Functions, and Approximation Theory. The minisymposium aims at discussing new results in the theory of orthogonal polynomials and their connections and applications in some of the fields mentioned above.

Organizer: Andrei Martinez-Finkelshtein

University of Almeria, Spain

Organizer: Ed Saff

Vanderbilt University, USA

10:30-10:55 Equilibrium Measure and Phase Transitions in the Random Matrix Models

Andrei Martinez-Finkelshtein, University of Almeria, Spain; Evgenii Rakhmanov, University of South Florida, USA; Ramon Orive, University La Laguna, Spain

11:00-11:25 Generalized Hurwitz Matrices, Multiple Interlacing, and Forbidden Sectors of the Complex Plane

Olga Holtz, University of California, Berkeley, USA and Technische Universitat Berlin, Germany; Sergey Khrushchev, Kazakh-British Technical University, Kazakhstan; Olga Kushel, Technische Universitaet Berlin, Germany; Mikhail Tyaglov, Shanghai Jiao Tong University, China

continued on next page

Tuesday, July 9

MS39

Orthogonal Polynomials: Connections and Applications

continued

11:30-11:55 Asymptotics of Carleman Polynomials for Level Curves of the Inverse of a Shifted Zhukovsky Transformation
Peter Dragnev, Indiana University - Purdue University Fort Wayne, USA; Erwin Miña-Díaz, University of Mississippi, USA; Michel Northington V, Vanderbilt University, USA

12:00-12:25 Zeros of Entire Fourier Transforms, Lee-Yang Measures and the Riemann Hypothesis Via Orthogonal Polynomials
Dimitar K. Dimitrov, State University of Sao Paulo, Brazil

Tuesday, July 9

MS40

Polynomials, Moments and Optimization

10:30 AM-12:30 PM

Room:Royal Palm 6

A rich mathematical subject with applications to optimization and moment problems is real algebraic geometry. It reaches into theoretical and computational aspects of polynomials. This session will address a wide range of recent research advances in polynomials, optimization and moment problems.

Organizer: J. William Helton
University of California, San Diego, USA

Organizer: Jiawang Nie
University of California, San Diego, USA

10:30-10:55 A Lagrangian Relaxation View of Linear and Semidefinite Hierarchies
Jean B. Lasserre, LAAS-CNRS, Toulouse, France

11:00-11:25 Truncated Moment Problems, Extensions, and Positivity
Lawrence A. Fialkow, State University of New York, New Paltz, USA

11:30-11:55 A Tale of Two Theorems
Greg Blekherman, Georgia Institute of Technology, USA

12:00-12:25 Inequalities on Polynomials in Matrix Variables
J. William Helton, University of California, San Diego, USA

Tuesday, July 9

CP5

Imaging Science

10:30 AM-12:30 PM

Room:Pacific Salon 7

Chair: Victoria Taroudaki, University of Maryland, USA

10:30-10:45 Estimating the Optimal Truncated SVD Filter for Image Restoration
Viktoria Taroudaki, University of Maryland, USA; Dianne P. O'Leary, University of Maryland, College Park, USA

10:50-11:05 Solving Composite Minimization and Its Application to Image Deblurring
Feishe Chen, Syracuse University, USA

11:10-11:25 From Proteins to Cells; Progress in Large Field Electron Microscope Tomography
Albert F. Lawrence, Xiaohua Wan, Sebastien Phan, and Mark Ellisman, University of California, San Diego, USA

11:30-11:45 Medical Imaging Via Slim
Ming Xue, University of Maryland, USA

11:50-12:05 Synchrosqueezed Wave Packet Transform for 2D Mode Decomposition
Haizhao Yang and Lexing Ying, Stanford University, USA

12:10-12:25 Repulsive Random Walk in Automatic Number Plate Recognition
Yosefat Nava Alemán, Universidad Autónoma de Nuevo León, Mexico

Tuesday, July 9

CP6

Physics and Statistical Mechanics

10:30 AM-11:30 AM

Room:Pacific Salon 6

Chair: Christopher Siefert, Sandia National Laboratories, USA

10:30-10:45 Electromagnetic XFEM with Weak Discontinuities
Christopher Siefert, Thomas Voth, and Pavel Bochev, Sandia National Laboratories, USA

10:50-11:05 Ritz-Galerkin Isogeometrics and Transformation Optics to Describe Metasolenoid Electromagnetic Singularities
Scott M. Little, Northcentral University, USA; Dan Cervo and Doug Bebb, MAD Fellows LLC, USA

11:10-11:25 Optimum Experimental Design for Egdm Modeled Organic Semiconductor Devices
Christoph Weiler, IWR Heidelberg University, Germany

Prizes and Awards Luncheon

12:30 PM-2:30 PM

Room:Golden Ballroom

Ticket Required

Tuesday, July 9

SP2

The John von Neumann Lecture: What Sparsity and l1 Optimization Can Do For You

2:30 PM-3:30 PM

Room:Town & Country

Chair: Irene Fonseca, Carnegie Mellon University, USA

Sparsity and compressive sensing have had a tremendous impact in science, technology, medicine, imaging, machine learning and now, in solving multiscale problems in applied partial differential equations. l1 and related optimization solvers are a key tool in this area. The special nature of this functional allows for very fast solvers: l1 actually forgives and forgets errors in Bregman iterative methods.

I will describe simple, fast algorithms and new applications ranging from sparse dynamics for PDE, new regularization paths for logistic regression and support vector machine to optimal data collection and hyperspectral image processing.

Stanley J. Osher
University of California, Los Angeles, USA

Coffee Break

3:30 PM-4:00 PM

Room:Golden West/California

Tuesday, July 9

MS41

Novel Approaches for Vision Applications

4:00 PM-6:00 PM

Room:Town & Country

Current and upcoming vision applications require increasing sophistication of approaches, modelling, algorithms, and implementation on state-of-the-art hardware. The minisymposium brings together experts in imaging and computational sciences to present modern techniques and recent results.

Organizer: Andrew Knyazev
University of Colorado, Denver, USA

Organizer: Fatih Porikli
Mitsubishi Electric Research Laboratories, USA

4:00-4:25 Mutliresolution Spectral Image Segmentation
Andrew Knyazev, University of Colorado, Denver, USA

4:30-4:55 Fast and Robust PCA
Gilad Lerman, University of Minnesota, USA

5:00-5:25 On the Optimal Design of Cascaded Classifiers for Object Detection
Nuno Vasconcelos, University of California, San Diego, USA

5:30-5:55 Forgery Detection in Paintings
Yi Grace Wang, SAMSI, USA; Gungor Polatkan, Princeton University, USA; Sina Jafarpour, Yahoo! Research, USA; Ingrid Daubechies, Duke University, USA

Tuesday, July 9

MS42

Painlevé Equations - Nonlinear Special Functions

4:00 PM-6:00 PM

Room:San Diego

Organized by SIAG/OPSF

The Painlevé equations, discovered around hundred years ago, are special amongst nonlinear ordinary differential equations in that they are "integrable" due to their representation as Riemann- Hilbert problems. The Painlevé equations are nonlinear analogues of the classical special functions (e.g. Bessel, parabolic cylinder and hypergeometric functions). Further the Painlevé equations have a plethora of remarkable properties and arise in a wide variety of Mathematical and Physical applications. Talks in this mini-symposium will describe various recent developments in the theory of Painlevé equations.

Organizer: Peter Clarkson

University of Kent, United Kingdom

4:00-4:25 Semi-Classical Orthogonal Polynomials and the Painlevé Equations

Peter Clarkson, University of Kent, United Kingdom

4:30-4:55 Applications of Painlevé Functions to Nonlinear Wave Equations

Robert J. Buckingham, University of Cincinnati, USA

5:00-5:25 Asymptotic Behavior of Rational Solutions to the Inhomogeneous Painlevé -II Equation

Peter D. Miller, University of Michigan, Ann Arbor, USA

5:30-5:55 Numerical Nonlinear Steepest Descent and Painlevé Transcendents

Sheehan Olver, University of Sydney, Australia

Tuesday, July 9

MS43

Uncertainty Quantification in Climate Modeling and Prediction - Part III of III

4:00 PM-5:30 PM

Room:Pacific Salon 1

For Part 2 see MS30

Uncertainty quantification (UQ) of climate system forecasts presents challenges in mathematics, intertwined with limitations in observations and understanding of the system. Our goal is to provide a forum for this diverse community to discuss ideas for advancing the science of UQ in climate modeling and many of its components. Topics of interest include UQ in a hierarchical set of climate models, representing uncertainties in coupled climate system models, risk assessment strategies, use of new approaches such as information theoretic metrics/simplified stochastic models for UQ, assimilation and calibration for UQ of initial and forcing fields.

Organizer: Aneesh Subramanian

University of California, San Diego, USA

Organizer: Ibrahim Hoteit

King Abdullah University of Science & Technology (KAUST), Saudi Arabia

Organizer: Charles Jackson

University of Texas at Austin, USA

4:00-4:25 A Spectral Based Approach to Conditional Simulation of Climate

William Leeds, University of Chicago, USA

4:30-4:55 The Role of Additive and Multiplicative Noises in Filtering Complex Dynamical Systems

John Harlim, North Carolina State University, USA

5:00-5:25 Bayesian Approaches to the Analysis of Computer Model Output

Mark Berliner, Ohio State University, USA

Tuesday, July 9

MS44

Radar Imaging - Part II of II

4:00 PM-6:00 PM

Room:Pacific Salon 2

For Part 1 see MS31

Radar imaging is a technology that has been very successfully developed within the engineering community over the last 60 years. Nevertheless, many mathematical challenges remain. This minisyposium focuses on recent work related to forming and understanding images of both stationary scenes and moving objects.

Organizer: Steven Scarborough

Air Force Research Laboratory, USA

Organizer: Margaret Cheney

Colorado State University and Naval Postgraduate School, USA

4:00-4:25 Moving Target ISAR Imaging

Duy Nguyen, Science Applications International Corporation, USA

4:30-4:55 Feature Extraction and Classification of Ground Moving Targets from ISAR Image Sequences

Ravi Prasanth and *Mikael Yamaguchi*, Systems & Technology Research, USA; Duy Nguyen, Science Applications International Corporation, USA; John Bennett, SAIC Corporation, USA; Mark McClure, Systems & Technology Research, USA

5:00-5:25 Mathematical Problems Associated with Imaging Moving Objects

Mark Stuff, Michigan Tech Research Institute, USA

5:30-5:55 On SAR Imaging through the Earth's Ionosphere

Mikhail Gilman, Erick Smith, and *Semyon Tsynkov*, North Carolina State University, USA

Tuesday, July 9

MS45

Stochastic Model, Uncertainty Quantification and Stochastic Inversion - Part I of VI

4:00 PM-6:00 PM

Room:Pacific Salon 3

For Part 2 see MS71

Uncertainty is everywhere, from material discovery to reactive transport in porous media. Quantifying the uncertainty associated with the parameters in complex systems is critical, which can help us to verify our modern simulation codes and assess confidence levels. Our aim is to use accurate computational simulations to predict the behavior of complex systems. For large number of random dimensions, advanced stochastic approximation techniques are necessary to minimize the complexity of mathematical models. This minisymposium will explore recent advances in numerical algorithms and applications for uncertainty quantification, model reduction, and stochastic inversion in large-scale high-dimensional complex systems.

Organizer: George E. Karniadakis
Brown University, USA

Organizer: Mihai Anitescu
Argonne National Laboratory, USA

Organizer: Karen E. Willcox
Massachusetts Institute of Technology, USA

Organizer: Omar Ghattas
University of Texas at Austin, USA

Organizer: Guang Lin
Pacific Northwest National Laboratory, USA

4:00-4:25 Effective Approximation of Stochastic Navier-Stokes Equation
Boris Rozovsky and George E. Karniadakis, Brown University, USA; Remigijus Mikulevicius, University of Southern California, USA; Daniele Venturi, Brown University, USA

continued in next column

4:30-4:55 A Dynamically Bi-Orthogonal Method for Time-Dependent Stochastic Partial Differential Equation
Tom Hou, California Institute of Technology, USA; Mulin Cheng, ExxonMobil Research, USA; Zhiwen Zhang, California Institute of Technology, USA

5:00-5:25 Fast Numerical Algorithms for Kalman Filters and Data Assimilation
Eric F. Darve, Sivaram Ambikasaran, Judith Yue Li, and Peter K. Kitanidis, Stanford University, USA

5:30-5:55 Data Free Inference in Computational Models
Habib N. Najm, Sandia National Laboratories, USA; Robert Berry, Climate Corporation, USA; Cosmin Safta, Khachik Sargsyan, Bert J. Debusschere, and Kenny Chowdhary, Sandia National Laboratories, USA

Tuesday, July 9

MS46

Student Days: Student Informal Meeting with Invited Speakers

4:00 PM-6:00 PM

Room:Royal Palm 1

For Part 2 see MS33
For Part 4 see MS59

Organized by the SIAM Education Committee

This informal session provides opportunities for students to meet invited speakers. This is your chance to ask research or career questions, or listen to advice provided by the experts. Discussions will be conducted in smaller groups; after about 20 minutes, the groups will change, so you get a chance to talk to all of the invited speakers present.

Organizer: Hinke M. Osinga
University of Auckland, New Zealand

Organizer: Bruce Hendrickson
Sandia National Laboratories, USA

Meet Informally with some of the 2013 Invited Speakers:

Tyrone E. Duncan, University of Kansas, USA
Mariana Haragus, Universite de Franche-Comte, France
Alejandro Jofré, Universidad de Chile, Chile
George E. Karniadakis, Brown University, USA
Erica Klampfl, Ford Motor Company, USA
Katsuhiro Nishinari, University of Tokyo, Japan
Stanley J. Osher, University of California, Los Angeles, USA
Hugh P. Possingham, University of Queensland, Australia
Michael Shub, IMAS, CONICET, Argentina and Graduate School of CUNY
George Sugihara, University of California, San Diego, USA
Nick Trefethen, Oxford University, United Kingdom
Yuan Xu, University of Oregon, USA
John Zack, MESO, Inc., USA

Tuesday, July 9

MS47

Combinatorial Optimization

4:00 PM-6:00 PM

Room:Royal Palm 2

Part of the SIAM Workshop Celebrating Diversity

From combinatorial algorithm on graphs and matroids to polyhedral combinatorics related to the traveling salesman problem, this session gives a potpourri of research in combinatorial optimization. The talks also cover a wide range of applications from logistics, sensor networks, social networks, and biological networks.

Organizer: Illya Hicks

Rice University, USA

4:00-4:25 Branch Decomposition Techniques for Matroid Circuit Problems

John Arellano, Rice University, USA

4:30-4:55 On the 4/3 Conjecture for the Symmetric TSP

Caleb Fast, Rice University, USA

5:00-5:25 Finding all Minimal *k*-Cores in Graphs for Modeling *k*-Assemblies

Cynthia Wood, Rice University, USA

5:30-5:55 Euclidian Hub-and-Spoke Networks

John Gunnar Carlsson, University of Minnesota, Twin Cities, USA

Tuesday, July 9

MS48

AWM - Workshop Mathematics of Planet Earth (MPE) Research Talks by Recent Ph.D.s

4:00 PM-6:00 PM

Room:Royal Palm 3

This minisymposium will feature Mathematics of Planet Earth (MPE) research talks by women recent Ph.D.s. The applications will include population dynamics, ice sheet models, DNA structure and function, and transmission dynamics of E. coli O157:H7.

Organizer: Elebeoba May

University of Houston, USA

Organizer: Holly Gaff

Old Dominion University, USA

4:00-4:25 Application of Population Dynamics on Heterotypic Cell Aggregation in Tumor Metastasis

Yanping Ma, Loyola Marymount University, USA

4:30-4:55 Uncertainty Quantification for Large-Scale Bayesian Inverse Problems with Application to Ice Sheet Models

Noemi Petra, University of Texas at Austin, USA

5:00-5:25 Dynamic Model of DNA Structure and Function

Cheryl Sershen, University of Houston, USA

5:30-5:55 Transmission Dynamics of Escherichia Coli O157:H7 in a Cattle Population

Xueying Wang, Texas A&M University, USA

Tuesday, July 9

MS50

Recent Advances in Numerical Methods for Partial Differential Equations with Random Inputs - Part I of III

4:00 PM-6:00 PM

Room:Royal Palm 5

For Part 2 see MS63

A large variety of phenomena observed in science and engineering are modeled by partial differential equations, where the input parameters are often uncertain, requiring stochastic approximations of quantities of interest (QoI). As such, forward uncertainty propagation and inverse calibration are of critical importance to uncertainty quantification. This minisymposium addresses recent advances in numerical analysis in both areas including methods for high-dimensional approximation, reduced-order modeling, adaptive methods, Bayesian inference and stochastic control/optimization.

Organizer: Miroslav Stoyanov

Oak Ridge National Laboratory, USA

Organizer: Guannan Zhang

Oak Ridge National Laboratory, USA

4:00-4:25 High Dimensional Interpolation for Multiphysics Models

Miroslav Stoyanov, Clayton G. Webster, and Sreekanth Pannala, Oak Ridge National Laboratory, USA

4:30-4:55 Coarse-Grid Sampling Interpolatory Methods for Approximating Correlated Random Fields

Marta D'Elia and Max Gunzburger, Florida State University, USA

5:00-5:25 Reduced Complexity Models for Stochastic Systems

Francesca Boso and Daniel M. Tartakovsky, University of California, San Diego, USA

5:30-5:55 A Multilevel Stochastic Collocation Algorithm for Optimization of PDEs with Uncertain Coefficients

Drew P. Kouri, Argonne National Laboratory, USA

Tuesday, July 9

MS51

Randomized Sketching Algorithms for Numerical Linear Algebra - Part II of II

4:00 PM-6:00 PM

Room:Garden Salon I

For Part 1 see MS38

Randomized algorithms for matrix computations are starting to gain ground for computations with massive datasets in application areas like nuclear engineering, population genomics, and astronomy. These computations include matrix multiplication; least squares and regression problems; low rank approximation and dimensionality reduction (PCA, CUR, subset selection); and preconditioning methods. This minisymposium will focus on randomized algorithms tailored to the above applications, as well as "general-purpose" algorithms for fundamental computations in statistics and machine learning. The common focus is leverage scores. The speakers will illustrate their use for different purposes: importance sampling for low-rank approximations; outlier detection and removal for robust PCA; and sub-sampling strategies for statistical regularization.

Organizer: Ilse Ipsen

North Carolina State University, USA

4:00-4:25 Randomized Solvers for Regession Problems

XIangrui Meng, LinkedIn, USA; Jiyan Yang and Michael Mahoney, Stanford University, USA

4:30-4:55 Sensitivity of Leverage Score Estimation

Thomas Wentworth and Ilse Ipsen, North Carolina State University, USA

5:00-5:25 Subsampling, Regularization and Leverage Scores

Garvesh Raskutti, University of North Carolina, USA

5:30-5:55 Randomized Preconditioning

Haim Avron, IBM T.J. Watson Research Center, USA

Tuesday, July 9

MS52

Laplacian Spectra for Shape Optimization, Classification, Recognition, and Beyond- Part III of IV

4:00 PM-6:00 PM

Room:Garden Salon II

For Part 2 see MS26
For Part 4 see MS65

The investigation of spectra of the Laplace and related operators on a bounded domain or manifold is a subject with a history of more than two hundred years. In this minisymposium, we want to focus on the geometric aspects of such spectra, in particular, shape optimization, shape classification and recognition. Significant progress has been made on such problems in recent years due to both theoretical and computational developments in numerical optimization methods, sensitivity analysis, and methods for modeling free interfaces. This minisymposium aims to bring together mathematicians and scientists working in this field to share new results and exchange ideas.

Organizer: Chiu-Yen Kao

Claremont McKenna College, USA

Organizer: Braxton Osting

University of California, Los Angeles, USA

Organizer: Naoki Saito

University of California, Davis, USA

4:00-4:25 Extremal Eigenvalues of the Laplace-Beltrami Operator

Braxton Osting, University of California, Los Angeles, USA; Chiu-Yen Kao, Claremont McKenna College, USA; Rongjie Lai, University of Southern California, USA

4:30-4:55 Applications of Laplace-Beltrami Spectrum Via Conformal Deformation

Rongjie Lai, University of Southern California, USA

5:00-5:25 Isoperimetric Inequalities for a Wedge-like Membrane

Lotfi Hermi, University of Arizona, USA

5:30-5:55 Principal Eigenvalue Minimization for An Elliptic Problem with Indefinite Weight and Robin Boundary Conditions

Michael Hintermüller, Humboldt University Berlin, Germany

Tuesday, July 9

MS53

Finite Element Methods for Equations with Singularities - Part I of II

4:00 PM-6:00 PM

Room:Royal Palm 6

For Part 2 see MS66

The development of finite element methods (FEMs) for equations with singularities is essential for practical applications, and remains an active research area. Singularities may appear in many circumstances, including rough/discontinuous data, domains with re-entrant corners, and non- smooth interfaces. Conventional numerical methods for these problems are inefficient and may only yield sub-optimal convergence rates. Special treatments must be given in FEMs to obtain higher order convergence rates. This minisymposium aims to discuss the following topics: (1) a priori analysis and convergence estimates; (2) choice of enrichment functions and implementation issues; (3) mesh grading techniques; (4) adaptive FEMs for a variety of error measures; and (5) numerical solves for equations with singularities.

Organizer: Hengguang Li

Wayne State University, USA

Organizer: Jeffrey S. Ovall

University of Kentucky, USA

4:00-4:25 Uncertainty Quantification for Elliptic Problems on Polyhedral Domains

Victor Nistor, Pennsylvania State University, USA

4:30-4:55 On Stable Discretizations for Non-Newtonian Flow Model by DG and Nonconforming FEMs

Young Ju Lee, Rutgers University, USA

5:00-5:25 Regularity and Multigrid Analysis for Laplace-Type Axisymmetric Equations

Hengguang Li, Wayne State University, USA

5:30-5:55 Convergence of Goal-Oriented Adaptive Finite Element Methods for Nonlinear Problems

Sara Pollock, University of California, San Diego, USA

Tuesday, July 9

CP7

Linear Algebra & Applications I

4:00 PM-5:40 PM

Room:Pacific Salon 7

Chair: Angelika Bunse-Gerstner, Universität Bremen, Germany

4:00-4:15 Randomized Matrix Algorithms for Spectral Clustering
Angelika Bunse-Gerstner, Universität Bremen, Germany; Valia Guerra-Ones, Delft University of Technology, Netherlands

4:20-4:35 Truncated Moment Problems, Extensions, and Positivity
Lawrence A. Fialkow, State University of New York, New Paltz, USA

4:40-4:55 New Results on the Kogbetliantz Method
Vjeran Hari and Josip Matejaš, University of Zagreb, Croatia

5:00-5:15 A Paradigm of Complex Symmetric Matrices in Matrix Analysis
Gordon E. Martin, Independent Researcher

5:20-5:35 A Useful Factorization in PDE-constrained Distributed Optimal Control Problems
Youngsoo Choi, Stanford University, USA

Tuesday, July 9

CP8

Partial Differential Equations

4:00 PM-5:20 PM

Room:Pacific Salon 6

Chair: Steve Anglin, Case Western Reserve University, USA

4:00-4:15 Image-Driven Inverse Problem for Estimating Initial Distribution of Brain Tumor Modeled by Advection-Diffusion-Reaction Equation
Amir Gholaminejad and George Biros, University of Texas at Austin, USA

4:20-4:35 Mathematical Modeling and Simulation of Biofilm Dispersal
Blessing Uzor and Hermann J. Eberl, University of Guelph, Canada

4:40-4:55 Partial Differential Equations Practicum
Steve Anglin, Case Western Reserve University, USA

5:00-5:15 Wave of Chaos and Pattern Formation in Spatially Extended Three Species Model Systems
Nitu Kumari, Indian Institute of Technology Mandi, India

Intermission

6:00 PM-6:15 PM

SIAM Business Meeting

6:15 PM-7:15 PM

Room:Town & Country

Complimentary beer and wine will be served.

