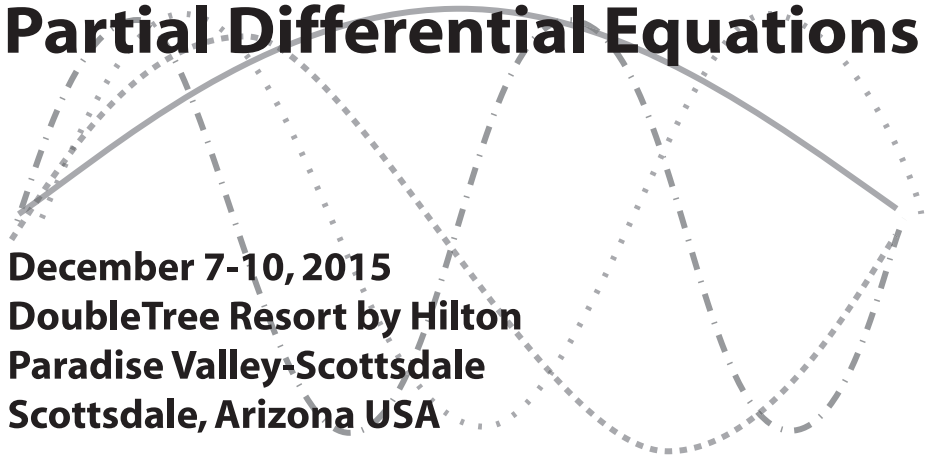
Final Program and Abstracts

SIAM Conference on
Analysis of Partial Differential Equations



December 7-10, 2015
DoubleTree Resort by Hilton
Paradise Valley-Scottsdale
Scottsdale, Arizona USA

Sponsored by the SIAM Activity Group on Analysis of Partial Differential Equations

The Activity Group on Analysis of Partial Differential Equations fosters activity in the analysis of partial differential equations (PDE) and enhances communication between analysts, computational scientists and the broad PDE community. Its goals are to provide a forum where theoretical and applied researchers in the area can meet, to be an intellectual home for researchers in the analysis of PDE, to increase conference activity in PDE, and to enhance connections between SIAM and the mathematics community.

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The SIAM registration desk is located in the Grand Ballroom Foyer - Main Level. It is open during the following hours:

Sunday, December 6

4:00 PM – 8:00 PM

Monday, December 7

7:30 AM – 5:30 PM

Tuesday, December 8

8:00 AM – 5:30 PM

Wednesday, December 9

8:00 AM – 5:30 PM

Thursday, December 10

8:00 AM – 3:00 PM

Hotel Address

DoubleTree Resort by Hilton Paradise Valley - Scottsdale

5401 N. Scottsdale Road

Scottsdale, Arizona 85250 USA

Hotel Telephone Number

To reach an attendee or leave a message, call +1-480-947-5400. If the attendee is a hotel guest, the hotel operator can connect you with the attendee's room.

Hotel Check-in and Check-out Times

Check-in time is 4:00 PM.

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* The Child's Garden 480-354-2122

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United States Department of Energy

List current October 2015.

Funding Agencies

SIAM and the conference organizing committee wish to extend their thanks and appreciation to U.S. National Science Foundation and U.S. Department of Energy for their support of this conference.

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Join SIAM and save!

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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 Session Room will have two (2) screens, one (1) data projector and one (1) overhead projector. The data projectors support VGA connections only. Presenters requiring an HDMI or alternate connection must provide their own adaptor.

All other concurrent/breakout rooms will have one (1) screen and one (1) data projector. The data projectors support VGA connections only. Presenters requiring an HDMI or alternate connection must provide their own adaptor.

If you have questions regarding availability of equipment in the meeting room of your presentation, please see a SIAM staff member at the registration desk.

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The DoubleTree Resort by Hilton Paradise Valley offers wireless Internet access to guestrooms in the SIAM block and in public areas of the hotel at no additional charge.

Complimentary wireless Internet access in the meeting space is also available to SIAM attendees.

In addition, a limited number of computers with Internet access will be available during registration hours.

Registration Fee Includes

- Admission to all technical sessions
- Business Meeting (open to SIAG/APDE members)
- Coffee breaks daily
- Poster Session
- Room set-ups and audio/visual equipment
- Welcome Reception and Poster Session

Job Postings

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

Important Notice to Poster Presenters

The poster session is scheduled for Sunday, December 6, from 6:00 PM – 8:00 PM. Poster presenters are requested to set up their poster material no later than 6:00 PM on Sunday, the official start time of the session. Posters will remain on display through Thursday, December 10 and must be removed by 11:00 AM. 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 12:00 PM on Thursday, December 10.

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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!

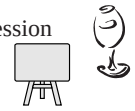
Comments?

Comments about SIAM meetings are encouraged! Please send to:

Cynthia Phillips, SIAM Vice President for Programs (*vpp@siam.org*).

Get-togethers

Welcome Reception and Poster Session



Sunday, December 6

6:00 PM – 8:00 PM

Business Meeting
(open to SIAG/APDE members)

Tuesday, December 8

7:15 PM – 8:00 PM

Complimentary beer and wine will be served.

Please Note

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Recording of Presentations

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

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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 this meeting is #SIAMPD15.

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Minitutorials

Tuesday, December 8

5:00 PM – 7:00 PM

MT1 PDE Aspects of Mean Field Games

Room: Forum – Lower Level

Organizer: **Pierre Cardaliaguet**, *Université Paris Dauphine, France*

Wednesday, December 9

5:15 PM – 7:15 PM

MT2 Simulating Stochastic Systems

Room: Forum – Lower Level

Organizer: **Jonathan Weare**, *University of Chicago, USA*

Prize Lecture

Wednesday, December 9

2:00 PM – 2:45 PM

SP1

SIAG/Analysis of Partial Differential Equations
Prize Lecture

Slow Modulation and Large-time Dynamics Near Periodic Waves

Room: Forum – Lower Level

Miguel Rodrigues, *Université de Rennes 1, France*

Invited Plenary Speakers

*** All Invited Plenary Presentations will take place in Forum - Lower Level***

Monday, December 7

11:00 AM – 11:45 AM

IP1 Tracing Genealogy Within an Invasion Wave

Kerry A. Landman, *University of Melbourne, Australia*

11:45 AM – 12:30 PM

IP2 Regularity Properties of the Euler Equations in Lagrangian Variables

Vlad C. Vicol, *Princeton University, USA*

Tuesday, December 8

11:00 AM – 11:45 AM

IP3 Hypersurfaces with Almost Constant Mean Curvature and Capillarity Theory

Francesco Maggi, *University of Texas at Austin, USA*

11:45 AM – 12:30 PM

IP4 Long Time Dynamics for Two Dimensional Water Wave Models

Daniel Tataru, *University of California, Berkeley, USA*

Wednesday, December 9

11:00 AM – 11:45 AM

IP5 Optimal Shape and Location of Sensors or Actuators in PDE Models

Emmanuel Trélat, U*niversité Pierre et Marie Curie, France*

11:45 AM – 12:30 PM

IP6 The Abelian Sandpile and Circle Packings

Charles Smart, *Cornell University, USA*

Invited Prenary Speakers

*** All Invited Plenary Presentations will take place in Forum - Lower Level***

Thursday, December