Dinner Break

7:15 PM-8:00 PM

Attendees on their own

Book Editorial Board

7:15 PM-8:30 PM

Room:Sunrise

Tuesday, July 9

PP1

Poster and Dessert Reception

8:00 PM-10:00 PM

Room:Exhibit Hall

Roots of Quadratic Interval Polynomials
Ibraheem Alolyan, King Saud University, Saudia Arabia

Parameter Estimation with Censored Data Via Kalman Filtering
Joseph Arthur and Hien T. Tran, North Carolina State University, USA

Improved Power Forecasting Using Pid Control Theory and Principal Component Analysis
Douglas S. Bebb, Scott Little, and Dan Cervo, MAD Fellows LLC, USA

Optimal Bayesian Inference in Social Networks
Manisha Bhardwaj, University of Houston, USA; Wei Ji Ma, Baylor College of Medicine, USA; Kresimir Josic, University of Houston, USA

Long-Time Asymptotics for Perturbations of the Toda Lattice
Deniz Bilman, University of Illinois, Chicago, USA

A Hamilton-Jacobi Equation for the Continuum Limit of Non-Dominated Sorting
Jeff Calder, Selim Esedoglu, and Alfred O. Hero, University of Michigan, USA

Domain Decomposition with Interface Phenomena and Application to Modeling Solar Cells
Timothy Costa, Malgorzata Peszynska, David Foster, and Guenter Schneider, Oregon State University, USA

An Exploration of Dynamical Systems with An Application in Cancer Growth
Patrick T. Davis and Leela Rakesh, Central Michigan University, USA

Successive Constraint Methods in the Collocation Reduced Basis Framework
Andrew C. Davey, University of Massachusetts, Dartmouth, USA

continued on next page

Tuesday, July 9

PP1

Poster and Dessert Reception

continued

Finding Singular Solutions to Polynomial Systems with Perturbed Regeneration
Brent R. Davis, Daniel J. Bates, David Eklund, Chris Peterson, and Eric Hanson, Colorado State University, USA

Heterogeneous Multiscale Method for Steady State Poroelasticity
Paul M. Delgado and Vinod Kumar, University of Texas at El Paso, USA

A Fractal Model of Time
Jorge Diaz-Castro, University of Puerto Rico, Puerto Rico

A Fractal Model of the Big Bang
Jorge Diaz-Castro, University of Puerto Rico, Puerto Rico

Detecting Changes in Weather Data Streams for Wind Energy Prediction
Ya Ju Fan and Chandrika Kamath, Lawrence Livermore National Laboratory, USA

Study of Weakly Discontinuous Solutions for Hyperbolic Differential Equations Based on Wavelet Transform Methods
Shijie Gu, University of Nevada, Reno, USA

Can Cfa Franc Promote the Trade Between the Waemu (West African Economic and Monetary Union) and Its Trading Partners?
Kodjo M. Houssou, University of Minnesota, USA

Wavelets and Wavelet Packets on Point Clouds
Jeffrey Irion and Naoki Saito, University of California, Davis, USA

Optimization of Pool and Tournament Play in the Top Swedish Handball League
Jeffrey M. Larson and Mikael Johansson, KTH Royal Institute of Technology, Sweden

Predicting Fetal Distress
Aisha Najera Chesler, Claremont Graduate University, USA; Ami Radunskaya, Pomona College, USA

Comparative Analysis of Multiphase Flow Simulation in Fractured Rock Using Asynchronous and Synchronous Time Stepping Schemes on Hybrid Finite Element-Finite Volume Meshes
Roman Manasipov, Julian E. Mindel, and Stephan Matthaei, Montan University of Leoben, Austria

Estimating the Violation of the Kkt Conditions
Delphine Mico-Umutesi and William Hager, University of Florida, USA

Robust Parameter Estimation: a Bayesian Inference Approach
Romarie Morales, Arizona State University, USA

Quantification and Optimization of Fantasy Football Effects on Nfl Schedule, Attendance, and Tv Ratings
Filippo Posta, Glendale Community College, USA

Micellar Formulations of Drug Modified Copolymers with Single Walled Carbon Nanotube for Drug Delivery
Leela Rakesh, Central Michigan University, USA

Adomian Polynomial Approximation to Reaction –diffusion Equation Using Fractional Derivatives
Leela Rakesh, Central Michigan University, USA; *Azza Abushams*, Carnegie Mellon University, USA

Variance Reduction for Multilevel Monte Carlo Simulation of SDEs
Lee Ricketson, University of California, Los Angeles, USA

Uniaxial Elongational Flow of a Thixotropic Yield Stress Fluid
Holly Timme and Yuriko Renardy, Virginia Tech, USA

Pancreatic Beta Cells: Modeling the Interdependence of Intracellular Calcium and Insulin Release
Diana W. Verzi, Jocelyn Alcala, Elizabeth Fletes, Dulce Hernandez, Eddie Palomares, and Perla Vega, San Diego State University, USA

Inhibition of Mis-Regulated Nf-KB by Decoy Oligonucleotides: A Mathematical Implication
Zhipeng Wang, Rice University, USA

Eulerian Ergodic Partition Using the Backward Phase Flow Method
Guoqiao You and Shingyu Leung, Hong Kong University of Science and Technology, Hong Kong

AWM Workshop – A Mathematical Model of Denitrification in Pseudomonas Aeruginosa
Seda Arat, Virginia Tech, USA

AWM Workshop – Derivation of SPDEs for Correlated Random Walk Models
Ummugul Bulut, Texas Tech University, USA

AWM Workshop – Applications and Recent Developments of Multilevel Optimization Framework (MG/OPT)
Zichao Di, George Mason University, USA

AWM Workshop – Parallel in Time Using Multigrid
Stephanie Friedhoff, Tufts University, USA

AWM Workshop – Gene Expression: Diffusion Equations Model and Numerical Simulations
Maryann Hohn, University of California, San Diego, USA

AWM Workshop – Finite-Sized Reproductive Numbers
Lindsay T. Keegan, McMaster University, Canada

AWM Workshop – Optimizing Intermittent Water Supply
Anna Lieb, University of California, Berkeley, USA

AWM Workshop – Feedback-Mediated Dynamics in the Kidney: Mathematical Modeling and Analysis
Hwayeon Ryu, Duke University, USA

AWM Workshop – Light Propagation In Semiconductor-Based Luminescent Solar Concentrators
Derya Sahin, and Boaz Ilan, University of California, Merced, USA

AWM Workshop---Global Existence for Surface/Interior Reaction Diffusion Systems
Vandana Sharma, University of Houston, USA

AWM Workshop – Lagrangian Data Assimilation and Its Application to Geophysical Fluid Flows
Laura Slivinski and Bjorn Sandstede, Brown University, USA

AWM Workshop – Mesoscale Stochastic Modeling and Simulation of the Dynamics of Soft Gels: Transient Networks
Yun Zeng, University of Delaware, USA

Wednesday, July 10

Program Committee
7:00 AM-8:30 AM

Room:Sunrise

Registration
8:00 AM-4:30 PM

Room:Atlas Foyer

Remarks
8:25 AM-8:30 AM

Room:Town & Country

Wednesday, July 10

IC5
Stochastic Multiscale Modeling
8:30 AM-9:15 AM

Room:Town & Country

Chair: Dirk Roose, Katholieke Universiteit Leuven, Belgium

We consider systems that are governed by stochastic ordinary and partial differential equations (SODEs and SPDEs), and we will present some effective methods for obtaining stochastic solutions. These can be coarse-grained molecular systems exhibiting multi-rate dynamics and governed by a very large number of SODEs or continuum multiscale systems governed by SPDEs. We will present methods derived from the Mori-Zwanzig framework combined with PDF evolution equations as well as recent extensions of generalized polynomial chaos in high dimensions. We will also discuss various applications in biophysics and in mesoscopic materials.

George E. Karniadakis
Brown University, US

Wednesday, July 10

IC6
The Mathematics of Conservation Decision Making
9:15 AM-10:00 AM

Room:Town & Country

Chair: Suzanne M. Lenhart, University of Tennessee, USA

Species are currently becoming extinct at least 100 times the background rate. The resources available to save biodiversity are inadequate. Consequently we need to optimise the return on investment from conservation decisions. In this talk I will show how we have been using optimisation tools to solve conservation problems such as reserve system design and allocating funds to threatened species management.

Hugh P. Possingham
University of Queensland, Australia

Exhibit Hall Open
9:30 AM-4:30 PM

Coffee Break
10:00 AM-10:30 AM

Room:Golden West/California

Wednesday, July 10

MS54

Stochastic and Multiscale Simulation in Biology and Biophysics

10:30 AM-12:30 PM

Room:Town & Country

Stochastic and multiscale phenomena arise in many applications in science and engineering. This minisymposium introduces several models describing particular phenomena in biology and biophysics, such as agent-based models of collective motion, spin models of swimming micro-organisms, particle-based models of bacterial chemotaxis. Also specific techniques to deal with multiscale aspects are discussed, including statistical inference across multiple scales and variance reduction. This session was organized to complement invited speaker George Karniadakis's presentation (see IC5).

Organizer: Dirk Roose
Katholieke Universiteit Leuven, Belgium

Organizer: I. G. Kevrekidis
Princeton University, USA

10:30-10:55 Coarse-Graining Agent-Based Models of Collective Motion
I. G. Kevrekidis, Princeton University, USA

11:00-11:25 Spin Models for Suspensions of Swimming Microorganisms
Peter R. Kramer, Rensselaer Polytechnic Institute, USA; Oleg Zaboronski, University of Warwick, United Kingdom

11:30-11:55 An Optimal Transport Approach to Statistical Inference Across Multiple Scales
Matthew Parno, Tarek El Moselhy, and *Youssef M. Marzouk*, Massachusetts Institute of Technology, USA

12:00-12:25 Simulating Multiscale Particle-Based Models of Bacterial Chemotaxis with Asymptotic Variance Reduction
Giovanni Samaey, Katholieke Universiteit Leuven, Belgium

Wednesday, July 10

MS55

Spatial Ecology

10:30 AM-12:30 PM

Room:San Diego

Traditional ecology started by ignoring issues of space. We now work at understanding and managing ecological systems in both space and time using a wide variety of optimisation, modelling and statistical approaches. This session was organized to complement invited speaker Hugh Possingham's presentation (see IC6).

Organizer: Kerry A. Landman
University of Melbourne, Australia

10:30-10:55 Spatial Models of Biodiversity
Ryan Chisholm, National University of Singapore, Singapore

11:00-11:25 Optimal Control of Spatial Models of Populations
S.M. Lenhart, University of Tennessee, USA

11:30-11:55 Spatial Features of Density Dependence and Weather Extremes in Population Models
Simone Vincenzi, University of California, Santa Cruz, USA

12:00-12:25 Integrative Evaluation of Diverse Conservation Strategies for a Rare Shrub Species under Global Change
Helen M. Regan, University of California, Riverside, USA

Wednesday, July 10

MS56

Metastability: New Developments, Theory and Numerics - Part I of II

10:30 AM-1:00 PM

Room:Pacific Salon 1

For Part 2 see MS69

Many problems arising from chemistry, physics and engineering involve rare but significant exit events and/or transition events between stable states. The transitions happen on a time scale much longer than the intrinsic time scale of the dynamical system. Examples of such events are conformational changes of biomolecules, chemical reactions and tracking loop problems in engineering. The purpose of this minisymposium is to bring together specialists working in theory and related numerical issues, such as analysis of models for metastable systems, dimensional reduction, free energy calculation, Monte Carlo methods and direct algorithms for finding transition paths.

Organizer: Maria K. Cameron
University of Maryland, USA

Organizer: Konstantinos Spiliopoulos
Brown University, USA

10:30-10:55 Importance Sampling in the Neighborhood of a Stable Equilibrium Point
Konstantinos Spiliopoulos and Paul Dupuis, Brown University, USA

11:00-11:25 Coarse-graining of Time and Space for Materials with Defects
Mitchell Luskin, Gideon Simpson, Alexander V. Shapeev, and David Aristoff, University of Minnesota, USA

11:30-11:55 Using Coarse Grained Models to Speed Convergence to the Minimum Energy Pathway
Jonathan Weare, Bo Qi, Seyit Kale, and Aaron Dinner, University of Chicago, USA

12:00-12:25 Metastability and Interacting Particle Systems
Paul Dupuis, Kavita Ramanan, and *Wei Wu*, Brown University, USA

12:30-12:55 Towards Rare Events Statistics in Molecular Dynamics
Christof Schuette, University of Berlin, Germany

Wednesday, July 10

MS57

Radar Detection and Imaging - Part I of II

10:30 AM-12:30 PM

Room:Pacific Salon 2

For Part 2 see MS70

The use of radar for detection and imaging is an area with many mathematical challenges, including not only the development of reconstruction algorithms, but also identification of signals in noise and quantification of uncertainty in the detections or images. This minisymposium focuses on three-dimensional imaging, including cases of propagation through complex media, and on quantification of uncertainty.

Organizer: Edmund Zelnio

Wright State University, USA

Organizer: Margaret Cheney

Colorado State University and Naval Postgraduate School, USA

10:30-10:55 SAR Imaging Considerations for Multi-Baseline Interferometry and Tomography

Scott Hensley, Thierry Michel, Ron Muellerschoen, and Brian Hawkins, Jet Propulsion Laboratory, California Institute of Technology, USA

11:00-11:25 Interrupted SAR Persistent Surveillance Via Joint Sparse Reconstruction of Multi-Pass Data

Les Novak and *Ivana Stojanovic*, Science Systems Company, Inc., USA; Clem Karl, Boston University, USA

11:30-11:55 Considerations in the Development of Passive Multimode Radar

Bill Melvin, Georgia Institute of Technology, USA

12:00-12:25 Motion Estimation in Synthetic Aperture Radar

George C. Papanicolaou, Stanford University, USA

Wednesday, July 10

MS58

Recent Advances in Uncertainty Quantification

10:30 AM-12:30 PM

Room:Pacific Salon 3

Uncertainty Quantification (UQ) techniques are essential for quantifying robustness of operation of modern day engineering systems. These methods provide the means for calculating the probability distributions of system outputs, given probability distributions that represent uncertainty on input parameters. This session presents new approaches and advances related to the development of novel UQ techniques. The minisymposium will present new techniques on automatic structure learning of graphical models, sensitivity analysis, and stochastic collocation for partial differential equations. The efficacy and utility of these methods will be demonstrated on real world problems.

Organizer: Tuhin Sahai

United Technologies Research Center, USA

10:30-10:55 A Traveling Salesman Learns Bayesian Networks

Tuhin Sahai and Stefan Klus, United Technologies Research Center, USA; Michael Dellnitz, University of Paderborn, Germany

11:00-11:25 Predicting Energy Savings Due to Building Retrofit

Slaven Peles and Sunil Ahuja, United Technologies Research Center, USA

11:30-11:55 An Adaptive Wavelet Stochastic Collocation Method for Irregular Solutions of PDEs with Random Inout Data

Max Gunzburger, Florida State University, USA; *Clayton G. Webster* and Guannan Zhang, Oak Ridge National Laboratory, USA

12:00-12:25 Designing Uncertainty: Sensitivity Analysis for Systems with Spatially Distributed Variability

Eric Dow and Qiqi Wang, Massachusetts Institute of Technology, USA

Wednesday, July 10

MS59

Student Days: SIAM Student Paper Prize Winner Presentations

10:30 AM-12:00 PM

Room:Royal Palm 1

For Part 3 see MS46
For Part 5 see MS72

Organized by the SIAM Education Committee

SIAM Student Paper Prize Winner Presentations.

Organizer: Peter R. Turner

Clarkson University, USA

10:30-10:55 Inner-Iteration Krylov Subspace Methods for Least Squares Problems

Keiichi Morikuni, The Graduate University for Advanced Studies, Sokendai, Japan

11:00-11:25 PhaseLift: Exact and Stable Signal Recovery from Magnitude Measurements Via Convex Programming

Vladislav Y. Voroninski, University of California, Berkeley, USA

11:30-11:55 An Adaptive Finite Element Eigenvalue Solver of Asymptotic Quasi-Optimal Computational Complexity

Joscha Gedicke, Humboldt University Berlin, Germany

Wednesday, July 10

MS60

Mathematical and Theoretical Ecology

10:30 AM-12:30 PM

Room:Royal Palm 2

Part of the SIAM Workshop Celebrating Diversity

Mathematical applications are ubiquitous in ecology, including infectious disease ecology and ecological applications in related areas of biology and medicine. These applications draw heavily from many fields of mathematics, yield valuable new scientific insights, and can lead to interesting new mathematical problems. The speakers in this session will present research that highlights applications of mathematical and numerical models in ecology and related fields of biology.

Organizer: Paul J. Hurtado
Ohio State University, USA

Organizer: Illya Hicks
Rice University, USA

Organizer: Cristina Villalobos
University of Texas - Pan American, USA

Organizer: Stephen Wirkus
Arizona State University, USA

10:30-10:55 Bifurcations, Infectious Disease Ecology and The Art of Approximation: Linking Biological Mechanisms with Dynamics
Paul J. Hurtado, Ohio State University, USA

11:00-11:25 Species Abundance Distributions in Ecological Communities with Niche and Neutral Dynamics
Rosalyn Rael, University of Michigan, USA

11:30-11:55 Top-Down Bottom-Up Effects In The Chesapeake Bay Fisheries Ecosystem Model
Shari Wiley, Hampton University, USA

12:00-12:25 Using Fast-slow Dynamical Systems Theory to Understand how Coevolution Shapes the Population Dynamics of Predator-prey Systems
Michael H. Cortez, Georgia Institute of Technology, USA

Wednesday, July 10

MS61

New Integral Equation Formulations and High Order Accurate Discretization Techniques for PDEs

10:30 AM-12:30 PM

Room:Royal Palm 3

In many areas of science and engineering, the cost of solving a partial differential equation (PDE) determines what can and cannot be modelled computationally. If the PDE is discretized via classical finite element or finite difference methods typically require the design of a problem specific preconditioner to achieve low order accuracy. Researchers are actively developing new high order accurate solution techniques such as integral equation formulations, and discretizations. Many of these methods are amenable to robust fast direct solvers. This minisymposium will present some recent efforts and discuss the complications associated with developing high order accurate methods.

Organizer: Adrianna Gillman
Dartmouth College, USA

Organizer: Min Hyung Cho
Dartmouth College, USA

10:30-10:55 A Direct Solver for Variable Coefficient Elliptic PDEs
Gunnar Martinsson, University of Colorado Boulder, USA

11:00-11:25 A Fast Algorithm for Spherical Grid Rotations and its Application to Singular Quadrature
Zydrunas Gimbutas, Courant Institute of Mathematical Sciences, New York University, USA; *Shravan Veerapaneni*, University of Michigan, USA

11:30-11:55 A Partition of Unity Method with Penalty for Fourth Order Problems
Christopher B. Davis, Louisiana State University, USA

12:00-12:25 Numerical Construction of Green's Functions for High Dimensional Elliptic Problems with Variable Coefficients
David Biagioni, University of Colorado Boulder, USA

Wednesday, July 10

MS62

Symbolic Computation and Special Functions - Part I of II

10:30 AM-12:00 PM

Room:Royal Palm 4

For Part 2 see MS75
Organized by SIAG/OPSF

This minisymposium is about recent work in symbolic computation with possible applications to special functions, and recent work about special functions that was made possible by symbolic computation. The development of computer algebra algorithms dealing with special functions has been a continuously growing area in symbolic computation since long. While at first, computer methods may have been more of theoretical interest, now we see more and more problems solved by computer algebra which seem hopeless to solve without computers. The two aims are to advertise modern computer algebra to potential users and to make researchers in computer algebra aware of current needs in the area of special functions.

Organizer: Manuel Kauers
Johannes Kepler Universität, Linz, Austria

Organizer: Veronika Pillwein
Johannes Kepler Universität, Linz, Austria

10:30-10:55 Ramanujan and Symbolic Computation
George E. Andrews, Pennsylvania State University, USA

11:00-11:25 Creative Telescoping for Rational Functions using the Griffiths-Dwork Method
Alin Bostan, INRIA, France

11:30-11:55 Recent Results for the Lambert W Function and its Relatives
David Jeffrey and Rob Corless, University of Western Ontario, Canada

Wednesday, July 10

MS63

Recent Advances in Numerical Methods for Partial Differential Equations with Random Inputs - Part II of III

10:30 AM-12:30 PM

Room:Royal Palm 5

For Part 1 see MS50
For Part 3 see MS76

A large variety of phenomena observed in science and engineering are modeled by partial differential equations, where the input parameters are often uncertain, requiring stochastic approximations of quantities of interest (QoI). As such, forward uncertainty propagation and inverse calibration are of critical importance to uncertainty quantification. This minisymposium addresses recent advances in numerical analysis in both areas including methods for high-dimensional approximation, reduced-order modeling, adaptive methods, Bayesian inference and stochastic control/optimization.

Organizer: Miroslav Stoyanov
Oak Ridge National Laboratory, USA

Organizer: Guannan Zhang
Oak Ridge National Laboratory, USA

10:30-10:55 A Hyper-Spherical Sparse Grid Approach for High-Dimensional Discontinuity Detection
Guannan Zhang and Clayton G. Webster, Oak Ridge National Laboratory, USA

11:00-11:25 Exploiting the Interpolating Property of Sparse Grids
John Burkardt and Max Gunzburg, Florida State University, USA; Clayton G. Webster, Oak Ridge National Laboratory, USA

11:30-11:55 Performance Breakdown of Stochastic Simulation Algorithms
David A. Barajas-Solano and Daniel M. Tartakovsky, University of California, San Diego, USA

12:00-12:25 Numerical Methods for Stochastic Quasi-Geostrophic Equations
Zhu Wang, University of Minnesota, USA

Wednesday, July 10

MS64

Multiscale Modeling of Biofluids

10:30 AM-12:30 PM

Room:Garden Salon I

Many biological fluids and gels contain immersed materials and/or structures which interact on multiple length and time scales. Some examples include a blood clot's dynamic polymer network, flow patterns resulting from populations of swimming organisms, biofilm growth, and particle diffusion through layers of mucus. Mathematical modeling to better understand these systems is challenging due to the coupling of multiscale phenomena, from macroscopic flows down to single particles or molecules. In this minisymposium, we will highlight recent advances in the field by bringing together researchers in the areas of model development, novel biological applications, and numerical algorithms.

Organizer: Sarah D. Olson
Worcester Polytechnic Institute, USA

Organizer: Karin Leiderman
University of California, Merced, USA

10:30-10:55 A Model of Particle Transport Through a Periodic Array of Beating Cilia
Karin Leiderman, University of California, Merced, USA

11:00-11:25 Multiphase Models and Simulations for Bacterial Biofilm Accounting for Cell Motility
Qi Wang and Jia Zhao, University of South Carolina, USA

11:30-11:55 A Multiscale Model of Fibrinolysis: from Single Molecules to Full 3-D Clots
Brittany Bannish, University of Central Oklahoma, USA; James P. Keener and Aaron L. Fogelson, University of Utah, USA

12:00-12:25 Sperm Interactions: Biochemistry and Hydrodynamic Signals
Sarah D. Olson, Worcester Polytechnic Institute, USA

Wednesday, July 10

MS65

Laplacian Spectra for Shape Optimization, Classification, Recognition, and Beyond- Part IV of IV

10:30 AM-12:00 PM

Room:Garden Salon II

For Part 3 see MS52

The investigation of spectra of the Laplace and related operators on a bounded domain or manifold is a subject with a history of more than two hundred years. In this minisymposium, we want to focus on the geometric aspects of such spectra, in particular, shape optimization, shape classification and recognition. Significant progress has been made on such problems in recent years due to both theoretical and computational developments in numerical optimization methods, sensitivity analysis, and methods for modeling free interfaces. This minisymposium aims to bring together mathematicians and scientists working in this field to share new results and exchange ideas.

Organizer: Chiu-Yen Kao
Claremont McKenna College, USA

Organizer: Braxton Osting
University of California, Los Angeles, USA

Organizer: Naoki Saito
University of California, Davis, USA

10:30-10:55 On Embedded Eigenvalues of Non-Homogeneous Operators
Stephen P. Shipman, Louisiana State University, USA

11:00-11:25 Modeling, Shape Analysis and Computation of the Equilibrium Pore Shape near a PEM-PEM Intersection
Arian Novruzi, University of Ottawa, Canada; Peter Berg, Norwegian University of Science and Technology, Norway; Sven-Joachim Kimmerle, Universität der Bundeswehr München, Germany

11:30-11:55 Minimization of the Ground State for Two Phase Conductors in Low Contrast Regime
Antoine Laurain, Humboldt University Berlin, Germany

Wednesday, July 10

MS66

Finite Element Methods for Equations with Singularities - Part II of II

10:30 AM-12:30 PM

Room:Royal Palm 6

For Part 1 see MS53

The development of finite element methods (FEMs) for equations with singularities is essential for practical applications, and remains an active research area. Singularities may appear in many circumstances, including rough/discontinuous data, domains with re-entrant corners, and non- smooth interfaces. Conventional numerical methods for these problems are inefficient and may only yield sub-optimal convergence rates. Special treatments must be given in FEMs to obtain higher order convergence rates. This minisymposium aims to discuss the following topics: (1) a priori analysis and convergence estimates; (2) choice of enrichment functions and implementation issues; (3) mesh grading techniques; (4) adaptive FEMs for a variety of error measures; and (5) numerical solves for equations with singularities.

Organizer: Hengguang Li
Wayne State University, USA

Organizer: Jeffrey S. Ovall
University of Kentucky, USA

10:30-10:55 A Hierarchical Error Estimate for a Schrodinger-Type Operator
Jeffrey S. Ovall, University of Kentucky, USA; Hengguang Li, Wayne State University, USA

11:00-11:25 A Posteriori Estimates and Adaptivity for Nonlinear Problems
Ryan Szypowski, University of California, San Diego, USA

11:30-11:55 Multigrid Methods for Degenerate and Singular Elliptic Equations
Long Chen, University of California, Irvine, USA

12:00-12:25 Variable-Degree HDG Method for Convection-Diffusion Equations on Meshes with Hanging Nodes
Yanlai Chen, University of Massachusetts, Dartmouth, USA; Bernardo Cockburn, University of Minnesota, USA

Wednesday, July 10

Lunch Break

12:30 PM-2:00 PM

Attendees on their own

New Initiatives Committee

12:30 PM-2:00 PM

Room:Galleria II

SIAP Editorial Board

12:30 PM-2:00 PM

Room:Sunrise

Wednesday, July 10

SP3

Past President's Address: Chebfun

2:00 PM-3:00 PM

Room:Town & Country

Chair: Irene Fonseca, Carnegie Mellon University, USA

Chebfun is a Matlab-based open-source software project for "numerical computing with functions" based on algorithms related to Chebyshev polynomials. In recent years developing Chebfun has been my main research activity, together with the closely linked project of writing the book *Approximation Theory and Approximation Practice* (SIAM 2013). This talk will present some highlights of the Chebfun endeavor and will be followed by a two-part Chebfun minisymposium.

Nick Trefethen
Oxford University, United Kingdom

Wednesday, July 10

SP4

W. T. and Idalia Reid Prize in Mathematics Lecture: Solvability for Stochastic Control Problems

3:00 PM-3:30 PM

Room:Town & Country

Chair: Irene Fonseca, Carnegie Mellon University, USA

Some stochastic control problems for continuous time systems are described where optimal controls and optimal costs can be explicitly determined by a direct method. The applicability of this method is demonstrated by examples including the linear quadratic control problem with the system driven by an arbitrary noise process with continuous sample paths, a controlled Brownian motion in a symmetric space and the linear exponential quadratic Gaussian control problem. The problems for linear systems can be modified to allow for equations in an infinite dimensional Hilbert space that describe stochastic partial differential equations.

Tyrone E. Duncan
University of Kansas, USA

Coffee Break

3:30 PM-4:00 PM

Room:Golden West/California

Wednesday, July 10

MS67

Numerical Methods in PDE-constrained Optimization

4:00 PM-6:00 PM

Room:Town & Country

Partial differential equations (PDEs) and optimization have broad applications that are both practical and powerful. PDE-constrained optimization combines these two disciplines. Three representative applications of PDE-constrained optimization are optimal control, optimal design, and inverse problems. In spite of its importance, PDE-constrained optimization is a challenging problem due to its large size and the complexity of the system represented by the PDE. Many efficient numerical methods have been developed and implemented. However, much more research needs to be done. The goal of this minisymposium is to address recent developments of robust and efficient numerical algorithms for PDE-constrained optimization problems.

Organizer: Youngsoo Choi
Stanford University, USA

4:00-4:25 Optimal Control Applied in Coupled Within-host and Between-host Models
Eric Numfor, University of Tennessee, USA

4:30-4:55 Multigrid Solution of Distributed Optimal Control Problems Constrained by Semilinear Elliptic Pdes
Jyoti Saraswat and Andrei Draganescu, University of Maryland, Baltimore County, USA

5:00-5:25 Optimal Fishery Harvesting on a Nonlinear Parabolic Pde in a Heterogeneous Spatial Domain
Michael Kelly, University of Tennessee, Knoxville, USA

5:30-5:55 An Error in Constitutive Equation Approach for Transient Inverse Elastodynamics
Wilkins Aquino, Duke University, USA; Marc Bonnet, CNRS, France

Wednesday, July 10

MS68

Mathematical Modeling of Public Health Problems

4:00 PM-6:00 PM

Room:Royal Palm 2

Part of the SIAM Workshop Celebrating Diversity

Mathematical modeling has become an increasingly important tool that can be used to shed light on imminent public health issues. This minisymposium, under SIAM's Workshop Celebrating Diversity, will highlight a wide range of applied mathematics tools (nonlinear dynamical systems, stochastic processes and optimization) that are currently used to model and analyze public health problems including problems arising from the spread of diseases and social addiction (Chagas' disease, lymphatic filariasis, diabetes, and avian influenza). The talks will also address issues relating to models, analysis and parameter estimations as well as problem implications.

Organizer: Kamuela E. Yong
Arizona State University, USA

Organizer: Anuj Mubayi
Northeastern Illinois University, USA

Organizer: Illya Hicks
Rice University, USA

Organizer: Cristina Villalobos
University of Texas - Pan American, USA

Organizer: Stephen Wirkus
Arizona State University, USA

4:00-4:25 An Agent-Based Approach to Model Host Switching of Two Trypanosoma Cruzi Infected Triatomine Vector Species on Two Preferred Sylvatic Hosts
Kamuela E. Yong, Arizona State University, USA; Anuj Mubayi, Northeastern Illinois University, USA; Christopher Kribs-Zaleta, University of Texas at Arlington, USA

4:30-4:55 Lymphatic Filariasis: Transmission Dynamics and Diagnostics During MDA
Ridouan Bani, Northeastern Illinois University, USA

continued on next page

Wednesday, July 10

MS68

Mathematical Modeling of Public Health Problems

continued

5:00-5:25 A Mathematical Approach to Skeletal Muscle and Insulin Sensitivity in Type 2 Diabetes
Anarina Murillo, Arizona State University, USA

5:30-5:55 Modeling Low and High Pathogenic Avian Influenza
Necibe Tuncer, University of Tulsa, USA; Juan Torres and *Maia Martcheva*, University of Florida, USA

Wednesday, July 10

MS69

Metastability: New Developments, Theory and Numerics - Part II of II

4:00 PM-6:00 PM

Room:Pacific Salon 1

For Part 1 see MS56

Many problems arising from chemistry, physics and engineering involve rare but significant exit events and/or transition events between stable states. The transitions happen on a time scale much longer than the intrinsic time scale of the dynamical system. Examples of such events are conformational changes of biomolecules, chemical reactions and tracking loop problems in engineering. The purpose of this minisymposium is to bring together specialists working in theory and related numerical issues, such as analysis of models for metastable systems, dimensional reduction, free energy calculation, Monte Carlo methods and direct algorithms for finding transition paths.

Organizer: Maria K. Cameron
University of Maryland, USA

Organizer: Konstantinos Spiliopoulos
Brown University, USA

4:00-4:25 Estimating Reactive Fluxes using an Analogy with Electric Circuits
Maria K. Cameron, University of Maryland, USA

4:30-4:55 Geometry and Approximation of Intrinsically Low-Dimensional Dynamical Systems in High Dimensions
Miles Crosskey and *Mauro Maggioni*, Duke University, USA

5:00-5:25 Theory of Transition Path Process
Jianfeng Lu and James Nolen, Duke University, USA

5:30-5:55 Free Energy Landscape and Kinetics of Particles with Short-Ranged Interactions
Miranda Holmes-Cerfon, Courant Institute of Mathematical Sciences, New York University, USA; Michael Brenner and Steven Gortler, Harvard University, USA

Wednesday, July 10

MS70

Radar Detection and Imaging - Part II of II

4:00 PM-6:00 PM

Room:Pacific Salon 2

For Part 1 see MS57

The use of radar for detection and imaging is an area with many mathematical challenges, including not only the development of reconstruction algorithms, but also identification of signals in noise and quantification of uncertainty in the detections or images. This minisymposium focuses on three-dimensional imaging, including cases of propagation through complex media, and on quantification of uncertainty.

Organizer: Edmund Zelnio
Wright State University, USA

Organizer: Margaret Cheney
Colorado State University and Naval Postgraduate School, USA

4:00-4:25 3D SAR Point Clouds
Richard E. Carande, Neva Ridge Technologies, Inc., USA

4:30-4:55 Uncertainty Propagation in Radar, A System-Level Perspective
Eric Keydel, Science Applications International Corporation, USA

5:00-5:25 Detection Theory for Multi-static Active and Passive Radar
Stephen Howard, Defence Science and Technology Organisation, Australia

5:30-5:55 Operator-theoretic Formulation of Radar Detection and Waveform Design Problems
Douglas Cochran, Arizona State University, USA

Wednesday, July 10

MS71

Stochastic Model, Uncertainty Quantification and Stochastic Inversion - Part II of VI

4:00 PM-6:00 PM

Room:Pacific Salon 3

For Part 1 see MS45
For Part 3 see MS84

Uncertainty is everywhere, from material discovery to reactive transport in porous media. Quantifying the uncertainty associated with the parameters in complex systems is critical, which can help us to verify our modern simulation codes and assess confidence levels. Our aim is to use accurate computational simulations to predict the behavior of complex systems. For large number of random dimensions, advanced stochastic approximation techniques are necessary to minimize the complexity of mathematical models. This minisymposium will explore recent advances in numerical algorithms and applications for uncertainty quantification, model reduction, and stochastic inversion in large-scale high-dimensional complex systems.

Organizer: George E. Karniadakis
Brown University, USA

Organizer: Mihai Anitescu
Argonne National Laboratory, USA

Organizer: Karen E. Willcox
Massachusetts Institute of Technology, USA

Organizer: Omar Ghattas
University of Texas at Austin, USA

Organizer: Guang Lin
Pacific Northwest National Laboratory, USA

4:00-4:25 Probabilistic Conditioning Without Bayes
Roger G. Ghanem and Evangelia Kalligiannaki, University of Southern California, USA

4:30-4:55 Reservoir Model Reduction Techniques for Uncertainty Quantification
Xiao-Hui Wu and Yahan Yang, ExxonMobil Upstream Research Company, USA

continued in next column

5:00-5:25 Model Reduction for Systems of Differential Equations with Initial Condition and Parametric Uncertainty
Panagiotis Stinis, University of Minnesota, USA

5:30-5:55 Representing High-Dimensional Random Variables from Data
Jinglai Li, Shanghai Jiao Tong University, China; Youssef M. Marzouk, Massachusetts Institute of Technology, USA

Wednesday, July 10

MS72

Student Days: SIAM/MCM Award Winners Presentations

4:00 PM-5:00 PM

Room:Royal Palm 1

For Part 4 see MS59

Organized by the SIAM Education Committee

SIAM/MCM Award Winners Presentations.

Organizer: Peter R. Turner
Clarkson University, USA

4:00-4:25 Quenching China's Thirst in 2025: A Min-Cost-Max-Flow Network Model
Pengfei Gao, Boshuo He, and Tianxin Zou, Tsinghua University, P. R. China

4:30-4:55 The Best Rounded Rectangle for Ultimate Brownies
Christopher Aicher, Tracy Babb, and Fiona Pigott, University of Colorado Boulder, USA

Wednesday, July 10

MS73

New Trends of Numerical Approximation Methods in Image/signal Processing and Sensing

4:00 PM-6:00 PM

Room:Garden Salon I

In applications of image/signal processing and sensing, we are usually working with direct data such as function values and/or indirect data such as spectral information or filtered information. The data from many practical applications might have very low regularity or a large size that is beyond the scope of the computational ability with current techniques and tools. In this minisymposium, we will discuss some new trends in developing robust and fast numerical approximation methods to deal with the low regularity and the large size of the data. It would also include their applications to the problems of reconstruction, edge/signal detection, and feature extraction in image/signal processing and sensing.

Organizer: Jae-Hun Jung

State University of New York at Buffalo, USA

Organizer: Guohui Song

Clarkson University, USA

4:00-4:25 Numerical Approximation Methods for Non-Uniform Fourier Data
Anne Gelb, Arizona State University, USA

4:30-4:55 A Framework for Moving Least Squares Method with Total Variation Minimizing Regularization
Yeon Ju Lee, Ewha W. University, Korea; Sukho Lee, Dongseo University, South Korea; Jungho Yoon, Ewha W. University, Korea

5:00-5:25 Constructing Approximation Kernels for Non-Harmonic Fourier Data
Aditya Viswanathan, California Institute of Technology, USA

5:30-5:55 Blind One-Bit Compressive Sampling
Lixin Shen, Syracuse University, USA

Wednesday, July 10

MS74

Mimetic Discretization Methods - Part I of II

4:00 PM-6:00 PM

Room:Royal Palm 3

For Part 2 see MS87

Mimetic discretizations or compatible discretizations have been a recurrent search in the history of numerical methods for solving partial differential equations with variable degree of success. There are many researches currently active in this area pursuing different approaches to achieve this goal and many algorithms have been developed along these lines. Loosely speaking, "mimetic" or "compatible" algebraic methods have discrete structures that mimic vector calculus identities and theorems. In this session we present theoretical aspects of different approaches to develop mimetic/compatible discretizations schemas as well as some application in different areas of interest.

Organizer: José E. Castillo

San Diego State University, USA

4:00-4:25 Mimetic Discretization Methods
José E. Castillo, San Diego State University, USA

4:30-4:55 Advances in the Development of the Mimetic Methods Toolkit (MTK): An Object-Oriented API for Mimetic Discretization Methods
Eduardo J. Sanchez, San Diego State University, USA

5:00-5:25 Mimetic Finite Difference PDE Based Models in Image Processing
Carlos Bazan, San Diego State University, USA

5:30-5:55 GPU Acceleration of a Fourth-order Mimetic Finite Difference Method for Elastic Wave Propagation
Jaime A. Parada, Universidad Central de Venezuela, Venezuela

Wednesday, July 10

MS75

Symbolic Computation and Special Functions - Part II of II

4:00 PM-6:00 PM

Room:Royal Palm 4

For Part 1 see MS62

Organized by SIAG/OPSF

This minisymposium is about recent work in symbolic computation with possible applications to special functions, and recent work about special functions that was made possible by symbolic computation. The development of computer algebra algorithms dealing with special functions has been a continuously growing area in symbolic computation since long. While at first, computer methods may have been more of theoretical interest, now we see more and more problems solved by computer algebra which seem hopeless to solve without computers. The two aims are to advertise modern computer algebra to potential users and to make researchers in computer algebra aware of current needs in the area of special functions.

Organizer: Manuel Kauers

Johannes Kepler Universität, Linz, Austria

Organizer: Veronika Pillwein

Johannes Kepler Universität, Linz, Austria

4:00-4:25 Differential Equations, Belyi Maps, and Modular Curves
Mark van Hoeij, Florida State University, USA

4:30-4:55 Efficient Implementation of the Hardy-Ramanujan-Rademacher Formula
Fredrik Johansson, Johannes Kepler Universität, Linz, Austria

5:00-5:25 Symbolic Computation and Modular Forms
Peter Paule, Johannes Kepler Universität, Linz, Austria

5:30-5:55 A Solution of Sun's $520 Challenge Concerning 520/pi
Armin Straub, University of Illinois at Urbana-Champaign, USA

Wednesday, July 10

MS76

Recent Advances in Numerical Methods for Partial Differential Equations with Random Inputs - Part III of III

4:00 PM-6:00 PM

Room:Royal Palm 5

For Part 2 see MS63

A large variety of phenomena observed in science and engineering are modeled by partial differential equations, where the input parameters are often uncertain, requiring stochastic approximations of quantities of interest (QoI). As such, forward uncertainty propagation and inverse calibration are of critical importance to uncertainty quantification. This mini-symposium addresses recent advances in numerical analysis in both areas including methods for high-dimensional approximation, reduced-order modeling, adaptive methods, Bayesian inference and stochastic control/optimization.

Organizer: Miroslav Stoyanov
Oak Ridge National Laboratory, USA

Organizer: Guannan Zhang
Oak Ridge National Laboratory, USA

4:00-4:25 Scaling of High Dimensional Function Approximation
Rick Archibald, Oak Ridge National Laboratory, USA

4:30-4:55 Sensitivity and Uncertainty
Hans-Werner Van Wyk, Florida State University, USA; Jeff Borggaard and Vítor Nunes, Virginia Tech, USA

5:00-5:25 The Mixed Finite Element Method for Parameter Identification in Porous Media
Catalin S. Trenchea, University of Pittsburgh, USA

5:30-5:55 Numerical Solutions for Stochastic Stokes Equations with White Noise Loading Terms
Yanzhao Cao, Feng Bao, and Xiaoying Han, Auburn University, USA

Wednesday, July 10

MS77

Recent Advances in Chebfun - Part I of II

4:00 PM-6:00 PM

Room:San Diego

For Part 2 see MS121

Chebfun is a collection of algorithms and an open-source software system in object-oriented MATLAB which extends familiar powerful methods of numerical computation involving numbers to continuous or piecewise-continuous functions. This minisymposium focuses on recent advances in Chebfun. The topics discussed will include the extension of Chebfun to two dimensions, and findings in approximation theory and numerical solution of differential equations, enabled by Chebfun.

Organizer: Asgeir Birkisson
University of Oxford, United Kingdom

4:00-4:25 Chebfun and Approximation Theory
Nick Trefethen, Oxford University, United Kingdom

4:30-4:55 Chebfun2: Extending Chebfun to Two Dimensions
Alex Townsend, University of Oxford, United Kingdom

5:00-5:25 A Spatially Adaptive Iterative Solution of Nonlinear Operator Eigenproblems
Stefan Guettel, University of Manchester, United Kingdom; Elias Jarlebring, KTH Royal Institute of Technology, Sweden

5:30-5:55 Chebfun and Quadrature
Nick Hale, University of Oxford, United Kingdom

Wednesday, July 10

MS78

Computational Methods for Medical Image Reconstruction: Recent Advances and Challenges - Part I of III

4:00 PM-6:00 PM

Room:Garden Salon II

For Part 2 see MS90

Tomographic reconstruction is one of the central topics in medical imaging. Distinct physical models and image properties in different modalities, e.g. CT, MRI, or optical imaging, have posed great challenges in these problems. Over the years, novel techniques have been developed. Exchanging these advances will inspire new ideas and facilitate developments. This minisymposium will bring together mathematicians, engineers, and medical physicists to present the most recent advances in a spectrum of tomographic reconstruction problems. Challenges and potential solutions will also be discussed. It will provide a forum to stimulate discussions and foster collaborations for the further developments of this field.

Organizer: Jianfeng Cai
University of Iowa, USA

Organizer: Xun Jia
University of California, San Diego, USA

Organizer: Hao Gao
Emory University, USA

4:00-4:25 Marriage and Mathematics of Computed Tomography and Magnetic Resonance Imaging
Ge Wang, Rensselaer Polytechnic Institute, USA; Hao Gao, Emory University, USA

4:30-4:55 Towards the Clinical Implementation of Iterative Cone-beam CT Reconstruction for Radiation Therapy using a Multi-GPU System
Xiaoyu Wang, *Hao Yan*, Laura Cervino, Steve Jiang, and Xun Jia, University of California, San Diego, USA

5:00-5:25 Fast Algorithms for Some Inverse Problems in Medical Imaging
Kui Ren, University of Texas at Austin, USA

5:30-5:55 Variable Step Lengths and Line Search for Nonsmooth Image Reconstruction
Xiaojing Ye, Georgia Institute of Technology, USA

Wednesday, July 10

MS79

Mathematical Approaches to Problems Related to our Environment

4:00 PM-6:00 PM

Room:Royal Palm 6

In this minisymposium, we will present results from a workshop dedicated to modeling problems related to our environment. The four problems presented here address the sources that contribute to ozone formation, consider the identification of toxic chemicals, explore the thermal properties of buildings, and predict energy demand in a distributed system. Techniques from a range of mathematical fields are used to attack these problems, and these talks highlight the need for collaboration between industry and mathematicians.

Organizer: Ami Radunskaya
Pomona College, USA

Organizer: Ali Nadim
Claremont Graduate University, USA

4:00-4:25 Next Generation Thermal Management of Buildings
Eun Heui Kim, California State University, Long Beach, USA; Jan M. Baetens, Ghent University, Belgium; Chiu-Yen Kao, Claremont McKenna College, USA; Ali Nadim Nadim, Claremont Graduate University, USA; Remy Friends Ndangali, Amherst College, USA; Ami Radunskaya Radunskaya, Pomona College, USA; Scott Shell, EHDD, USA

4:30-4:55 Using In Vitro Data to Predict Pathway-Based Effects of Environmental Chemicals
Cymra Haskell, University of Southern California, USA

5:00-5:25 Developing Algorithms to Distinguish and Classify Locations Based on Their Weather Sensitivity
Robert Tucker, Southern California Edison, USA

5:30-5:55 Attributing Tropospheric Ozone Formation to Precursor Sources Considering Nonlinear Chemistry
Antonio Palacios, San Diego State University, USA

Wednesday, July 10

CP9

Linear Algebra & Applications II

4:00 PM-5:20 PM

Room:Pacific Salon 7

Chair: David Bindel, Cornell University, USA

4:00-4:15 Nonlinear Gerschgorin Regions and Applications
David Bindel, Cornell University, USA

4:20-4:35 Similarity Reduction to Upper Hessenberg Form
Eugene L. Wachspress, Columbia University, USA

4:40-4:55 A Linear Complexity Structured Selected Inversion for Large Sparse Matrices
Yuanzhe Xi and Jianlin Xia, Purdue University, USA; Stephen Cauley, Massachusetts General Hospital, USA; Venkataramanan Balakrishnan and Xiao Liu, Purdue University, USA

5:00-5:15 A Non-Gap-Revealing Method for Determining Numerical Rank
Tsung-Lin Lee, National Sun Yat-Sen University, Taiwan

Wednesday, July 10

CP10

Numerical PDE I

4:00 PM-6:00 PM

Room:Pacific Salon 6

Chair: Benjamin Seibold, Temple University, USA

4:00-4:15 Gradient-Augmented Schemes for Reinitialization and Other Hamilton-Jacobi Equations
Benjamin Seibold, Temple University, USA

4:20-4:35 Chebyshev Collocation Methods for Hyperbolic Balance Laws with Non-Stationary Singular Source Terms
Jean P. Suarez and Gustaaf Jacobs, San Diego State University, USA

4:40-4:55 Combined Finite-Element, Finite-Volume, and Discrete Event Simulation of Structurally Complex Hydrocarbon Reservoirs
Julian E. Mindel, Roman Manasipov, and Stephan Matthaei, Montan University of Leoben, Austria

5:00-5:15 On the Numerical Integration of Initial-Boundary Value Problem to One Nonlinear Parabolic Equation
Mikheil Tutberidze, Ilia State University, Georgia

5:20-5:35 Fourth-Order Mimetic Finite Difference Modeling of Free Surfaces on Elastic Media
Otilio Rojas, Universidad Central de Venezuela, Venezuela

5:40-5:55 Optimal Error Analysis of Linearized Backward Euler Galerkin Fems for Time-Dependent Nonlinear Joule Heating Equations
Huadong Gao, City University of Hong Kong, Hong Kong

Intermission

6:00 PM-6:15 PM

Wednesday, July 10

SP5

I. E. Block Community Lecture:

From Razor Clams to Robots: The Mathematics Behind Biologically Inspired Design

6:15 PM - 7:15 PM

Room: Town & Country

Chair: Irene Fonseca, Carnegie Mellon University, USA

Many natural systems have evolved to perform certain tasks -- climbing, sensing, swimming -- as perfectly as possible within the limits set by the laws of physics. This observation can be used both to guide engineering design, and to gain insights into the form and function of biological systems. In this talk we will consider both of these themes in the context of crawling snails, digging clams and swimming microorganisms. We will discover how an analysis of the physical principles exploited by snails and clams leads to the development of novel robotic diggers and crawlers, and explore the role of mathematics in the design, control, and assessment of unconventional robotic systems.

Anette Hosoi
Massachusetts Institute of Technology, USA

Community Reception

7:15 PM-8:15 PM

Room:Grand Plaza Fountain Court

Mathematics in Industry Book Series Editorial Board

7:45 PM-9:00 PM

Room:Sunrise

Workshop Celebrating Diversity (WCD) Continues

8:15 PM-9:15 PM

Room:Royal Palm 2

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Thursday, July 11

Education Committee
7:00 AM-8:30 AM

Room:Sunrise

Membership Committee
7:00 AM-8:30 AM

Room:Board Room

Industry Committee
7:00 AM-8:30 AM

Room:Sunset

Registration
8:00 AM-4:30 PM

Room:Atlas Foyer

Remarks
8:25 AM-8:30 AM

Room:Town & Country

IC7

Nonlinear Waves and Patterns: Two Examples
8:30 AM-9:15 AM

Room:Town & Country

Chair: Ricardo Carretero, San Diego State University, USA

Nonlinear waves and patterns are ubiquitous in nature. Surface waves on rivers, lakes and oceans, cloud patterns in the air, crystal structures in materials and animal skin patterns are just a few examples encountered in our everyday lives. The underlying mathematical problems lead to nonlinear systems involving ordinary differential equations or partial differential equations. This talk focuses on the analysis of two kinds of nonlinear waves and patterns. Relying upon techniques from the areas of dynamical systems and bifurcation theory, we shall discuss, on the one hand the dynamics of nonlinear water waves, and on the other hand, the existence of defects, such as dislocations and grain boundaries, in pattern forming systems.

Mariana Haragus
Universite de Franche-Comte, France

IC8

Orthogonal Polynomials and Cubature Rules
8:30 AM-9:15 AM

Room:San Diego

Chair: Diego Dominici, State University of New York, New Paltz, USA

Gaussian quadrature rules are important tools for numerical integration. Their nodes are necessarily zeros of orthogonal polynomials. Does this relation extend to cubature (synonym for quadrature in higher dimension) rules and orthogonal polynomials in several variables? The extension works in some extend, but the relation becomes far more complicated in higher dimension. For starter, it is necessary to consider common zeros of a family of polynomials, or, variety of a polynomial idea, in the language of algebraic geometry. This talk explains what is known about zeros of orthogonal polynomials and cubature rules, mostly restricted to two variables, and it includes several recent examples that provide efficient numerical integration rules.

Yuan Xu
University of Oregon, USA

Thursday, July 11

IP1

Likelihood-based Climate Model Evaluation

9:15 AM-10:00 AM

Room:Town & Country

Chair: Chandrika Kamath, Lawrence Livermore National Laboratory, USA

Climate models can be evaluated by comparing their output to observations. Remote sensing data provide new possibilities for such comparisons because they are spatially and temporally dense enough to go beyond simple moments and estimate distributions. We evaluate climate model fidelity to observations by the likelihood that a summary statistic computed from an observational time series arises from a sampling distribution of that same statistic calculated from a given climate model's time series. We demonstrate using models from the CMIP5 archive and observations from NASA's Atmospheric Infrared Sounder mission.

Amy Braverman
Jet Propulsion Laboratory, California Institute of Technology, USA

Exhibit Hall Open

9:30 AM-4:30 PM

Coffee Break

10:00 AM-10:30 AM

Room:Golden West/California

Thursday, July 11

MS80

Recent Advances in Spatio-temporal Pattern Formation and Nonlinear Waves - Part I of II

10:30 AM-12:30 PM

Room:Town & Country

For Part 2 see MS96

Organized by SIAG/NW

Most of the beauty displayed by natural phenomena arises from a complex interplay between the different constituents of the system under consideration and intrinsic nonlinearities on the medium's response. The goal of this minisymposium is to showcase some of the state-of-the-art results in the fields of pattern formation and nonlinear waves. We will bring together a group of experts that will present results on the current theoretical understanding in these fields. Some of the main topics that we will focus on include the emergence, stability, evolution and interactions of patterns and nonlinear waves from the point of view of dynamical systems and bifurcations. This session was organized to complement invited speaker Mariana Haragus's presentation (see IC7).

Organizer: Ricardo Carretero
San Diego State University, USA

Organizer: Mariana Haragus
Universite de Franche-Comte, France

10:30-10:55 Instability Indices for Matrix Pencils
Todd Kapitula, Elizabeth Hibma, and Hwa-Pyeong Kim, Calvin College, USA; Jonathan Timkovich, University of Michigan, USA

11:00-11:25 Stability and Phase Transition in the Kuramoto Model of Coupled Oscillators
Jared Bronski, University of Illinois at Urbana-Champaign, USA; Lee DeVille, University of Illinois, USA

11:30-11:55 Competitive Instability and Geometric Evolution in Amphiphilic Systems
Keith Promislow and Shibin Dai, Michigan State University, USA; Arjen Doelman, Leiden University, Netherlands; Noa Kraitzman, Michigan State University, USA

12:00-12:25 Colliding Convectons
Edgar Knobloch, University of California, Berkeley, USA; Isabel Mercader, Oriol Batiste, and Arantxa Alonso, Universitat Politecnica de Catalunya, Spain

Thursday, July 11

MS81

Multivariate Orthogonal Polynomials

10:30 AM-12:30 PM

Room:San Diego

Organized by SIAG/OPSF

In the last several years there has been renewed interest in the analysis ofmultivariate orthogonal polynomials and their applications. One area of interest is the extension of the one variable theory of Bernstein-Szego measures to two variables with applications to factorization of positive trigonometric polynomials. Another area is the extension of the one variable Christoffel function theory to multivariables and its application to random matrix theory. A third area deals with multivariable special functions such as the q-analogs of Jacobi functions and bivariate Koornwinder polynomials. This session was organized to complement invited speaker Yuan Xu's presentation (see IC8).

Organizer: Jeffrey S. Geronimo
Georgia Institute of Technology, USA

Organizer: Francisco Marcellan
University of Carlos III of Madrid, Spain

Organizer: Yuan Xu
University of Oregon, USA

10:30-10:55 Polynomials with No Zeros on a Face of the Bidisk
Greg Knese, University of Alabama, USA

11:00-11:25 Christoffel Functions and Universality Limits for Multivariate Orthogonal Polynomials
Doron S. Lubinsky, Georgia Institute of Technology, USA

11:30-11:55 The C-Function Expansion of the Multivariable Basic Hypergeometric Function
Jasper Stokman, University of Amsterdam, Netherlands

12:00-12:25 On Koornwinder Bivariate Orthogonal Polynomials
Miguel Pinar, University of Granada, Spain

Thursday, July 11

MS82

Recent Advances in Nonlinear Optimization

10:30 AM-12:30 PM

Room:Pacific Salon 1

Numerical optimization plays a crucial role in many applications. Vast arrays of scientific and engineering challenges which were previously considered intractable have become feasible – but only when scalable and robust numerical algorithms are available. In this minisymposium, we highlight some recent advances in nonlinear optimization methods. A variety of approaches will be addressed.

Organizer: Roummel F. Marcia
University of California, Merced, USA

Organizer: Elizabeth Wong
University of California, San Diego, USA

10:30-10:55 A Two-Phase Augmented Lagrangian Filter Method
Sven Leyffer, Argonne National Laboratory, USA

11:00-11:25 Primal-Dual Regularized Methods for Nonlinear Programming
Elizabeth Wong and Philip E. Gill, University of California, San Diego, USA

11:30-11:55 Continuous Method Models for Quadratic Programming with Bound Constraints
Li-Zhi Liao, Hong Kong Baptist University, Hong Kong

12:00-12:25 On Solving L-BFGS Trust-Region Subproblems
Jennifer Erway, Wake Forest University, USA; *Roummel F. Marcia*, University of California, Merced, USA

Thursday, July 11

MS83

Mathematical Approaches for Radar Imaging - Part I of II

10:30 AM-12:30 PM

Room:Pacific Salon 2

For Part 2 see MS99

Radar imaging is an area rich in mathematics; from the propagation of the electromagnetic waves to the inverse problems whose solutions are the images themselves and finally the processing and analysis of these images to obtain information on the underlying content of the data collected. While the engineering community has pioneered much of the work in this field, the open challenges are highly mathematical in nature. This minisymposium will demonstrate the utility of many areas of mathematics and introduce innovative work in the field for a broad number of applications and radar modalities.

Organizer: Kaitlyn Voccola
Colorado State University, USA

Organizer: Margaret Cheney
Colorado State University and Naval Postgraduate School, USA

10:30-10:55 Statistical and Analytical Techniques in Synthetic Aperture Radar Imaging
Kaitlyn Voccola, Colorado State University, USA

11:00-11:25 Radar Waveform Design
Ali Pezeshki, Colorado State University, USA

11:30-11:55 Sensor Geometry
William Moran, University of Melbourne, Australia

12:00-12:25 Radar Imaging Work at MIT Lincoln Laboratory
Heather Palmeri, Massachusetts Institute of Technology, USA

Thursday, July 11

MS84

Stochastic Model, Uncertainty Quantification and Stochastic Inversion - Part III of VI

10:30 AM-12:30 PM

Room:Pacific Salon 3

For Part 2 see MS71
For Part 4 see MS100

Uncertainty is everywhere, from material discovery to reactive transport in porous media. Quantifying the uncertainty associated with the parameters in complex systems is critical, which can help us to verify our modern simulation codes and assess confidence levels. Our aim is to use accurate computational simulations to predict the behavior of complex systems. For large number of random dimensions, advanced stochastic approximation techniques are necessary to minimize the complexity of mathematical models. This minisymposium will explore recent advances in numerical algorithms and applications for uncertainty quantification, model reduction, and stochastic inversion in large-scale high-dimensional complex systems.

Organizer: George E. Karniadakis
Brown University, USA

Organizer: Mihai Anitescu
Argonne National Laboratory, USA

Organizer: Karen E. Willcox
Massachusetts Institute of Technology, USA

Organizer: Omar Ghattas
University of Texas at Austin, USA

Organizer: Guang Lin
Pacific Northwest National Laboratory, USA

10:30-10:55 CDF Solutions of Nonlinear Hyperbolic Equation with Uncertain Parameters
Peng Wang, Alexandre M. Tartakovsky, and Kenneth D. Jarman, Pacific Northwest National Laboratory, USA; Daniel M. Tartakovsky, University of California, San Diego, USA

continued on next page

11:00-11:25 Bayesian Treed Multivariate Gaussian Process for Uncertainty Quantification
Guang Lin, Bledar Konomi, and Georgios Karagiannis, Pacific Northwest National Laboratory, USA

11:30-11:55 Improved Diffusion Monte Carlo for Quantum Monte Carlo, Rare Event Simulation, Data Assimilation, and More
Jonathan Weare, University of Chicago, USA; Martin Hairer, University of Warwick, United Kingdom

12:00-12:25 Fast Linear Algebra for Stochastic Inversion in Large-Scale High-Dimensional Complex Systems
Sivaram Ambikasaran and Eric F. Darve, Stanford University, USA

Thursday, July 11

MS85

Sensitivity Analysis and Uncertainty Quantification in Chaotic Systems - Part I of II

10:30 AM-12:30 PM

Room:Royal Palm 1

For Part 2 see MS101
Sensitivity analysis and uncertainty quantification in chaotic systems have applications in fluid dynamics, climate, molecular dynamics, etc. It presents fundamental mathematical challenges. One such challenge is due to the sensitivity and ill-conditioning in simulating chaotic systems. This minisymposium combines researchers from various institutions, presenting their current progress towards efficient sensitivity analysis and uncertainty quantification of chaotic dynamical systems. These research activities are motivated by a broad variety of applications including large eddy simulations, climate system and molecular dynamics simulations.

Organizer: Qiqi Wang
Massachusetts Institute of Technology, USA

Organizer: Robert D. Moser
University of Texas at Austin, USA

Organizer: Paul Constantine
Stanford University, USA

10:30-10:55 Challenges in Sensitivity Analysis and Uncertainty Quantification of Chaotic Systems
Qiqi Wang, Massachusetts Institute of Technology, USA

11:00-11:25 Estimating Uncertainties in Statistics Computed from Simulations of Chaotic Systems
Todd Oliver and Robert D. Moser, University of Texas at Austin, USA

11:30-11:55 Multi-Level Dynamical Systems: Connecting the Ruelle Response Theory and the Mori-Zwanzig Approach
Valerio Lucarini, Universitat Hamburg, Germany

12:00-12:25 Towards Least Squares Sensitivity Analysis of Chaotic Fluid Flows
Patrick Blonigan and Qiqi Wang, Massachusetts Institute of Technology, USA

Thursday, July 11

MS86

Computational Approaches to Mathematical Modeling and Analysis of Biological Systems

10:30 AM-12:30 PM

Room:Royal Palm 2

Part of the SIAM Workshop Celebrating Diversity

Modeling and analysis of biological systems has become a central component of applied mathematics. This has allowed mathematicians to develop interesting computational tools used to address specific questions about the dynamic properties of biological processes. This minisymposium presents several computational studies of molecular networks associated to the immune response, natural selection, and population genetics. The speakers will highlight how they constructed and analyzed their models by focusing on the mathematical approaches and computational challenges they have encountered in their interdisciplinary work.

Organizer: Anael Verdugo
Virginia Tech, USA

Organizer: Illya Hicks
Rice University, USA

Organizer: Cristina Villalobos
University of Texas - Pan American, USA

Organizer: Stephen Wirkus
Arizona State University, USA

10:30-10:55 Dynamics of an mRNA-Protein Model with Delay
Anael Verdugo, Virginia Tech, USA

11:00-11:25 Computational and Statistical Models for Detecting Natural Selection in Humans
Emilia Huerta-Sanchez, University of California, Berkeley, USA

11:30-11:55 Immunity Consequences of Crispr-Induced Host-Viral Co-Evolution
Lauren Childs, Harvard University, USA

12:00-12:25 A Multi-Scale Mathematical Model of Aspergillus Fumigatus in the Airway
Reinhard Laubenbacher, Virginia Bioinformatics Institute, USA

Thursday, July 11

MS87

Mimetic Discretization Methods - Part II of II

10:30 AM-12:00 PM

Room:Royal Palm 3

For Part 1 see MS74

Mimetic discretizations or compatible discretizations have been a recurrent search in the history of numerical methods for solving partial differential equations with variable degree of success. There are many researches currently active in this area pursuing different approaches to achieve this goal and many algorithms have been developed along these lines. Loosely speaking, "mimetic" or "compatible" algebraic methods have discrete structures that mimic vector calculus identities and theorems. In this session we present theoretical aspects of different approaches to develop mimetic/compatible discretizations schemas as well as some application in different areas of interest.

Organizer: José E. Castillo

San Diego State University, USA

10:30-10:55 Low Dispersive Mimetic Modeling of Rayleigh Waves on Partly Staggered Grids

Otilio Rojas, Universidad Central de Venezuela, Venezuela; Beatriz Otero, Universitat Politecnica de Catalunya, Spain; Jose Castillo, San Diego State University, USA

11:00-11:25 Finite Difference Modeling of Rupture Propagation under Velocity-dependent and Thermal Weakening Processes

Sergio Rivas, Adelis Nieves, and Otilio Rojas, Universidad Central de Venezuela, Venezuela; Steven Day, San Diego State University, USA

11:30-11:55 High-Order Mimetic Modelling of 3D Surface Waves

Josep de La Puente, Barcelona Supercomputing Center, Spain; José E. Castillo, San Diego State University, USA; Miguel Ferrer and Jose Maria Cela, Barcelona Supercomputing Center, Spain

Thursday, July 11

MS88

Numerical Methods for Phase Field Models

10:30 AM-12:30 PM

Room:Royal Palm 5

Phase field models have been used to describe a variety of interfacial problems by exchanging boundary conditions at domain interfaces for partial differential equations that provide evolution. They have been particularly effective in bridging gaps in length and time scales, making it possible to accurately simulate physics on realistic domains in space and time. The purpose of this minisymposium is to propose and improve numerical methods for solving the PDEs associated with modern phase field models.

Organizer: Jaylan S. Jones

Michigan State University, USA

Organizer: Zhengfu Xu

Michigan Technological University, USA

10:30-10:55 A High-Performance Solution to the Functionalized Cahn-Hilliard Equation

Jaylan S. Jones, Andrew Christlieb, and Keith Promislow, Michigan State University, USA

11:00-11:25 A Gradient Stable Numerical Method For The Functionalized Cahn-Hilliard Equation

Zhengfu Xu, Michigan Technological University, USA

11:30-11:55 Second-order Convex Splitting Schemes for the Periodic Nonlocal Cahn-Hilliard and Allen-Cahn Equations

Zhen Guan, University of California, Irvine, USA; Steven Wise, University of Tennessee, USA; Cheng Wang, University of Massachusetts, Dartmouth, USA; John Lowengrub, University of California, Irvine, USA

12:00-12:25 A Thermodynamically Consistent Algorithm for Liquid-Vapour Phase Transition

Ju Liu, University of Texas at Austin, USA; Hector Gomez, University of A Coruña, Spain; John Evans, Thomas Hughes, and Chad Landis, University of Texas at Austin, USA

Thursday, July 11

MS89

Establishing a Professional Presence in the Online World: Unraveling the Mysteries of Social Media and More

10:30 AM-12:30 PM

Room:Garden Salon I

The goal of this minisymposium is to educate the SIAM community, both young and old, about becoming more engaged in the online world. The session will cover a variety of topics from maintaining an online publication list to blogging and tweeting. It will also introduce SIAM's new online community platform.

Organizer: Tamara G. Kolda

Sandia National Laboratories, USA

Organizer: Nicholas J. Higham

University of Manchester, United Kingdom

10:30-10:55 Maintaining An Online Publication List

Tamara G. Kolda, Sandia National Laboratories, USA

11:00-11:25 Tools for Social Media

David F. Gleich, Purdue University, USA

11:30-11:55 More Tools for Social Media

Nicholas J. Higham, University of Manchester, United Kingdom

12:00-12:25 SIAM's New Online Community Platform

Karthika Muthukumaraswamy, SIAM, USA

Thursday, July 11

MS90

Computational Methods for Medical Image Reconstruction: Recent Advances and Challenges - Part II of III

10:30 AM-12:30 PM

Room:Garden Salon II

For Part 1 see MS78
For Part 3 see MS107

Tomographic reconstruction is one of the central topics in medical imaging. Distinct physical models and image properties in different modalities, e.g. CT, MRI, or optical imaging, have posed great challenges in these problems. Over the years, novel techniques have been developed. Exchanging these advances will inspire new ideas and facilitate developments. This minisymposium will bring together mathematicians, engineers, and medical physicists to present the most recent advances in a spectrum of tomographic reconstruction problems. Challenges and potential solutions will also be discussed. It will provide a forum to stimulate discussions and foster collaborations for the further developments of this field.

Organizer: Jianfeng Cai
University of Iowa, USA

Organizer: Xun Jia
University of California, San Diego, USA

Organizer: Hao Gao
Emory University, USA

10:30-10:55 Adaptive Algorithms for Accelerated Dynamic MRI
Mathews Jacob and Sajan Goud Lingala, University of Iowa, USA

11:00-11:25 Investigation of Iterative Image Reconstruction for X-Ray Phase-Contrast Imaging
Mark Anastasio, Qiaofeng Xu, Huifeng Guan, and Trey Garson, Washington University in St. Louis, USA

11:30-11:55 Dose Shaping and Carving - Utilizing Sparsity and Learning
Dan Ruan, George Sayre, Patrick Kupelian, and Daniel Low, University of California, Los Angeles, USA

12:00-12:25 Source Recovery in RTE-based Bioluminescent Tomography
Tianyi Zhang, Jianfeng Cai, and Weimin Han, University of Iowa, USA

Thursday, July 11

MS91

Recent Developments in Numerical Methods for PDEs - Part I of IV

10:30 AM-12:30 PM

Room:Windsor

For Part 2 see MS111

Partial Differential Equations play an important role in the mathematical modeling of real life applications. Very often, the solution to these equations can only be obtained by the use of appropriate numerical schemes. Consequently, there is a need for the design of accurate and computationally efficient methods that can serve as a reliable tool in mathematical modeling. Recent progress and open questions in the area will be discussed. Talks may address theoretical and computational aspects of the numerical methods, as well as different applications arising from biomedical problems, geophysical flows, and Material Sciences problems.

Organizer: Yekaterina Epshteyn
University of Utah, USA

Organizer: Fengyan Li
Rensselaer Polytechnic Institute, USA

10:30-10:55 Algorithms Composition Approach Based on Difference Potentials Method
Yekaterina Epshteyn, University of Utah, USA

11:00-11:25 A Loosely Coupled Scheme for Fluid Structure-Structure Interaction with Application to Blood Flow
Suncica Canic, University of Houston, USA; Martina Bukac, University of Pittsburgh, USA; B. Muha, University of Zagreb, Croatia

11:30-11:55 Solving PDEs in Dynamic, Complex Geometries: The Diffuse Domain Method
John Lowengrub, University of California, Irvine, USA

12:00-12:25 Title Not Available at Time of Publication
Xiangxiong Zhang, Massachusetts Institute of Technology, USA

Thursday, July 11

MS92

Stochastic Analysis, Control and Computation of Fluid Dynamics and other Physical Phenomena - Part I of IV

10:30 AM-12:30 PM

Room:Hampton

For Part 2 see MS109

Stochastic analysis, control and computation of nonlinear infinite dimensional systems such as fluid flow systems and other systems modeled by PDEs have seen substantial growth in the past two decades due to its importance in science and engineering. These developments have the potential to impact a number of domestic and defense industries. With many unsettled issues and problems remaining, the need for new methods and techniques is emerging. The aim of this minisymposium is to bring together leading experts and junior researchers who work in this area with an emphasis on control of fluids and other physical phenomena to present recent advances, to address current challenges, and to identify new directions.

Organizer: S.S. Ravindran
University of Alabama, Huntsville, USA

Organizer: Meng Xu
Rockefeller University, USA

Organizer: Nathan D. Moshman
Naval Postgraduate School, USA

10:30-10:55 Well-Posedness of Supersonic and Transonic Characteristic Discontinuities in Two-Dimensional Steady Compressible Euler Flows
Vaibhav Kukreja, Naval Postgraduate School, USA

11:00-11:25 Identifying Random Parameters Through Parallel Inversion
Hans-Werner Van Wyk, Florida State University, USA; Kevin Pond, Air Force Institute of Technology, USA; Jeff Borggaard, Virginia Tech, USA

11:30-11:55 Optimally Controlling Unsteady Shock Waves
Nathan D. Moshman, Naval Postgraduate School, USA

12:00-12:25 Relaminarization of Turbulent Channel Flow by Pre-determined Control
Koji Fukagata, Keio University, Japan

Thursday, July 11

MS93

Algorithms, Libraries and Frameworks for Scalable Manycore Computations - Part I of II

10:30 AM-12:30 PM

Room:Sheffield

For Part 2 see MS124

The new commodity performance curves in high performance computing are tied to intra- processor concurrency. It is widely recognized that careful design of software and data structures, with effective memory management and communication optimizations are the most critical issues for optimal performance on scalable manycore systems. Application and library software developers are making progress analyzing how to effectively use clusters of such processors and some general approaches have emerged. In this pair of minisymposia we discuss current experiences and development of applications, libraries and frameworks using a variety of hardware. Speakers will address performance results and software design.

Organizer: Michael A. Heroux
Sandia National Laboratories, USA

Organizer: Serge G. Petiton
CNRS/LIFL and INRIA, France

Organizer: Kengo Nakajima
University of Tokyo, Japan

10:30-10:55 Exploiting Trends in Emerging Manycore Processors
Michael A. Heroux, Sandia National Laboratories, USA

11:00-11:25 Multifrontal Sparse QR Factorization on a GPU
Timothy A. Davis, Sanjay Ranka, Sencer Nuri Yeralan, and Helia Zandi, University of Florida, USA; Sharanyan Chetlur, NVIDIA, USA

11:30-11:55 Streaming Singular Value Computations on GPU Platforms
Christopher G. Baker, Oak Ridge National Laboratory, USA

12:00-12:25 KokkosArray: Multidimensional Arrays for Manycore Performance-Portability
H. Carter Edwards, Sandia National Laboratories, USA

Thursday, July 11

MS94

Methods for Option Pricing and Investment

10:30 AM-12:30 PM

Room:Brittany

Numerical methods are used for pricing American options. Two main approaches are PDE and tree based methods. A binomial tree method is suggested with an improved convergence rate. Efficient time discretizations for PDEs are studied under regime switching and jump-diffusion models. For long term investments, the properties of utility optimization problems are considered.

Organizer: Jari Toivanen
Stanford University, USA

Organizer: Zhijian Wu
University of Alabama, USA

10:30-10:55 Utility Optimization and Turnpike Properties for Long Term Investments
Baojun Bian, Tongji University, China

11:00-11:25 Improved Convergence Order of Binomial Tree Methods for Pricing American Options
Jingtang Ma, Southwestern University of Finance and Economics, China

11:30-11:55 Efficient Exponential Time Differencing Methods for the Valuation of American Options with Multi-State Regime Switching
Muhammad Yousuf, King Fahd University of Petroleum and Minerals, Saudi Arabia; Ruihua Liu, University of Dayton, USA; *Abdul M. Khaliq*, Middle Tennessee State University, USA

12:00-12:25 Implicit-Explicit Time Discretizations for Option Pricing under Jump-Diffusion Models
Santtu Salmi, University of Jyvaskyla, Finland; *Jari Toivanen*, Stanford University, USA

Thursday, July 11

MS95

Fluid-Structure Interactions: Applications and Advances in Numerical Methods - Part I of II

10:30 AM-12:30 PM

Room:Royal Palm 4

For Part 2 see MS104

Interesting phenomena involving fluid-structure interactions arises in physical systems spanning scales from the macroscopic to the microscopic. A fundamental challenge is to develop useful descriptions that capture essential physical features while being tractable for computation and amenable to analysis. In this session speakers will present recent results on progress in this area and interesting related applications.

Organizer: Yaohong Wang
University of California, Santa Barbara, USA

Organizer: Paul J. Atzberger
University of California, Santa Barbara, USA

10:30-10:55 Stochastic Eulerian Lagrangian Methods for Fluid-Structure in Confined Geometry
Yaohong Wang and Paul J. Atzberger, University of California, Santa Barbara, USA

11:00-11:25 Kinetic Density Functional Theory of Freezing
Arvind Baskaran, University of California, Irvine, USA; Aparna Baskaran, Brandeis University, USA; John Lowengrub, University of California, Irvine, USA

11:30-11:55 Fluctuating Hydrodynamics Thermostats for Dynamic Studies of Soft Materials Using Implicit-Solvent Coarse-Grained Models
Paul J. Atzberger, University of California, Santa Barbara, USA

12:00-12:25 Locomotion of Helical Bodies in Viscoelastic Fluids
Saverio E. Spagnolie, University of Wisconsin, USA; Bin Liu and Thomas R. Powers, Brown University, USA

Thursday, July 11

CP11

Geosciences I

10:30 AM-12:10 PM

Room:Pacific Salon 6

Chair: Prabir Daripa, Texas A&M University, USA

10:30-10:45 On the Stability of Perfectly Matched Layer for the Wave Equation in Heterogeneous and Layered Media
Kenneth Duru, Stanford University, USA

10:50-11:05 Numerical Evidence of Extreme Diffusive Stabilization in Immiscible Models of Chemical Enhanced Oil Recovery
Prabir Daripa, Texas A&M University, USA

11:10-11:25 3D Underwater Acoustical Imaging with Contrast Source Inversion Technique
Ibrahim Akduman, Istanbul Technical University, Turkey; *Hulya Sahinturk*, Yildiz Technical University, Turkey

11:30-11:45 A Model for the Freezing of a Porous Media Saturated by An Aqueous Solution
Michael Chapwanya, University of Pretoria, South Africa

11:50-12:05 Modeling Surface Currents in The Eastern Levantine Mediterranean
Leila Issa, Lebanese American University, Lebanon; Julien Brajard, Universite de Paris VI, France

Thursday, July 11

CP12

Life Sciences I

10:30 AM-12:30 PM

Room:Pacific Salon 7

Chair: Amanda L. Traud, North Carolina State University, USA

10:30-10:45 A Stochastic Model for *Escherichia Coli* 157:H7 Infection in Cattle
Xueying Wang, Texas A&M University, USA; Linda J. S. Allen, Texas Tech University, USA; Renata Ivanek, Raju Gautam, and Pablo Pinedo, Texas A&M University, USA

10:50-11:05 Periodicity of An Arizona Tiger Salamander Population
Maeve L. McCarthy, Murray State University, USA

11:10-11:25 Predicting the Maximum Per Capita Rate of Population Growth for Shorebirds
Yanthe E. Pearson and Elise Larsen, University of Maryland, College Park, USA; Emma Goldberg, University of Illinois, Chicago, USA; Bill Fagan, University of Maryland, College Park, USA; Cagan Sekercioglu, Stanford University, USA

11:30-11:45 Ant-Isocial Dynamics: Studying Ant Social Network Accumulation
Amanda L. Traud, North Carolina State University, USA

11:50-12:05 Mussel/Oyster Population Dynamics and Control
Daniel L. Kern and Matthew Neubek, Florida Gulf Coast University, USA

12:10-12:25 A Mathematical Model for Eradication of the Screwworm Fly by Sterile Insect Release Method
John G. Alford, Sam Houston State University, USA

Thursday, July 11

CP13

Models of Materials

10:30 AM-11:50 AM

Room:Royal Palm 6

Chair: Eva M. Strawbridge, James Madison University, USA

10:30-10:45 A Model for Transient Evolution of a Material with Complex Microstructure from Elastic Deformation to Flow
Holly Timme and Yuriko Renardy, Virginia Tech, USA

10:50-11:05 Noise Induced Oscillations and Coherent Stochastic Resonance in a Generic Model of the Nonisothermal Minimal Chemical Oscillator
David S. Simakov and Juan Perez-Mercader, Harvard University, USA

11:10-11:25 Surface Traction and the Dynamics of Elastics Rods at Low Reynolds Number
Eva M. Strawbridge, James Madison University, USA; Charles Wolgemuth, University of Arizona, USA

11:30-11:45 Mathematical Modeling of Transverse Shear Deformation Thick Shell Theory
Leela Rakesh and *Mohammad Zannon*, Central Michigan University, USA; Mohamad Qatu, Carnegie Mellon University, USA

Thursday, July 11

CP14

Numerical Methods in PDE II

10:30 AM-12:30 PM

Room:Eaton

Chair: Shivkumar Chandrasekaran, University of California, Santa Barbara, USA

10:30-10:45 Hp Finite Element Method for Linear Dispersive Waves
Duncan A. Mcgregor, Vrushali A. Bokil, and Nathan L. Gibson, Oregon State University, USA; Pavel Solin, University of Nevada, Reno, USA

10:50-11:05 On the Accuracy and Stability of a Higher-Order Compact Scheme for Elastic Wave Equation
Wenyuan Liao, University of Calgary, Canada

11:10-11:25 A Minimum Sobolev Norm Technique for the Numerical Solution of PDEs
Shivkumar Chandrasekaran, University of California, Santa Barbara, USA

11:30-11:45 Semilinear Elliptic PDE on Manifolds
Daryl J. Springer, Arizona State University, USA

11:50-12:05 A Balancing Domain Decomposition Method by Constraints for Raviart-Thomas Vector Fields
Duk-Soon Oh, Louisiana State University, USA; Olof B. Widlund, Courant Institute of Mathematical Sciences, New York University, USA; Clark R. Dohrmann, Sandia National Laboratories, USA

12:10-12:25 Application of Fft-Recursive-Relation Based Hybrid Fast Algorithms to Computing Interfacial Flows
JoungDong Kim and Prabir Daripa, Texas A&M University, USA

Thursday, July 11

SIAG Chairs Meeting

12:30 PM-2:00 PM

Room:Sunrise

Workshop Celebrating Diversity (WCD) Luncheon (by invitation only)

12:30 PM-2:00 PM

Room:Tiki Pavillion

Lunch Break

12:30 PM-2:00 PM

Attendees on their own

Thursday, July 11

IP2

Correlation and Causality

2:00 PM-2:45 PM

Room:Town & Country

Chair: Hiroshi Kokubu, Kyoto University, Japan

While everyone knows Berkeley's 1710 dictum "correlation does not imply causation" few realize that the converse "causation does not imply correlation" is also true. This conundrum runs counter to deeply ingrained heuristic thinking that is at the basis of modern science. Ecosystems are particularly perverse on this issue by exhibiting mirage correlations that can continually cause us to rethink relationships we thought we understood. Identifying causal networks is important for effective policy and management recommendations on climate, epidemiology, financial regulation, and much else. Here we introduce a method based on Taken's theorem that can distinguish causality from correlation in dynamical systems. It is a radically different empirical approach for leveraging time series information from complex systems of interacting parts.

George Sugihara
University of California, San Diego, USA

Intermission

2:45 PM-3:00 PM

Thursday, July 11

SP6

James H. Wilkinson Prize Lecture: Interpolative Decomposition and Novel Operator Factorizations

3:00 PM-3:30 PM

Room:Town & Country

Chair: Irene Fonseca, Carnegie Mellon University, USA

I will discuss some recent results on developing new factorizations for matrices obtained from discretizing differential and integral operators. A common ingredient of these new factorizations is the interpolative decomposition for numerically low-rank matrices. As we shall see, these factorizations offer efficient algorithms for applying and inverting these operators. This is a joint work with Kenneth Ho.

Lexing Ying
Stanford University, USA

Coffee Break

3:30 PM-4:00 PM

Room:Golden West/California

Thursday, July 11

MS96

Recent Advances in Spatio-temporal Pattern Formation and Nonlinear Waves - Part II of II

4:00 PM-6:00 PM

Room:Town & Country

For Part 1 see MS80
Organized by SIAG/NW

Most of the beauty displayed by natural phenomena arises from a complex interplay between the different constituents of the system under consideration and intrinsic nonlinearities on the medium's response. The goal of this minisymposium is to showcase some of the state-of-the-art results in the fields of pattern formation and nonlinear waves. We will bring together a group of experts that will present results on the current theoretical understanding in these fields. Some of the main topics that we will focus on include the emergence, stability, evolution and interactions of patterns and nonlinear waves from the point of view of dynamical systems and bifurcations. This session was organized to complement invited speaker Mariana Haragus's presentation (see IC7).

Organizer: Ricardo Carretero
San Diego State University, USA

Organizer: Mariana Haragus
Universite de Franche-Comte, France

4:00-4:25 Wavenumber Selection in the Wake of Fronts
Arnd Scheel, University of Minnesota, Minneapolis, USA

4:30-4:55 Spectral Stability Properties of Periodic Traveling Waves in the Sine-Gordon Equation
Peter D. Miller, University of Michigan, Ann Arbor, USA

5:00-5:25 Vortex Swarms
Theodore Kolokolnikov, Dalhousie University, Canada

5:30-5:55 On the Instability of Periodic Wave Trains in the Whitham Equation
Mathew Johnson, University of Kansas, USA; Vera Mikyoung Hur, University of Illinois at Urbana-Champaign, USA

Thursday, July 11

MS97

Inference in Climate Studies

4:00 PM-6:00 PM

Room:San Diego

This minisymposium focuses on making inferences about present and future climate from modern observational data sources. These data sources are usually large and complex, requiring careful statistical modeling to represent sources of uncertainty relative to the underlying processes being investigated. In some cases the underlying process of interest is not necessarily the true geophysical process, but rather a representation of it produced by a climate model. These talks highlight four areas of active research for which the conclusions and their associated uncertainties have important scientific and societal implications. This session was organized to complement invited speaker Amy Braverman's presentation (see IP1).

Organizer: Amy Braverman
Jet Propulsion Laboratory, California Institute of Technology, USA

4:00-4:25 Inferential Uncertainty Introduced by Biased Or Missing Observations
Tao Shi, Ohio State University, USA

4:30-4:55 Projecting Future Climate Based on Model-Observation Consistency in the Past
Dorit Hammerling, Statistical and Applied Mathematical Sciences Institute, USA; Esther Salazar, Duke University, USA; Bruno Sanso, University of California, Santa Cruz, USA; Andrew Finley, Michigan State University, USA; Xia Wang, University of Cincinnati, USA

5:00-5:25 Influence of Climate Change on Extreme Weather Events
Richard Smith, Statistical and Applied Mathematical Sciences Institute, USA

5:30-5:55 Uncertainty Quantification for Regional Climate Change Projection
Emily L. Kang, University of Cincinnati, USA; Noel Cressie, University of Wollongong, Australia

Thursday, July 11

MS98

AMS Minisymposia on Complexity and the Foundations of Numerical Computation - Part I of III

4:00 PM-6:00 PM

Room:Pacific Salon 1

For Part 2 see MS114

Sponsored by the American Mathematical Society

This session will address some fundamental questions about numerical computations: what can be computed efficiently? Are there intrinsically hard problems? One way to measure the cost of numerical computations is to count the number of arithmetic operations. In that setting, known hardness results are related to computational algebraic geometry problems. The main topics for this workshop are: Complexity theory of real number algorithms. Complexity of numerical methods. Computational Algebraic Geometry. Numerical Nonlinear Equation Solving. This session was organized to complement invited AMS speaker Michael Shub's presentation (see IP3).

Organizer: Gregorio Malajovich

Universidade Federal do Rio De Janeiro, Brazil

Organizer: Luis Miguel Pardo

Universidad de Cantabria, Spain

4:00-4:25 How Much does it Cost to Find Eigenvalues of Matrices?

Michael Shub, IMAS, CONICET, Argentina and Graduate School of CUNY

4:30-4:55 Phase Transitions in Convex Geometry and Optimization: the Statistical Dimension and Applications

Martin Lotz, University of Manchester, United Kingdom

5:00-5:25 Phase Transitions in Convex Geometry and Optimization: Geometric Foundations

Dennis Ameluxen, Cornell University, USA

5:30-5:55 Numerical Homotopy Tracking for Determinantal Representations of Hyperbolic Curves

Anton Leykin, Georgia Institute of Technology, USA

Thursday, July 11

MS99

Mathematical Approaches for Radar Imaging - Part II of II

4:00 PM-5:30 PM

Room:Pacific Salon 2

For Part 1 see MS83

Radar imaging is an area rich in mathematics; from the propagation of the electromagnetic waves to the inverse problems whose solutions are the images themselves and finally the processing and analysis of these images to obtain information on the underlying content of the data collected. While the engineering community has pioneered much of the work in this field, the open challenges are highly mathematical in nature. This minisymposium will demonstrate the utility of many areas of mathematics and introduce innovative work in the field for a broad number of applications and radar modalities.

Organizer: Kaitlyn Voccola

Colorado State University, USA

Organizer: Margaret Cheney

Colorado State University and Naval Postgraduate School, USA

4:00-4:25 Is a Curved Flight Path in SAR better than a Straight One?

Plamen Stefanov, Purdue University, USA

4:30-4:55 Radar Imaging through Dispersive Media

Jose Hector Morales Barcenas, Metropolitan Autonomous University, Mexico

5:00-5:25 A Multiscale Approach to Synthetic Aperture Radar in Dispersive Random Media

Knut Solna, University of California, Irvine, USA

Thursday, July 11

MS100

Stochastic Model, Uncertainty Quantification and Stochastic Inversion - Part IV of VI

4:00 PM-6:00 PM

Room:Pacific Salon 3

For Part 3 see MS84
For Part 5 see MS116

Uncertainty is everywhere, from material discovery to reactive transport in porous media. Quantifying the uncertainty associated with the parameters in complex systems is critical, which can help us to verify our modern simulation codes and assess confidence levels. Our aim is to use accurate computational simulations to predict the behavior of complex systems. For large number of random dimensions, advanced stochastic approximation techniques are necessary to minimize the complexity of mathematical models. This minisymposium will explore recent advances in numerical algorithms and applications for uncertainty quantification, model reduction, and stochastic inversion in large-scale high-dimensional complex systems.

Organizer: George E. Karniadakis

Brown University, USA

Organizer: Mihai Anitescu

Argonne National Laboratory, USA

Organizer: Karen E. Willcox

Massachusetts Institute of Technology, USA

Organizer: Omar Ghattas

University of Texas at Austin, USA

Organizer: Guang Lin

Pacific Northwest National Laboratory, USA

4:00-4:25 Metastability and Coarse-Graining of Stochastic System

Jianfeng Lu, Duke University, USA; Eric Vanden-Eijnden, Courant Institute of Mathematical Sciences, New York University, USA

4:30-4:55 An Explicit Cross-Entropy Scheme for Mixtures

Hui Wang, Brown University, USA; Xiang Zhou, City University of Hong Kong, Hong Kong

continued on next page

5:00-5:25 Sparse Surrogate Model Construction Via Compressive Sensing for High-Dimensional Complex Models
Khachik Sargsyan, Cosmin Safta, Bert J. Debusschere, and Habib N. Najm, Sandia National Laboratories, USA

5:30-5:55 Uncertainty Quantification in Molecular and Mesoscopic System
Xiu Yang, Huan Lei, and George E. Karniadakis, Brown University, USA

Thursday, July 11

MS101

Sensitivity Analysis and Uncertainty Quantification in Chaotic Systems - Part II of II

4:00 PM-6:00 PM

Room:Royal Palm 1

For Part 1 see MS85

Sensitivity analysis and uncertainty quantification in chaotic systems have applications in fluid dynamics, climate, molecular dynamics, etc. It presents fundamental mathematical challenges. One such challenge is due to the sensitivity and ill-conditioning in simulating chaotic systems. This minisymposium combines researchers from various institutions, presenting their current progress towards efficient sensitivity analysis and uncertainty quantification of chaotic dynamical systems. These research activities are motivated by a broad variety of applications including large eddy simulations, climate system and molecular dynamics simulations.

Organizer: Qiqi Wang
Massachusetts Institute of Technology, USA

Organizer: Robert D. Moser
University of Texas at Austin, USA

Organizer: Paul Constantine
Sandia National Laboratories, USA

4:00-4:25 How Well Does Polynomial Chaos Model Chaos?
Paul Constantine, Stanford University, USA

4:30-4:55 Hybrid (adjoint/ensemble) Uncertainty Quantification Methods for Data Assimilation and Adaptive Observation of Environmental Plumes
Thomas Bewley, University of California, San Diego, USA

5:00-5:25 Continuum Heat Transfer Constitutive Laws with Quantified Uncertainty Extracted from Atomistic Simulations Using Bayesian Inference
Jeremy Templeton, Sandia National Laboratories, USA

5:30-5:55 Optimal Maps for Data Assimilation in Nonlinear Chaotic Systems
Tarek Moselhy and Youssef M. Marzouk, Massachusetts Institute of Technology, USA

Thursday, July 11

MS102

Numerical Models in Applied Problems

4:00 PM-6:00 PM

Room:Royal Palm 2

Part of the SIAM Workshop Celebrating Diversity

Differential equations play an integral part in solving equations and in modeling phenomena. This session will discuss photoreceptor degeneration in zebrafish, the discrete empirical interpolation method for model reduction of nonlinear dynamical systems, methods to solve the Kadomtsev-Petviashvili Equation, and linear temporal instability of models in electrically forced jets.

Organizer: Cristina Villalobos
University of Texas - Pan American, USA

Organizer: Illya Hicks
Rice University, USA

Organizer: Stephen Wirkus
Arizona State University, USA

4:00-4:25 A Model of Photoreceptor Degeneration in Zebrafish Via a Cone Mutation
Stephen Wirkus, Arizona State University, USA

4:30-4:55 Automating and Stabilizing the Discrete Empirical Interpolation Method for Nonlinear Model Reduction
Russell Carden, Rice University, USA

5:00-5:25 An Exact Solution Formula for the Kadomtsev-Petviashvili Equation
Alicia Machuca, University of Texas at Arlington, USA

5:30-5:55 Resonant Instability and Nonlinear Wave Interactions in Electrically Forced Jets
Saulo Orizaga, Iowa State University, USA

Thursday, July 11

MS103

Special Functions: Applications and Numerical Aspects - Part I of II

4:00 PM-6:00 PM

Room:Royal Palm 3

For Part 2 see MS119
Organized by SIAG/OPSF

Recent activities in the computation of special functions will be reviewed with special attention to a new project of NIST and the University of Antwerp concerning the computation of accurate function values with a tables-on-demand capability for a subset of real functions in the NIST DLMF. New methods will be discussed for computing integrals and solutions of differential equations, with attention to special functions. Application areas are problems from mathematical physics, but also certain cumulative distribution functions arising in probability theory and mathematical statistics. The role of symbolic computations in software design for special functions will be considered as well.

Organizer: Nico M. Temme
Centrum voor Wiskunde en Informatica, The Netherlands

Organizer: Amparo Gil
Universidad de Cantabria, Spain

Organizer: Javier Segura
Universidad de Cantabria, Spain

4:00-4:25 Numerical Methods for Special Functions
Nico M. Temme, Centrum voor Wiskunde en Informatica, The Netherlands; Amparo Gil and Javier Segura, Universidad de Cantabria, Spain

4:30-4:55 Toward an On-Demand Data Service for Special Functions
Daniel Lozier, National Institute of Standards and Technology, USA; Annie Cuyt, University of Antwerp, Belgium

5:00-5:25 Stieltjes-Wigert Polynomials and the q-Airy Function
Roderick Wong, City University of Hong Kong, Hong Kong

5:30-5:55 Special Function Integrals by the Method of Brackets
Karen Kohl, University of Southern Mississippi, USA

Thursday, July 11

MS104

Fluid-Structure Interactions: Applications and Advances in Numerical Methods - Part II of II

4:00 PM-6:00 PM

Room:Royal Palm 4

For Part 1 see MS95
Interesting phenomena involving fluid-structure interactions arises in physical systems spanning scales from the macroscopic to the microscopic. A fundamental challenge is to develop useful descriptions that capture essential physical features while being tractable for computation and amenable to analysis. In this session speakers will present recent results on progress in this area and interesting related applications.

Organizer: Yaohong Wang
University of California, Santa Barbara, USA

Organizer: Paul J. Atzberger
University of California, Santa Barbara, USA

4:00-4:25 Increased Accuracy of Immersed Boundary Methods Using Fourier Approximations of Delta Functions
Robert Guy, University of California, Davis, USA; David Hartenstine, Western Washington University, USA; Wanda Strychalski, University of California, Davis, USA

4:30-4:55 The Moment of Fluid Interface Reconstruction with Filaments: Increasing Sub-Gridcell Resolution
Matthew B. Jemison and Mark Sussman, Florida State University, USA

5:00-5:25 Variational Implicit Solvation of Biomolecules
Bo Li, University of California, San Diego, USA

5:30-5:55 Nonlinear Response of Bio-Polymers Subject to Stretching Flow with Thermal Noise
Mingge Deng, Bruce Caswell, and George E. Karniadakis, Brown University, USA

Thursday, July 11

MS106

Recent Advances in Computational Algorithms for Image Analysis

4:00 PM-6:00 PM

Room:Garden Salon I

Nonsmooth convex regularized optimization has been used in inverse problems for image analysis as it is able to recover images with well preserved edges. This minisymposium focuses on recently developed efficient numerical methods for solving large-scale, ill-conditioned inverse problems with applications to image analysis including image reconstruction, registration, restoration, and segmentation.

Organizer: Wiliam Hager
University of Florida, USA

Organizer: Maryam Yashtini
University of Florida, USA

4:00-4:25 Alternating Direction Approximate Newton Method for Partially Parallel Imaging
Maryam Yashtini, William Hager, and Cuong Ngo, University of Florida, USA; Hongchao Zhang, Louisiana State University, USA

4:30-4:55 Fast Algorithms for Adaptive Temporal Compression in Video Data
Yi Yang, Hayden Schaeffer, and Stanley J. Osher, University of California, Los Angeles, USA

5:00-5:25 A Difference of Convex Method to Select Point Correspondences for Image Registration
Ernie Esser, University of California, Irvine, USA

5:30-5:55 Compressive Video Using Single Pixel Cameras
Tom Goldstein, Rice University, USA

Thursday, July 11

MS107

Computational Methods for Medical Image Reconstruction: Recent Advances and Challenges - Part III of III

4:00 PM-5:30 PM

Room:Garden Salon II

For Part 2 see MS90

Tomographic reconstruction is one of the central topics in medical imaging. Distinct physical models and image properties in different modalities, e.g. CT, MRI, or optical imaging, have posed great challenges in these problems. Over the years, novel techniques have been developed. Exchanging these advances will inspire new ideas and facilitate developments. This minisymposium will bring together mathematicians, engineers, and medical physicists to present the most recent advances in a spectrum of tomographic reconstruction problems. Challenges and potential solutions will also be discussed. It will provide a forum to stimulate discussions and foster collaborations for the further developments of this field.

Organizer: Jianfeng Cai
University of Iowa, USA

Organizer: Xun Jia
University of California, San Diego, USA

Organizer: Hao Gao
Emory University, USA

4:00-4:25 Accelerated Statistical Image Reconstruction Methods in X-Ray Computed Tomography (ct): Advances in Algorithm Developments and Clinical Practices
Guang-Hong Chen, University of Wisconsin, Madison, USA

4:30-4:55 Diffuse Optical Cortical Mapping Using the Bem++ Boundary Element Library
Simon Arridge, Timo Betcke, Wojciech Smigaj, and Martin Schweiger, University College London, United Kingdom

5:00-5:25 Tensor Framelet based Novel Reconstruction Methods for Better and Faster CT Imaging
Hao Gao, Emory University, USA

Thursday, July 11

MS108

Web-based CO2 Subsurface Modeling

4:00 PM-6:00 PM

Room:Royal Palm 6

Through a grant provided by the US Department of Energy's National Energy Technology Laboratory (NETL), researchers in the Computational Science Research Center (CSRC) at San Diego State University (SDSU) have developed a novel new software system that will give scientists and students the ability to simulate the long-term chemical, structural, and seismic consequences of injected CO2 in deep geologic water-rock systems. The novelty of this software lies in its intuitive Web-based user interface designed to allow geology students, at the undergraduate level, the ability to define a computational domain consisting of an arbitrary number of lithologies and brine water mixtures.

Organizer: José E. Castillo
San Diego State University, USA

Organizer: Christopher Paolini
San Diego State University, USA

4:00-4:25 An Overview of Web-Based CO2 Subsurface Flow Modeling
Christopher Paolini and *Johnny Corbino*, San Diego State University, USA

4:30-4:55 Using the Helgeson-Kirkham-Flowers Model to Study Reservoir Temperature Evolution During CO2 Injection
Christopher Paolini, San Diego State University, USA; Chris Binter, Exxon, USA

5:00-5:25 Numerical Poroelastic Pressure Diffusion Simulation in CO2 Sequestration
Jonathan Mathews, San Diego State University, USA

5:30-5:55 A Study of High-Performance Computing Tools in Simulating Carbon Dioxide Geologic Sequestration Scenarios
Eduardo J. Sanchez, San Diego State University, USA

Thursday, July 11

MS109

Stochastic Analysis, Control and Computation of Fluid Dynamics and other Physical Phenomena - Part II of IV

4:00 PM-6:00 PM

Room:Hampton

For Part 1 see MS92
For Part 3 see MS123

Stochastic analysis, control and computation of nonlinear infinite dimensional systems such as fluid flow systems and other systems modeled by PDEs have seen substantial growth in the past two decades due to its importance in science and engineering. These developments have the potential to impact a number of domestic and defense industries. With many unsettled issues and problems remaining, the need for new methods and techniques is emerging. The aim of this minisymposium is to bring together leading experts and junior researchers who work in this area with an emphasis on control of fluids and other physical phenomena to present recent advances, to address current challenges, and to identify new directions.

Organizer: S.S. Ravindran
University of Alabama, Huntsville, USA

Organizer: Meng Xu
Rockefeller University, USA

Organizer: Nathan D. Moshman
Naval Postgraduate School, USA

4:00-4:25 Best Location of Actuators for the Stabilization of the Navier-Stokes Equations
Jean-Pierre Raymond, Universite Paul Sabatier, France

4:30-4:55 Malliavin Calculus for Stochastic Point Vortex and Lagrangian Models
Meng Xu, Rockefeller University, USA

5:00-5:25 Balanced POD: Approximation Capability and Potential for Nonlinear Model Reduction
John Singler, Missouri University of Science and Technology, USA

5:30-5:55 An Adjoint-Based Approach for the Understanding of Flapping Wings
Mingjun Wei and Min Xu, New Mexico State University, USA

Thursday, July 11

MS110

Regarding Reproducible and Repeatable Computations

4:00 PM-5:30 PM

Room:Sheffield

Computational results are increasingly used for scientific discovery, informing decision making and designing new products. At the same time, errors due to the confluence of approximations inherent in computational methods are difficult to isolate. Furthermore, the expanding impact of non-determinism in floating point computations is leading us to weigh the concerns of reproducibility and repeatability with efficiency of computation. In this minisymposium we discuss the importance of reproducibility and repeatability; when it is essential and when it can be relaxed. We then discuss capabilities and approaches to address these issues including new approaches for, and use of, extended precision arithmetic.

Organizer: Michael A. Heroux

Sandia National Laboratories, USA

4:00-4:25 Reproducibility and Repeatability: A Roadmap for the Computational Scientist

Michael A. Heroux, Sandia National Laboratories, USA

4:30-4:55 Strategies and Challenges of Reproducibility in Global Climate Modeling

Katherine J. Evans and *Richard Archibald*, Oak Ridge National Laboratory, USA

5:00-5:25 Efficient Reproducible Floating Point Reduction Operations on Large Scale Systems

Hong Diep Nguyen and James Demmel, University of California, Berkeley, USA

Thursday, July 11

MS111

Recent Developments in Numerical Methods for PDEs - Part II of IV

4:00 PM-6:30 PM

Room:Windsor

For Part 1 see MS91
For Part 3 see MS126

Partial Differential Equations play an important role in the mathematical modeling of real life applications. Very often, the solution to these equations can only be obtained by the use of appropriate numerical schemes. Consequently, there is a need for the design of accurate and computationally efficient methods that can serve as a reliable tool in mathematical modeling. Recent progress and open questions in the area will be discussed. Talks may address theoretical and computational aspects of the numerical methods, as well as different applications arising from biomedical problems, geophysical flows, and Material Sciences problems.

Organizer: Yekaterina Epshteyn

University of Utah, USA

Organizer: Fengyan Li

Rensselaer Polytechnic Institute, USA

4:00-4:25 High Order Asymptotic Preserving Methods for Discrete-velocity Kinetic Equations

Juhi Jang, University of California, Riverside, USA; *Fengyan Li*, Rensselaer Polytechnic Institute, USA; Jingmei Qiu and Tao Xiong, University of Houston, USA

4:30-4:55 Error Estimates of RKDG Methods for the Vlasov-Maxwell System

He Yang and Fengyan Li, Rensselaer Polytechnic Institute, USA

continued in next column

5:00-5:25 H-to-P Efficiently: A Progress Report on Hdg in 3D

Sergey B. Yakovlev, University of Utah, USA; David Moxey, Imperial College London, United Kingdom; Robert Kirby, University of Utah, USA; Spencer Sherwin, Imperial College London, United Kingdom

5:30-5:55 H-to-P Efficiently: A Progress Report on High-Order Fem on Manifolds with Applications in Electrophysiology

Chris Cantwell, Imperial College London, United Kingdom; Sergey B. Yakovlev and *Robert Kirby*, University of Utah, USA; Nicholas Peters and Spencer Sherwin, Imperial College London, United Kingdom

6:00-6:25 On the Bound of DG and Central DG Operators for Linear Hyperbolic Problems

Matthew Reyna and Fengyan Li, Rensselaer Polytechnic Institute, USA

Thursday, July 11

CP15

Fluids I

4:00 PM-6:00 PM

Room:Pacific Salon 7

Chair: Jeffrey Hyman, University of Arizona, USA

4:00-4:15 Uncoupling Groundwater-Surface Water Flow Using Partitioned and Multi-Rate Methods
Michaela J. Kubacki, Marina Moraiti, and Xin Xiong, University of Pittsburgh, USA

4:20-4:35 Mathematical Modelling of Sap Exudation in Maple Trees
John M. Stockie, Simon Fraser University, Canada; Maurizio Ceseri, Istituto per le Applicazioni del Calcolo "Mauro Picone", Italy

4:40-4:55 Simulating Three-Dimensional Fluid Flow in Porous Media
Jeffrey D. Hyman, University of Arizona, USA; Piotr Smolarkiewicz, European Centre for Medium-Range Weather Forecasts, United Kingdom; Larrabee Winter, University of Arizona, USA

5:00-5:15 Turbulent Fluid Mixing of Multiphase Flow
Hyunkyung Lim, James Glimm, and Yijie Zhou, State University of New York, Stony Brook, USA; Xiangmin Jiao, Stony Brook University, USA

5:20-5:35 Onset of Buoyancy-driven Convection in Cartesian and Cylindrical Geometries
Philip C. Myint and Abbas Firoozabadi, Yale University, USA

5:40-5:55 Symmetry-Breaking Hopf Bifurcations to 1-, 2-, and 3-Tori in Small-Aspect-Ratio Counter-Rotating Taylor-Couette Flow
Sebastian A. Altmeyer and Younghae Do, Kyungpook National University, Korea; Juan Lopez, Arizona State University, USA; Fernando Marques, Universitat Politecnica de Catalunya, Spain

Thursday, July 11

CP16

Geosciences II

4:00 PM-5:40 PM

Room:Pacific Salon 6

Chair: German A. Larrazabal, Jaguar Exploration Inc., USA

4:00-4:15 Turbulence in Climate Models: Multi-Scale Approaches
Joao Teixeira, California Institute of Technology, USA

4:20-4:35 Structure Oriented Attributes Using Cuda Kernels for Oil Exploration
German A. Larrazabal, Jaguar Exploration Inc., USA

4:40-4:55 The Effects of Numerical Model Error on 4D-Variational Data Assimilation
Siân E. Jenkins, Chris Budd, Melina Freitag, and Nathan Smith, University of Bath, United Kingdom

5:00-5:15 Hypergraph Partitioner for Reservoir Simulations
Vladimir Rerikh and Vladislav Pravilnikov, Neurok Techsoft LLC, Russia; Serguei Y. Maliassov, ExxonMobil Research, USA

5:20-5:35 Mpi Geometrical Partitioner
Vladislav Pravilnikov and Vladimir Rerikh, Neurok Techsoft LLC, Russia; Serguei Y. Maliassov, ExxonMobil Research, USA

Thursday, July 11

CP17

Numerical Methods in PDE III

4:00 PM-6:00 PM

Room:Eaton

Chair: Adrianna Gillman, Dartmouth College, USA

4:00-4:15 A High Order Accurate Solution Technique for Free Space Scattering Problems in Variable Media
Adrianna Gillman, Dartmouth College, USA

4:20-4:35 Anti-Differential Operators: An Application of the Pseudo-Inverse
James V. Lambers, University of Southern Mississippi, USA

4:40-4:55 Numerical Methods for the Poisson-Fermi Equation in Electrolytes
Jinn-Liang Liu, National Hsinchu University of Education, Taiwan

5:00-5:15 A Overlapping Surface Decomposition Based Kernel-Free Boundary Integral Method for Variable Coefficient Elliptic Pde
Wenjun Ying, Shanghai Jiao Tong University, China

5:20-5:35 Pseudo-Spectral Method for Elliptic Interface Problems with Discontinuous Coefficients and Singular Sources
Peyman Hessari, Kyungpook National University, Korea; Byeong Chun Shin, Chonnam National University, Korea

5:40-5:55 Delta Functions and the Euler-Maclaurin Formula
Mohsin Javed, University of Oxford, United Kingdom

Thursday, July 11

CP18

Stochastic Models

4:00 PM-5:40 PM

Room:Brittany

Chair: Zohar Strinka, University of Michigan, USA

4:00-4:15 Logconcavity of Compound Distributions with Applications in Stochastic Optimization
Anh Ninh and Andras Prekopa, Rutgers University, USA

4:20-4:35 Developing Approximation Algorithms for Risk-Averse Stochastic Selection Problems
Zohar Strinka and Edwin Romeijn, University of Michigan, USA

4:40-4:55 Problem of Non-Monotone Quadratic Estimating Equations in Saddlepoint Approximating the Moving Average Model of Order One
Indika P. Wickramasinghe, Eastern New Mexico University, USA; Alex Trindade, Texas Tech University, USA

5:00-5:15 Optimal Preventive Maintenance and Repair Policies for Multi-State Systems
Shey-Huei Sheu, Providence University, Taiwan; Yen-Luan Chen, Takming University of Science and Technology, Taiwan; Chin-Chih Chang, Providence University, Taiwan

5:20-5:35 Geometric Asian Options under Heston Model: Pricing and Hedging
In-Suk Wee and Jerim Kim, Korea University, South Korea

SIAM Council

4:00 PM-10:00 PM

Room:Sunrise

Intermission

6:00 PM-6:15 PM

Thursday, July 11

Professional Development Evening

6:15 PM-9:15 PM

Room:San Diego

Organizers: Christopher Siefert, Sandia National Laboratories, USA
Maria Emelianenko, George Mason University, USA
Cammey Cole Manning, Meredith College, USA

Careers: Backward and Forward
Join us for an evening devoted to developing a successful career in the mathematical sciences. Several professionals from academia, government, and industry will share their work experiences and give advice on how to develop a career in the mathematical sciences. The target audience for this event includes early career professionals (i.e., less than five years past last degree), postdocs, and students. However, we are also encouraging participation from the senior professional community during the networking session.

6:15 PM **Panel Discussion: Looking Backward**
Panelists:
Tony Drummond, Lawrence Berkeley National Laboratory, USA
Katie Gurski, Howard University, USA
Michele Joyner, East Tennessee State University, USA
Ben Santer, Lawrence Livermore National Laboratory, USA

7:15 PM **Networking Reception**

8:15 PM **Panel Discussion: Looking Forward**
Panelists:
Bruce Hendrickson, Sandia National Laboratories, USA
Hans Kaper, Argonne National Laboratory, USA
Georgetown University and University of Illinois at Urbana-Champaign, USA
Deborah Lockhart, National Science Foundation, USA

Organizers: Christopher Siefert, Sandia National Laboratories, USA
Maria Emelianenko, George Mason University, USA
Cammey Cole Manning, Meredith College, USA

Hold the Date!

2014 SIAM Annual Meeting
July 7-11, 2014
The Palmer House,
Chicago, Illinois, USA

Friday, July 12

Diversity Advisory Committee

7:00 AM-8:30 AM

Room:Board Room

Compensation Committee

8:00 AM-11:00 AM

Room:Sunset

Registration

8:00 AM-4:30 PM

Room:Atlas Foyer

Closing Remarks

8:25 AM-8:30 AM

Room:Town & Country

Friday, July 12

IC9

Photoacoustic Tomography: Ultrasonically Breaking through Optical Diffusion and Diffraction Limits

8:30 AM-9:15 AM

Room:Town & Country

Chair: Jennifer L. Mueller, Colorado State University, USA

Photoacoustic tomography (PAT), combining optical and ultrasonic waves via the photoacoustic effect, provides in vivo multiscale non-ionizing functional and molecular imaging. PAT is the only modality capable of imaging across the length scales of organelles, cells, tissues, and organs with consistent contrast. PAT has the potential to empower multiscale systems biology and accelerate translation from microscopic laboratory discoveries to macroscopic clinical practice. PAT may also hold the key to the earliest detection of cancer by in vivo label-free quantification of hypermetabolism, the quintessential hallmark of cancer. The basic principle of PAT and the recent progress will be covered.

Lihong Wang
Washington University, St. Louis, USA

Friday, July 12

IC10

Dynamics of Near Parallel Vortex Filaments

8:30 AM-9:15 AM

Room:San Diego

Chair: Keith Promislow, Michigan State University, USA

Techniques have been developed for the phase space analysis of the dynamics of many model nonlinear Hamiltonian PDEs. In this talk I will describe some extensions of these ideas to a problem in fluid dynamics concerning the interaction of two near-parallel vortex filaments in three dimensions. In addition, as well as generalizations of this problem, I will describe a number of promising further applications of the techniques of Hamiltonian PDEs and nonlinear evolution problems to other systems in fluid dynamics of physical significance.

Walter Craig
McMaster University, Canada

Friday, July 12

IP3

AMS Invited Presentation: On the Geometry and Complexity of Solving Systems of Polynomial Equations

9:15 AM-10:00 AM

Room:Town & Country

Chair: John Guckenheimer, Cornell University, USA

Theoretical computer science has a well developed notion of complexity. Numerical analysis doesn't have a comparably developed theory. In this context Steve Smale included in his list of problems for the next century: Problem 17: Solving Polynomial Equations. Can a zero of ***n***-complex polynomial equations in ***n***-unknowns be found approximately, on the average, in polynomial time with a uniform algorithm? I will describe progress on this problem including the eigenvalue problem (the answer looks like yes), and the mathematics employed.

Michael Shub
IMAS, CONICET, Argentina and Graduate School of CUNY, USA

Coffee Break

10:00 AM-10:30 AM

Room:Golden West/California

Friday, July 12

MS112

Recent Advances in Matrix Function Computations: Theory and Practice

10:30 AM-12:30 PM

Room:Town & Country

The efficient computation of matrix functions has become a very important task in scientific computing and engineering. In many applications the matrices of interest are typically large and sparse, and dimension reduction techniques need to be applied first to reduce the problem to the evaluation of a small matrix function. This minisymposium aims at discussing recent advances, both theoretical and computational. The emphasis will be on the matrix exponential, which certainly is the function most important in applications like, e.g., exponential integrators or time-domain simulation of electromagnetic fields.

Organizer: Stefan Guettel
University of Manchester, United Kingdom

Organizer: Mike A. Botchev
University of Twente, Netherlands

10:30-10:55 Block Krylov Subspace Methods and a Preconditioning Approach for the Matrix Exponential Action
Mike A. Botchev, University of Twente, Netherlands

11:00-11:25 The Matrix Unwinding Function
Mary Aprahamian and Nicholas Higham, University of Manchester, United Kingdom

11:30-11:55 Transient Electromagnetic Simulation in Geophysical Exploration
Oliver G. Ernst, TU Bergakademie Freiberg, Germany; Stefan Güttel, University of Manchester, United Kingdom; Ralph-Uwe Börner, TU Bergakademie Freiberg, Germany

12:00-12:25 Matrix Functions and Their Krylov Approximations for Wave Propagation in Unbounded Domains
Vladimir L. Druskin, Schlumberger-Doll Research, USA; Rob Remis, TU Delft, Netherlands; Mikhal Zaslavsky, Schlumberger-Doll Research, USA

Friday, July 12

MS113

Stochastic and Continuum Models in Structural Biology: Assembly and Functionality

10:30 AM-12:30 PM

Room:Royal Palm 4

This minisymposium surveys recent advances in the modeling, analysis and simulation of the fundamental biological processes of particle nucleation and biopolymerization. Particle nucleation describes the aggregation of particles and assembly of machinery for a wide variety of systems such as cell motility, virus assembly and protein synthesis. Biopolymerization processes such as transcription of DNA to mRNA and translation of mRNA to protein are two key cellular processes that are considered. Fully stochastic as well as continuum models are combined with analytic tools and numerical simulations to tackle important questions related to the output of these systems.

Organizer: Lisa G. Davis
Montana State University, USA

10:30-10:55 Stochastic Nucleation in Biology
Maria D'Orsogna, California State University, Northridge, USA

11:00-11:25 From Asymmetric Exclusion Processes to Protein Synthesis
Beate Schmittmann, Iowa State University, USA; Jiajia Dong, Bucknell University, USA; Royce Zia, Virginia Tech, USA

11:30-11:55 Introducing Stochasticity into a Continuum Model for Transcription
Lisa G. Davis, Tomas Gedeon, and Jennifer Thorenson, Montana State University, USA

12:00-12:25 A Discontinuous Method for Analyzing and Modeling Delay Due to Pauses During Transcription
Jennifer Thorenson, Lisa G. Davis, and Tomas Gedeon, Montana State University, USA

Friday, July 12

MS114

AMS Minisymposia on Complexity and the Foundations of Numerical Computation - Part II of III

10:30 AM-12:30 PM

Room:Pacific Salon 1

For Part 1 see MS98
For Part 3 see MS129
Sponsored by the American Mathematical Society

This session will address some fundamental questions about numerical computations: what can be computed efficiently? Are there intrinsically hard problems? One way to measure the cost of numerical computations is to count the number of arithmetic operations. In that setting, known hardness results are related to computational algebraic geometry problems. The main topics for this workshop are: Complexity theory of real number algorithms. Complexity of numerical methods. Computational Algebraic Geometry. Numerical Nonlinear Equation Solving. This session was organized to complement invited AMS speaker Michael Shub's presentation (see IP3).

Organizer: Gregorio Malajovich
Universidade Federal do Rio De Janeiro, Brazil

Organizer: Luis Miguel Pardo
Universidad de Cantabria, Spain

10:30-10:55 A Concrete Approach to Hermitian Determinantal Representations
Cynthia Vinzant, University of Michigan, USA

11:00-11:25 Faster Real-Solving for Random Sparse Polynomial Systems
J. Maurice Rojas, Texas A&M University, USA

11:30-11:55 Property Testing in the Real Number Model
Klaus Meer, Technical University Cottbus, Germany

12:00-12:25 Computing Regularity from Singularity
Jean-Claude Yakoubsohn, Universite Paul Sabatier, France

Friday, July 12

MS115

Recent Development on Photoacoustic Tomography - Part I of II

10:30 AM-12:30 PM

Room:Pacific Salon 2

For Part 2 see MS130
Photoacoustic tomography is a recently developed hybrid imaging modality that can render optical contrast with ultrasound resolution and stability. It has been successfully applied to biomedical research, clinical practices and other areas. The two key physical processes in photoacoustic tomography are (1) light propagation and optical absorption, (2) conversion to acoustic sources and acoustic propagation. Consequently, photoacoustic tomography is an inverse source problem. In this symposium, mathematical and computational issues -- such as incomplete data, variable/discontinuous acoustic speed, iterative imaging, and quantitative photoacoustic tomography -- as well as practical developments will be discussed. This session was organized to complement invited speaker Lihong Wang's presentation (see IC9).

Organizer: Hongkai Zhao
University of California, Irvine, USA

Organizer: Lihong Wang
Washington University, St. Louis, USA

10:30-10:55 Ultrasound Modulated Optical Tomography
Habib Ammari, Ecole Normale Superieure, France

11:00-11:25 Recent Advancement in Photoacoustic Tomography Iterative Image Reconstruction
Mark Anastasio, Kun Wang, Chao Huang, and Bob Schoonover, Washington University in St. Louis, USA

11:30-11:55 Quantitative Photoacoustics Using Transport and Diffusion Models
Simon Arridge, University College London, United Kingdom

12:00-12:25 Gradient-based Bound-constrained Split Bregman Method (GBSB) for Large-scale Quantitative Photoacoustic Tomography
Hao Gao, Emory University, USA

Friday, July 12

MS116

Stochastic Model, Uncertainty Quantification and Stochastic Inversion - Part V of VI

10:30 AM-12:30 PM

Room:Pacific Salon 3

For Part 4 see MS100
For Part 6 see MS131
Uncertainty is everywhere, from material discovery to reactive transport in porous media. Quantifying the uncertainty associated with the parameters in complex systems is critical, which can help us to verify our modern simulation codes and assess confidence levels. Our aim is to use accurate computational simulations to predict the behavior of complex systems. For large number of random dimensions, advanced stochastic approximation techniques are necessary to minimize the complexity of mathematical models. This minisymposium will explore recent advances in numerical algorithms and applications for uncertainty quantification, model reduction, and stochastic inversion in large-scale high-dimensional complex systems.

Organizer: George E. Karniadakis
Brown University, USA

Organizer: Mihai Anitescu
Argonne National Laboratory, USA

Organizer: Karen E. Willcox
Massachusetts Institute of Technology, USA

Organizer: Omar Ghattas
University of Texas at Austin, USA

Organizer: Guang Lin
Pacific Northwest National Laboratory, USA

10:30-10:55 Zwanzig-Type PDF Equations and Exponential Integrators for Functionals of the Solution to Nonlinear SPDEs with High-Dimensional Parametric Uncertainty
Daniele Venturi and George E. Karniadakis, Brown University, USA

continued on next page

11:00-11:25 Interannual Variability and Memory Reemergence of North Pacific Sea Ice in Comprehensive Climate Models
Dimitris Giannakis and Mitchell Bushuk, New York University, USA; Andrew Majda and David Holland, Courant Institute of Mathematical Sciences, New York University, USA

11:30-11:55 The Wick Approximation of Elliptic Problems with Lognormal Random Coefficients
Xiaoliang Wan, Louisiana State University, USA; Boris Rozovskii, Brown University, USA

12:00-12:25 PDF Method for Power Generation Systems
Peng Wang, Alexandre Tartakovsky, and Zhengyu Huang, Pacific Northwest National Laboratory, USA

Friday, July 12

MS117

Mathematics of Compressible Fluid Flows- Part I of II

10:30 AM-12:30 PM

Room:Royal Palm 1

For Part 2 see MS132

We present some recent results in the mathematical theory of compressible fluid flows. The main topics range from purely theoretical questions related to well-posedness of the associated systems of partial differential equations, qualitative properties of solutions, to numerical issues. The discussion focuses mostly on compressible viscous fluids described by means of the Navier-Stokes and related systems.

Organizer: Eduard Feireisl

Mathematical Institute ASCR, Prague, Czech Republic

10:30-10:55 Stability Issues in the Theory of Complete Fluid Systems
Eduard Feireisl, Mathematical Institute ASCR, Prague, Czech Republic

11:00-11:25 Incompressible Limits of Fluids Excited by Moving Boundaries
Sarka Necasova, Eduard Feireisl, Jiri Neustupa, Ondrej Kreml, and Jan Stebel, Mathematical Institute ASCR, Prague, Czech Republic

11:30-11:55 Regularity Problems Related to Brenner-Navier-Stokes Equations
Yongzhong Sun, Nanjing University, China

12:00-12:25 Relative Entropy Applied to the Study of Stability of Shocks for Conservation Laws, and Application to Asymptotic Analysis
Alexis F. Vasseur, University of Texas, Austin, USA

Friday, July 12

MS118

Integral Equations: Discretization, Conditioning, and Applications - Part I of II

10:30 AM-12:30 PM

Room:Royal Palm 2

For Part 2 see MS133

Integral equation methods have been successfully used to solve problems in many areas of science and engineering. However, many open issues remain, for example, well-conditioned discretizations, quadratures for layer potentials, complex geometries, preconditioners, fast multipole methods, and fast direct solvers. This minisymposium will discuss recent developments in addressing these issues.

Organizer: Bryan D. Quaife

University of Texas at Austin, USA

Organizer: George Biros

University of Texas at Austin, USA

10:30-10:55 Spectral Deferred Correction Methods for Two-Dimensional Vesicle Suspensions
Bryan D. Quaife, University of Texas at Austin, USA

11:00-11:25 Isogoemetric Boundary Element Methods on Smooth Domains
Matthias Taus, University of Texas, USA; Gregory Rodin, University of Texas at Austin, USA

11:30-11:55 Fast Integral Equation Method for Maxwell's Equations in Layered Media
Min Hyung Cho, Dartmouth College, USA

12:00-12:25 High-order Nystrom Discretization of Boundary Integral Equations in the Plane
Sijia Hao, University of Colorado Boulder, USA

Friday, July 12

MS119

Special Functions: Applications and Numerical Aspects - Part II of II

10:30 AM-12:30 PM

Room:Royal Palm 3

For Part 1 see MS103
Organized by SIAG/OPSF

Recent activities in the computation of special functions will be reviewed with special attention to a new project of NIST and the University of Antwerp concerning the computation of accurate function values with a tables-on-demand capability for a subset of real functions in the NIST DLMF. New methods will be discussed for computing integrals and solutions of differential equations, with attention to special functions. Application areas are problems from mathematical physics, but also certain cumulative distribution functions arising in probability theory and mathematical statistics. The role of symbolic computations in software design for special functions will be considered as well.

Organizer: Nico M. Temme
Centrum voor Wiskunde en Informatica, The Netherlands

Organizer: Amparo Gil
Universidad de Cantabria, Spain

Organizer: Javier Segura
Universidad de Cantabria, Spain

10:30-10:55 The Wright Function and Fractional Diffusion Problems
Renato Spigler, Università degli Studi Roma Tre, Italy; Moreano Concezzi, Universita Roma Tre, Italy

11:00-11:25 Existence and Uniqueness of Tronquee Solutions of the Third and Fourth Painleve Equations
Dan Dai, City University of Hong Kong, Hong Kong

11:30-11:55 Saddle Points, Special Functions and Electromagnetic Pulse Propagation
Natalie Cartwright, State University of New York, New Paltz, USA

12:00-12:25 Some New Techniques in the Approximation of Special Functions
José López, Universidad Pública de Navarra, Spain; *Ester Pérez Sinusía*, Universidad de Zaragoza, Spain

Friday, July 12

MS120

Advances in Numerical Methods to Wave Propagations

10:30 AM-12:30 PM

Room:Royal Palm 5

Modeling wave propagation is essential for many different applications including fluid dynamics, quantum mechanics, electromagnetics and seismology. It is therefore important to develop accurate and efficient numerical approaches to approximate the phenomenon. This mini-symposium will discuss various recent efficient numerical algorithms including, but not limited to, finite difference methods, finite element methods, spectral methods, discontinuous Galerkin methods and some asymptotic methods.

Organizer: Shingyu Leung
Hong Kong University of Science and Technology, Hong Kong

Organizer: Eric Chung
Chinese University of Hong Kong, Hong Kong

10:30-10:55 Eulerian Methods for Schrodinger Equations in the Semi-Classical Regime
Shingyu Leung, Hong Kong University of Science and Technology, Hong Kong

11:00-11:25 High-Order Factorization Based High-Order Hybrid Fast Sweeping Methods
Jianliang Qian, Michigan State University, USA

11:30-11:55 Energy Conserving Local Discontinuous Galerkin Methods for the Wave Propagation Problems
Yulong Xing, University of Tennessee and Oak Ridge National Laboratory, USA

12:00-12:25 A Uniformly Second Order Fast Sweeping Method for Eiknoal Equations
Songting Luo, Iowa State University, USA

Friday, July 12

MS121

Recent Advances in Chebfun - Part II of II

10:30 AM-12:30 PM

Room:San Diego

For Part 1 see MS77
Chebfun is a collection of algorithms and an open-source software system in object-oriented MATLAB which extends familiar powerful methods of numerical computation involving numbers to continuous or piecewise-continuous functions. This minisymposium focuses on recent advances in Chebfun. The topics discussed will include the extension of Chebfun to two dimensions, and findings in approximation theory and numerical solution of differential equations, enabled by Chebfun.

Organizer: Asgeir Birkisson
University of Oxford, United Kingdom

10:30-10:55 Computing Multiple Solutions of Nonlinear ODEs with Chebfun
Asgeir Birkisson, University of Oxford, United Kingdom; Tobin A Driscoll, University of Delaware, USA

11:00-11:25 Stability of Certain Singular and Singularly Perturbed Differential Equations
Sheehan Olver, University of Sydney, Australia; Alex Townsend, University of Oxford, United Kingdom

11:30-11:55 Chebfun and Equispaced Data
Georges Klein, University of Oxford, United Kingdom

12:00-12:25 Computing on Surfaces with Chebfun2
Rodrigo B. Platte, Arizona State University, USA

Friday, July 12

MS122

Computing and Using Generalized Jacobians and Gradients

10:30 AM-12:30 PM

Room:Pacific Salon 6

The very elaborate theory of nonsmooth analysis was largely triggered by the desire to characterize solutions in optimal control and the calculus of variations. Unfortunately, the practical application of nonsmooth analysis in algorithms for nonlinear equations and optimization is still hampered by the fact that the set valued derivatives satisfy only rather inaccurate inclusion rules. Hence it seemed impossible to identify generalized Jacobians and gradients with certainty even in infinite precision arithmetic. Recently, this limitation has been overcome, so that the generalized Newton's method can now be applied almost as mechanically as the classical variant in the smooth case. Similarly generalized gradients can be provided constructively for optimization.

Organizer: Andreas Griewank
Humboldt University Berlin, Germany

Organizer: Paul I. Barton
Massachusetts Institute of Technology, USA

10:30-10:55 Evaluating a Clarke Generalized Jacobian of a Piecewise Differentiable Function
Kamil Khan and Paul I. Barton, Massachusetts Institute of Technology, USA

11:00-11:25 Generalized Derivatives Via Piecewise Linearization
Andreas Griewank, Humboldt University Berlin, Germany

11:30-11:55 An Optimization Method Based on Piecewise Differentiation
Sabrina Fiege, Universität Paderborn, Germany; Andreas Griewank, Humboldt University Berlin, Germany; Andrea Walther, Universität Paderborn, Germany

12:00-12:25 Subdifferential Test for Optimality
Marc Lassonde, Université des Antilles, Guadeloupe

Friday, July 12

MS123

Stochastic Analysis, Control and Computation of Fluid Dynamics and other Physical Phenomena - Part III of IV

10:30 AM-12:30 PM

Room:Royal Palm 6

For Part 2 see MS109

For Part 4 see MS139

Stochastic analysis, control and computation of nonlinear infinite dimensional systems such as fluid flow systems and other systems modeled by PDEs have seen substantial growth in the past two decades due to its importance in science and engineering. These developments have the potential to impact a number of domestic and defense industries. With many unsettled issues and problems remaining, the need for new methods and techniques is emerging. The aim of this minisymposium is to bring together leading experts and junior researchers who work in this area with an emphasis on control of fluids and other physical phenomena to present recent advances, to address current challenges, and to identify new directions.

Organizer: S.S. Ravindran
University of Alabama, Huntsville, USA

Organizer: Meng Xu
Rockefeller University, USA

Organizer: Nathan D. Moshman
Naval Postgraduate School, USA

10:30-10:55 Two-Dimensional Stochastic Navier-Stokes Equations with Fractional Brownian Noise
P. Sundar, Louisiana State University, USA

11:00-11:25 Multigrid Methods for Optimal Control Problems in Fluid Flow
Ana Maria Soane, University of Maryland, Baltimore County, USA

11:30-11:55 Nonlinear Stochastic Estimation of Turbulence Subject to Levy Noise
B.P.W Fernando, Naval Postgraduate School, USA

12:00-12:25 Uncertainty Quantification in Hemodynamics, a Bayesian Approach to Data Assimilation
Marta D'Elia, Florida State University, USA

Friday, July 12

MS124

Algorithms, Libraries and Frameworks for Scalable Manycore Computations - Part II of II

10:30 AM-12:30 PM

Room:Towne

For Part 1 see MS93

The new commodity performance curves in high performance computing are tied to intra- processor concurrency. It is widely recognized that careful design of software and data structures, with effective memory management and communication optimizations are the most critical issues for optimal performance on scalable manycore systems. Application and library software developers are making progress analyzing how to effectively use clusters of such processors and some general approaches have emerged. In this pair of minisymposia we discuss current experiences and development of applications, libraries and frameworks using a variety of hardware. Speakers will address performance results and software design.

Organizer: Michael A. Heroux
Sandia National Laboratories, USA

Organizer: Serge G. Petiton
CNRS/LIFL and INRIA, France

Organizer: Kengo Nakajima
University of Tokyo, Japan

10:30-10:55 Programming Model for Sustainable Numerical Libraries for Extreme Scale Computing
Leroy A. Drummond, Lawrence Berkeley National Laboratory, USA; Makarem Dandouna and Nahid Emad, Universite de Versailles, France

11:00-11:25 Gmres Cache Aware Auto-Tuning Strategies for Parallel Architectures
Pierre-Yves Aquilanti, A*STAR Computational Resource Centre, Singapore; Takahiro Katagiri, University of Tokyo, Japan; Serge G. Petiton, CNRS/LIFL and INRIA, France; Satoshi Ohshima, University of Tokyo, Japan

continued on next page

Friday, July 12

MS124

Algorithms, Libraries and Frameworks for Scalable Manycore Computations - Part II of II

continued

11:30-11:55 Petaflop supercomputers, What Programming Model for Seismic Application
Henri Calandra, Total, France; terrence liao, Total E&P, USA; Asma Farjallah, University of Versailles Saint-Quentin, France; Issam Said, Université Paris 6, France; Sayan Gosh, University of Houston, USA; Alan Richardson, Massachusetts Institute of Technology, USA

12:00-12:25 Krylov Basis Orthogonalization Algorithms on Many Core Architectures
Christophe Calvin, CEA Saclay, France; Serge G. Petiton, Universite de Lille 1, France; Fan Ye, CEA, France

Friday, July 12

MS125

Sparse and Low-rank Modeling in the Geophysical Sciences

10:30 AM-12:30 PM

Room:Pacific Salon 7

Sparse approximation and low-rank modeling are at the heart of many important geophysical challenges in remote sensing industry, down from the subsurface geodetic and seismic imaging up to the spaceborne environmental imaging and predictions. Recent developments in low-rank modeling and sparse promoting approximation methods are going to develop the next generation of geophysical acquisition, processing, and forecasting algorithms. The goal of this minisymposium is to bridge the gaps and bring the scientists across the aisles to discuss some of the very recent and exciting developments of such modeling and highlight fundamental applications related to these explorations in important geophysical inverse problems.

Organizer: Mohammad Ebtehaj
University of Minnesota, USA

Organizer: Gilad Lerman
University of Minnesota, USA

10:30-10:55 Geophysics Meets Spectral Graph Theory: Interferometric Waveform Inversion
Laurent Demanet, Massachusetts Institute of Technology, USA

11:00-11:25 Seismic Tomography with Sparsity Constraints, at the Global and the Exploration Scale
Frederik J. Simons and Yanhua Yuan, Princeton University, USA; Jean Charlety, Geosciences Azur Universite de Nice, France; Ignace Loris, Université Libre de Bruxelles, Belgium; Sergey Voronin, Université de Nice, France; Guust Nolet, Université de Nice, Sophia Antipolis, France; Ingrid Daubechies, Duke University, USA

11:30-11:55 Sparse Solution of Nonlinear Subsurface Flow Inverse Problems
Benham Jafarpour, University of Southern California, USA

12:00-12:25 Variational Data Assimilation with Sparse Regularization
Efi Foufoula-Georgiou and Mohammad Ebtehaj, University of Minnesota, USA

Friday, July 12

MS126

Recent Developments in Numerical Methods for PDEs - Part III of IV

10:30 AM-12:30 PM

Room:Eaton

For Part 2 see MS111
For Part 4 see MS137
Partial Differential Equations play an important role in the mathematical modeling of real life applications. Very often, the solution to these equations can only be obtained by the use of appropriate numerical schemes. Consequently, there is a need for the design of accurate and computationally efficient methods that can serve as a reliable tool in mathematical modeling. Recent progress and open questions in the area will be discussed. Talks may address theoretical and computational aspects of the numerical methods, as well as different applications arising from biomedical problems, geophysical flows, and Material Sciences problems.

Organizer: Yekaterina Epshteyn
University of Utah, USA

Organizer: Fengyan Li
Rensselaer Polytechnic Institute, USA

10:30-10:55 Numerical Modeling Methane Hydrate Evolution
Malgorzata Peszynska, Nathan L. Gibson, Patricia Medina, and Ralph Showalter, Oregon State University, USA

11:00-11:25 A Two-Grid Method for Coupled Free Flow with Porous Media Flow
Prince Chidyagwai, Temple University, USA

11:30-11:55 A Robust Central-Upwind Scheme for 2D Shallow Water Equations
Jason Albright and Yekaterina Epshteyn, University of Utah, USA; Alexander Kurganov, Tulane University, USA

12:00-12:25 Numerical Solution of Miscible Displacement under Low Regularity
Beatrice Riviere, Rice University, USA

Friday, July 12

CP19

Fluid Structure Interaction

10:30 AM-12:10 PM

Room:Dover

Chair: Jared A. Hicks, Northwestern University, USA

10:30-10:45 A Continuum Model for the Simultaneous Growth and Deformation of Biofilms
Jared A. Hicks and David L. Chopp, Northwestern University, USA

10:50-11:05 Low-Reynolds-Number Swimming in Two-Phase Fluids
Jian Du, Florida Institute of Technology, USA; James P. Keener, University of Utah, USA; Robert D. Guy, University of California, Davis, USA; Aaron L. Fogelson, University of Utah, USA

11:10-11:25 A Supercavitating Flexible Hydrofoil in a Stream of Ideal Fluid
Anna Zemlyanova, Texas A&M University, USA

11:30-11:45 Eulerian/Lagrangian Sharp Interface Schemes for Compressible Multimaterials
Thomas Milcent, I2M Bordeaux, France

11:50-12:05 Stable Explicit Interface Advancing Scheme for Fluid-Solid Interaction with Applications to Fish Swimming Simulation
Jie Liu, National University of Singapore, Singapore

Friday, July 12

CP20

Dynamical Systems Applications

10:30 AM-12:50 PM

Room:Brittany

Chair: Claus Kadelka, Virginia Tech, USA

10:30-10:45 Stabilizing Gene Regulatory Networks Through Feed Forward Loops
Claus Kadelka, Virginia Tech, USA; David Murrugarra, Georgia Institute of Technology, USA; Reinhard Laubenbacher, Virginia Bioinformatics Institute, USA

10:50-11:05 A Unified Approach for Controlling Crosstalk in Broadband Optical Waveguide Systems
Avner Peleg, State University of New York, Buffalo, USA; Quan M. Nguyen, Vietnam National University at Ho Chi Minh City, Vietnam; Yeojin Chung, Southern Methodist University, USA

11:10-11:25 Optimization of Two and Three-Link Snake-Like Locomotion
Fangxu Jing, University of Southern California, USA; Silas Alben, University of Michigan, USA

11:30-11:45 Spiking Properties of Fractional Order Leaky Integrate-and-Fire Model
Wondimu W. Teka, Toma Marinov, and Fidel Santamaria, University of Texas, San Antonio, USA

11:50-12:05 Crosstalk Dynamics of Nls Solitons in Many-Body Interaction
Quan M. Nguyen, Vietnam National University at Ho Chi Minh City, Vietnam; Avner Peleg and Paul Glenn, State University of New York, Buffalo, USA

12:10-12:25 Global Synchronization For Coupled Map Lattices in Ecology
Jonq Juang and Chun-Ming Huang, National Chiao Tung University, Taiwan

12:30-12:45 Extreme Events and Travel Time Reliability in Coupled Spatial Networks
Mao-Bin Hu, Qing-Song Wu, and Rui Jiang, University of Science and Technology of China, China

Friday, July 12

CP21

Life Sciences II

10:30 AM-12:50 PM

Room:Stratford

Chair: Michael A. Robert, North Carolina State University, USA

10:30-10:45 Mathematical Modeling of the Spread of Antibiotic Resistant Bacteria in a Hospital
Michele Joyner, Ed Snyder, and Adam White, East Tennessee State University, USA

10:50-11:05 Analysis of Si Model for a Chronic Disease with Multiple Interacting Populations Using Subpopulations with Forcing Terms
Katharine Gurski, Howard University, USA; Evelyn Thomas, Bennett College For Women, USA; Kathleen A. Hoffman, University of Maryland, Baltimore County, USA

11:10-11:25 Spread of Avian Influenza Pandemic to Usa Via Air Travel
Trang Le and Necibe Tuncer, University of Tulsa, USA

11:30-11:45 Utilizing Female-Killing Strategies in the Optimal Control of the Dengue Vector, *Aedes Aegypti*
Michael A. Robert, Fred Gould, and Alun Lloyd, North Carolina State University, USA

11:50-12:05 Optimal Control of Influenza Model
Jungeun Kim and Jeehyun Lee, Yonsei University, South Korea; Hee-Dae Kwon, Inha University, Korea

12:10-12:25 Fractional Order Model of Rabies
Elif Demirci, Ankara University, Turkey

12:30-12:45 Hybrid On-Off Control for An HIV Model Based on a Linear Control Problem
Hee-Dae Kwon, Inha University, Korea

Friday, July 12

CP22

Optimization

10:30 AM-12:10 PM

Room:Clarendon

Chair: Ke Han, Pennsylvania State University, USA

10:30-10:45 Dynamic Congestion and Tolls with Mobile Source Emission
Ke Han, Terry Friesz, Hongcheng Liu, and Tao Yao, Pennsylvania State University, USA

10:50-11:05 Differential Variational Inequality Approach to Dynamic Games with Shared Constraints
Xiaojun Chen, Hong Kong Polytechnic University, China

11:30-11:45 A Perfect Match Condition for Point-Set Matching Problems Using the Optimal Mass Transport Approach
Pengwen Chen, National Chung-Hsing University, Taiwan; Ching-Long Lin, University of Iowa, USA; I-Liang Chern, National Taiwan University, Taiwan

11:50-12:05 Single Machine Scheduling to Minimize Tardy Jobs
Ali Allahverdi, Kuwait University, Kuwait; Asiye Aydilek and Harun Aydilek, Gulf University for Science and Technology, Kuwait

Friday, July 12

Systems Oversight Committee (SOC)

11:00 AM-12:15 PM

Room:Sunrise

SOC and FMC Joint Lunch

12:15 PM-1:30 PM

Room:Sunset

Lunch Break

12:30 PM-2:00 PM

Attendees on their own

Financial Management Committee (FMC)

1:30 PM-3:30 PM

Room:Sunset

Friday, July 12

IP4

Short-Term Renewable Energy Forecasting: Current Status, Challenges and Opportunities

2:00 PM-2:45 PM

Room:Town & Country

Chair: Mihai Anitescu, Argonne National Laboratory, USA

The cost of integrating power from variable renewable energy sources such as wind and solar into electric systems is strongly linked to the accuracy of short-term (0-48 hours) predictions. Although forecasts from current approaches are providing considerable value, they often fail to anticipate critical events in which the energy resource experiences large and rapid changes. The presentation will provide an overview of the current status of renewable energy forecasting tools and performance, the key challenges that must be addressed to increase the value of forecasts and the near-term opportunities associated with new atmospheric sensor and modeling technology.

John Zack
MESO, Inc., USA

Friday, July 12

IP5

The Search for a Human Fingerprint in the Changing Thermal Structure of the Atmosphere

2:45 PM-3:30 PM

Room:Town & Country

Chair: Mary Silber, Northwestern University, USA

Satellite temperature measurements reveal multi-decadal tropospheric warming and stratospheric cooling, punctuated by short-term volcanic signals of reverse sign. Similar long- and short-term temperature signals occur in model simulations driven by human-caused changes in atmospheric composition and natural variations in volcanic aerosols. Previous research attempted to discriminate a human-caused latitude/altitude pattern of atmospheric temperature change ("fingerprint") from the background noise of internal variability. We present the first evidence that a human fingerprint can also be identified relative to the larger "total" noise arising from internal variability, solar irradiance changes, and volcanic forcing.

Benjamin Santer
Lawrence Livermore National Laboratory, USA

Coffee Break

3:30 PM-4:00 PM

Room:Golden West/California

Friday, July 12

MS127

Short-term Wind and Solar Power Production Forecasting: Current Status and Challenges

4:00 PM-5:30 PM

Room:Town & Country

The cost of integrating power from variable renewable energy sources such as wind and solar into electric systems is strongly linked to the accuracy of short-term (0-12 hours) predictions. Forecasts from current approaches often fail to anticipate critical events in which the energy resource experiences large and rapid changes. The fundamental issue is the inability to adequately model the non-linear interaction of atmospheric features on multiple space-time scales with sparse input datasets. Focusing on two approaches: rapid-update numerical weather prediction and time-lagged, geo-statistical models, we will discuss research addressing the issues that limit the effectiveness of each approach. This session was organized to complement invited speaker John Zack's presentation (see IP4).

Organizer: John Zack
MESO, Inc., USA

Organizer: Chandrika Kamath
Lawrence Livermore National Laboratory, USA

4:00-4:25 Statistical Applications of Offsite Meteorological Measurements for Short-Horizon Wind Power Prediction
Craig Collier, GL Garrad Hassan, USA

4:30-4:55 The Challenges of Wind Prediction from a Forecast Sensitivity Perspective
Brian Ancell, Texas Tech University, USA

5:00-5:25 Stochastic Learning Methods for Solar Forecasting
Hugo Pedro and Carlos Coimbra, University of California, San Diego, USA

Friday, July 12

MS128

Tipping Points: Mathematical Mechanisms and Applications to Natural World

4:00 PM-5:30 PM

Room:San Diego

The notion of a "tipping point" or "critical transition" is used by scientists investigating threshold behaviour in complex systems. In the last few years, the idea of tipping points has especially caught the imagination in environmental science due to the possibility, also indicated by paleoclimate data, that natural systems may abruptly change or tip from one regime to another in a comparatively short time. However, there is a gap between the tipping phenomena in the complex world of science and the currently available mathematical and statistical theory. This minisymposium highlights mathematical difficulties involved in narrowing this gap. This session was organized to complement invited speaker Benjamin Santer's presentation (see IP5).

Organizer: Sebastian M. Wieczorek
University of Exeter, United Kingdom

Organizer: Mary Silber
Northwestern University, USA

4:00-4:25 Tipping Points: Overview and Challenges
Mary Silber, Northwestern University, USA

4:30-4:55 Asymptotics of Stochastically and Periodically Forced Tipping: Advance Or Delay
Rachel Kuske and Jielin Zhu, University of British Columbia, Canada

5:00-5:25 A Mathematical Framework for Critical Transitions: Normal Forms, Variance and Applications
John Guckenheimer, Cornell University, USA

Friday, July 12

MS129

AMS Minisymposia on Complexity and the Foundations of Numerical Computation - Part III of III

4:00 PM-5:30 PM

Room:Pacific Salon 1

For Part 2 see MS114

Sponsored by the American Mathematical Society

This session will address some fundamental questions about numerical computations: what can be computed efficiently? Are there intrinsically hard problems? One way to measure the cost of numerical computations is to count the number of arithmetic operations. In that setting, known hardness results are related to computational algebraic geometry problems. The main topics for this workshop are: Complexity theory of real number algorithms. Complexity of numerical methods. Computational Algebraic Geometry. Numerical Nonlinear Equation Solving. This session was organized to complement invited AMS speaker Michael Shub's presentation (see IP3).

Organizer: Gregorio Malajovich

Universidade Federal do Rio De Janeiro, Brazil

Organizer: Luis Miguel Pardo

Universidad de Cantabria, Spain

4:00-4:25 Self-Convexity

Gregorio Malajovich, Universidade Federal do Rio De Janeiro, Brazil

4:30-4:55 Hamiltonian Approach to Geodesics Computation in Condition Metric

Dimitri Nowicki, University of Massachusetts, USA

5:00-5:25 Title Not Available at Time of Publication

Luis Miguel Pardo, Universidad de Cantabria, Spain

Friday, July 12

MS130

Recent Development on Photoacoustic Tomography - Part II of II

4:00 PM-6:00 PM

Room:Pacific Salon 2

For Part 1 see MS115

Organized by SIAG/IS

Photoacoustic tomography is a recently developed hybrid imaging modality that can render optical contrast with ultrasound resolution and stability. It has been successfully applied to biomedical research, clinical practices and other areas. The two key physical processes in photoacoustic tomography are (1) light propagation and optical absorption, (2) conversion to acoustic sources and acoustic propagation. Consequently, photoacoustic tomography is an inverse source problem. In this symposium, mathematical and computational issues -- such as incomplete data, variable/discontinuous acoustic speed, iterative imaging, and quantitative photoacoustic tomography -- as well as practical developments will be discussed. This session was organized to complement invited speaker Lihong Wang's presentation (see IC9).

Organizer: Hongkai Zhao

University of California, Irvine, USA

Organizer: Lihong Wang

Washington University, St. Louis, USA

4:00-4:25 Inverse Source Problem for the Wave Equation with an Uncertain Wave Speed

Lauri Oksanen, University of Washington, USA

4:30-4:55 Inverse Problems in Quantitative Fluorescence Photoacoustic Tomography

Kui Ren, University of Texas at Austin, USA; Hongkai Zhao, University of California, Irvine, USA

5:00-5:25 Quantitative Photoacoustic Tomography

Hongkai Zhao, University of California, Irvine, USA

5:30-5:55 Inverse Problems with Internal Information

Peter Kuchment, Texas A&M University, USA

Friday, July 12

MS131

Stochastic Model, Uncertainty Quantification and Stochastic Inversion - Part VI of VI

4:00 PM-5:30 PM

Room:Pacific Salon 3

For Part 5 see MS116

Uncertainty is everywhere, from material discovery to reactive transport in porous media. Quantifying the uncertainty associated with the parameters in complex systems is critical, which can help us to verify our modern simulation codes and assess confidence levels. Our aim is to use accurate computational simulations to predict the behavior of complex systems. For large number of random dimensions, advanced stochastic approximation techniques are necessary to minimize the complexity of mathematical models. This minisymposium will explore recent advances in numerical algorithms and applications for uncertainty quantification, model reduction, and stochastic inversion in large-scale high-dimensional complex systems.

Organizer: George E. Karniadakis

Brown University, USA

Organizer: Mihai Anitescu

Argonne National Laboratory, USA

Organizer: Karen E. Willcox

Massachusetts Institute of Technology, USA

Organizer: Omar Ghattas

University of Texas at Austin, USA

Organizer: Guang Lin

Pacific Northwest National Laboratory, USA

4:00-4:25 Stochastic Models of Cancer Evolution

Jasmine Y. Foo, University of Minnesota, USA

4:30-4:55 A Multi-stage Sparse Grid Collocation Method for Stochastic Differential Equations with White Noise

Zhongqiang Zhang, Brown University, USA; Michael Tretyakov, University of Nottingham, United Kingdom; Boris Rozovsky and George E. Karniadakis, Brown University, USA

5:00-5:25 Numerical Techniques for Optimal Sequential Experimental Design via Dynamic Programming

Xun Huan and Youssef M. Marzouk, Massachusetts Institute of Technology, USA

Friday, July 12

MS132

Mathematics of Compressible Fluid Flows-Part II of II

4:00 PM-5:30 PM

Room:Royal Palm 1

For Part 1 see MS117

We present some recent results in the mathematical theory of compressible fluid flows. The main topics range from purely theoretical questions related to well-posedness of the associated systems of partial differential equations, qualitative properties of solutions, to numerical issues. The discussion focuses mostly on compressible viscous fluids described by means of the Navier-Stokes and related systems.

Organizer: Eduard Feireisl

Mathematical Institute ASCR, Prague, Czech Republic

4:00-4:25 BV Estimate for Isentropic Gas Dynamics

Geng Chen, Pennsylvania State University, USA

4:30-4:55 Asymptotic Preserving Schemes for Low Mach Number Flow

Maria Lukacova, University of Mainz, Germany

5:00-5:25 Existence Results for a Model of the Compressible Mixtures Flow

Ewelina Zatorska, Warsaw University of Technology, Poland

Friday, July 12

MS133

Integral Equations: Discretization, Conditioning, and Applications - Part II of II

4:00 PM-6:00 PM

Room:Royal Palm 2

For Part 1 see MS118

Integral equation methods have been successfully used to solve problems in many areas of science and engineering. However, many open issues remain, for example, well-conditioned discretizations, quadratures for layer potentials, complex geometries, preconditioners, fast multipole methods, and fast direct solvers. This minisymposium will discuss recent developments in addressing these issues.

Organizer: Bryan D. Quaife

University of Texas at Austin, USA

Organizer: George Biros

University of Texas at Austin, USA

4:00-4:25 Results and Applications from a Generalized Software Framework for Treecode/FMM

Cris R. Cecka, Harvard University, USA

4:30-4:55 An Approximate Deflation Preconditioning Method Based on Multiple Grids for Wave Scattering Problems

Josef Sifuentes, Texas A&M University, USA

5:00-5:25 Parallel Higher-order Boundary Integral Electrostatics Computation on Molecular Surfaces with Curved Triangulation

Weihua Geng, University of Alabama, Tuscaloosa, USA

5:30-5:55 A Petascale Fast Multipole Method for Volume Potentials

Dhairya Malhotra, University of Texas at Austin, USA

Friday, July 12

MS134

Asymptotics of Orthogonal Polynomials

4:00 PM-6:00 PM

Room:Royal Palm 3

Organized by SIAG/OPSF

The speakers will focus on issues of asymptotic behavior of orthogonal polynomials and related quantities. These asymptotics have wide ranging applications in statistics, numerical analysis, combinatorics, harmonic analysis, and mathematical physics. In particular, our four speakers will focus on asymptotics that involve random matrices and variational problems; Nikolskii inequalities; orthogonal polynomials associated with regions in the complex plane; and Bessel functions.

Organizer: Doron S. Lubinsky

Georgia Institute of Technology, USA

4:00-4:25 On Order Derivatives of Bessel Functions

Mark Dunster, San Diego State University, USA

4:30-4:55 The Generalized Christoffel Functions and Extremal Problems

Eli Levin, The Open University of Israel, Israel

5:00-5:25 Universality Limits for Random Matrices and Orthogonal Polynomials

Doron S. Lubinsky, Georgia Institute of Technology, USA

5:30-5:55 Spectral Transforms and Orthogonal Polynomials

Brian Simanek, Vanderbilt University, USA

Friday, July 12

MS135

Methods, Applications, and Innovations in Electromagnetic Imaging

4:00 PM-6:00 PM

Room:Royal Palm 4

Electrical impedance tomography (EIT) is an imaging method where one probes an unknown conductive body using electric currents and aims to recover the inner conductivity distribution of the body from the data. This minisymposium highlights innovations in reconstruction algorithms, particularly for medical imaging applications.

Organizer: Jennifer L. Mueller

Colorado State University, USA

4:00-4:25 Reconstructions of Lung Pathologies by a D-Bar Method for 2-D Electrical Impedance Tomography

Jennifer L. Mueller, Colorado State University, USA; Sarah Hamilton, University of Helsinki, Finland; Natalia Herrera and Miguel Montoya, Colorado State University, USA

4:30-4:55 Mathematical Problems in the Diagnosis and Treatment of Disease

David Isaacson, Rensselaer Polytechnic Institute, USA

5:00-5:25 Benefits of using Anatomical and Physiological Priors in Electrical Impedance Tomography: Experimental Results

Erick Camargo, *Fernando S. Moura*, Thais H. S. Sousa, Olavo L. Silva, Caio Biasi, Alessandro R. C Martins, and Denise T. Fantoni, University of Sao Paulo, Brazil; Jari Kaipio, University of Auckland, New Zealand; Raul G. Lima, University of Sao Paulo, Brazil

5:30-5:55 Comparison of Bipolar Injection Patterns in Terms of Noise Propagation, Image Quality and Observability

Olavo L. Silva, Fernando S. Moura, Erick D. L. B. Camargo, Marcelo B. P. Amato, and *Raul G. Lima*, University of Sao Paulo, Brazil

Friday, July 12

MS136

Recent Advances on Optimization Methods and their Applications

4:00 PM-6:00 PM

Room:Royal Palm 5

Several recently developed nonlinear optimization methods, algorithms and their possible applications will be presented in this session. These optimization methods and algorithms include polynomial optimization with real varieties, optimal methods for a class of composite variational problems, affine scaling methods for optimiztion problems with polyhedral constraints, adaptive bregman pperator splitting algorithm for nonsmooth convex optimization with application in parallel image recostruction.

Organizer: Hongchao Zhang

Louisiana State University, USA

4:00-4:25 Polynomial Optimization with Real Varieties

Jiawang Nie, University of California, San Diego, USA

4:30-4:55 Optimal Methods for a Class of Composite Variational Problems

Guanghui Lan, University of Florida, USA

5:00-5:25 The Limited Memory Conjugate Gradient Method

Hongchao Zhang, Louisiana State University, USA

5:30-5:55 Inexact BOSVS Algorithm for Ill-Posed Inversion with Application to PPI

Maryam Yashtini and William Hager, University of Florida, USA; Hongchao Zhang, Louisiana State University, USA

Friday, July 12

MS137

Recent Developments in Numerical Methods for PDEs - Part IV of IV

4:00 PM-6:00 PM

Room:Eaton

For Part 3 see MS126

Partial Differential Equations play an important role in the mathematical modeling of real life applications. Very often, the solution to these equations can only be obtained by the use of appropriate numerical schemes. Consequently, there is a need for the design of accurate and computationally efficient methods that can serve as a reliable tool in mathematical modeling. Recent progress and open questions in the area will be discussed. Talks may address theoretical and computational aspects of the numerical methods, as well as different applications arising from biomedical problems, geophysical flows, and Material Sciences problems.

Organizer: Yekaterina Epshteyn

University of Utah, USA

Organizer: Fengyan Li

Rensselaer Polytechnic Institute, USA

4:00-4:25 High-Order Positivity Preserving Methods for Hyperbolic Equations

Martin Berzins, University of Utah, USA

4:30-4:55 Parametrized Maximum Principle Flux Limiters for High Order Schemes Solving Hyperbolic Conservation Law

Zhengfu Xu, Michigan Technological University, USA

5:00-5:25 Threshold Dynamics for Networks with Arbitrary Surface Tensions

Selim Esedoglu, University of Michigan, USA

5:30-5:55 Further Study of the Back and Forth Error Compensation and Correction Method for Advection Equations and Hamilton Jacobi Equations

Yingjie Liu, Georgia Institute of Technology, USA

Friday, July 12

MS138

Problems and Progress in Geometric Mechanics

4:00 PM-6:00 PM

Room:Pacific Salon 7

In recent years, the focus of geometric mechanics has been shifting from fundamental theory towards applications, and there is now significant momentum towards applications beyond classical mechanics and control. In this minisymposium, the speakers will discuss the use of geometric mechanics in a number of these novel application areas, with examples taken from quantum mechanics, hydrodynamics, optics and light transport, and image analysis. The focus will be on identifying open problems and directions for future research.

Organizer: Joris Vankerschaver
Imperial College London, United Kingdom

Organizer: Tomoki Ohsawa
University of Michigan, USA

4:00-4:25 An Euler-Poincare Description of Curve Matching
Joris Vankerschaver, Imperial College London, United Kingdom; Lyle Noakes, University of Western Australia, Australia; Darryl Holm, Imperial College London, United Kingdom

4:30-4:55 Symplectic Semiclassical Wave Packet Dynamics
Tomoki Ohsawa, University of Michigan, USA; Melvin Leok, University of California, San Diego, USA

5:00-5:25 The Geometry of Phase Space Lifts: From Maxwell's Equations to Radiative Transfer Theory
Christian Lessig, California Institute of Technology, USA

5:30-5:55 Unimodulariy and Conservation of Volumes in Nonholonomic Mechanics
Luis Garcia Naranjo, Universidad Nacional Autonoma de Mexico, Mexico

Friday, July 12

MS139

Stochastic Analysis, Control and Computation of Fluid Dynamics and other Physical Phenomena - Part IV of IV

4:00 PM-6:30 PM

Room:Towne

For Part 3 see MS123

Stochastic analysis, control and computation of nonlinear infinite dimensional systems such as fluid flow systems and other systems modeled by PDEs have seen substantial growth in the past two decades due to its importance in science and engineering. These developments have the potential to impact a number of domestic and defense industries. With many unsettled issues and problems remaining, the need for new methods and techniques is emerging. The aim of this mini-symposium is to bring together leading experts and junior researchers who work in this area with an emphasis on control of fluids and other physical phenomena to present recent advances, to address current challenges, and to identify new directions.

Organizer: S.S. Ravindran
University of Alabama, Huntsville, USA

Organizer: Meng Xu
Rockefeller University, USA

Organizer: Nathan D. Moshman
Naval Postgraduate School, USA

4:00-4:25 Optimal Reconstruction of Constitutive Relations in Complex Multiphysics Phenomena
Bartosz Protas, McMaster University, Canada; Vladislav Bukshtynov, Stanford University, USA

4:30-4:55 Dynamics of Inertial Particles in Viscous Flows Driven By Oscillating Cilia
Scott D. Kelly, University of North Carolina, Charlotte, USA; Kwitae Chong and Jeff D. Eldredge, University of California, Los Angeles, USA; Stuart Smith, University of North Carolina, Charlotte, USA

continued in next column

5:00-5:25 H Infinity Feedback Boundary Stabilization for Incompressible Fluid Flow
Sheetal Dharmatti, IISER-TVM, India; Jean Pierre Raymond, Institut de Mathématiques de Toulouse, France

5:30-5:55 Investigation of Steady NS Flows past a Cylinder using a Spectral Method, which basis Functions Spans the Infinite Domain
Jonathan Gustafsson, Naval Postgraduate School, USA; Bartosz Protas, McMaster University, Canada

6:00-6:25 Mathematical Approaches to Stochastic Signaling and Pattern Formation
Likun Zheng, University of California, Irvine, USA

Friday, July 12

CP23

Fluids II

4:00 PM-6:00 PM

Room:Clarendon

Chair: Victor A. Miroshnikov, College of Mount Saint Vincent, USA

4:00-4:15 Effectiveness of Stiffly-Stable Projection Schemes for Smooth Particle Hydrodynamics Simulations of Transient Viscous Flows
Nathaniel Trask and Martin Maxey, Brown University, USA

4:20-4:35 A Massively Parallel Finite Element Solver for High Definition Chromatography Simulations
Andreas Puettmann, German Research School for Simulation Sciences, Germany; Eric Von Lieres, Research Centre Juelich, Germany

4:40-4:55 Computing Nonlinear Waves of the Korteweg-De Vries and Korteweg-De Vries-Burgers Equations in Invariant Structures
Victor A. Miroshnikov, College of Mount Saint Vincent, USA

5:00-5:15 Two-Way Coupling of Lagrangian and Eulerian Governing Equations for Particles in Incompressible Fluids
Ilker Tari and Sibel Tari, Middle East Technical University, Turkey

5:20-5:35 Stokes Flow Past a Porous Body of Arbitrary Shape
T. Amaranath, University of Hyderabad, India

5:40-5:55 Slip Flow Past Bodies of Arbitrary Shape in a Viscous, Incompressible Flow
Sri Padmavati Bhavaraju, University of Hyderabad, India

Friday, July 12

CP24

Life Sciences III

4:00 PM-5:20 PM

Room:Brittany

Chair: Carrie A. Manore, Tulane University, USA

4:00-4:15 Models for Comparing Chikungunya and Dengue
Carrie A. Manore, Sen Xu, and Kyle S. Hickmann, Tulane University, USA; Helen Wearing, University of New Mexico, USA; Mac Hyman, Tulane University, USA

4:20-4:35 Modeling the Cell Biology of the Heat Shock Response of Barley Aleurone Cells
Hoa Nguyen, Trinity University, USA

4:40-4:55 A Discrete Model of Denitrification in Pseudomonas Aeruginosa
Seda Arat, Virginia Tech, USA; Michael Schalis and George Bullerjahn, Bowling Green State University, USA; Reinhard Laubenbacher, Virginia Bioinformatics Institute, USA

5:00-5:15 Modeling Sustainability of Biological Systems
Luis J. Martinez and Pablo Padilla, Universidad Nacional Autonoma de Mexico, Mexico

Friday, July 12

CP25

Uncertainty Quantification

4:00 PM-5:40 PM

Room:Pacific Salon 6

Chair: Michael McKerns, California Institute of Technology, USA

4:00-4:15 *mystic:* a Framework for Uncertainty Quantification and Predictive Science
Michael McKerns and Houman Owhadi, California Institute of Technology, USA; Tim Sullivan, University of Warwick, United Kingdom; Alta Fang, Princeton University, USA; Michael Aivazis, California Institute of Technology, USA

4:20-4:35 Multi-Scale Modeling with Generalized Dynamic Discrepancy
David S. Mebane, West Virginia University, USA; Sham Bhat and Curtis Storlie, Los Alamos National Laboratory, USA

4:40-4:55 Uncertainty Quantification Based on Joint Response-Excitation Pdf Equations
Heyrim Cho, Daniele Venturi, and George E. Karniadakis, Brown University, USA

5:00-5:15 Separating Intrinsic and Parametric Uncertainty in Stochastic Simulations
Kyle S. Hickmann, Tulane University, USA

5:20-5:35 Numerical Validation of Data Assimilation Codes Generated by the Yao Software
Julien Brajard, Universite de Paris VI, France; Pei Li, Fabienne Jezequel, Hector-Simon Benavides, and Sylvie Thiria, UPMC, France

Board of Trustees, Executive Session

4:00 PM-10:00 PM

Room:Sunrise

Saturday, July 13

Board of Trustees, Regular Session

8:30 AM-3:30 PM

Room:Sunrise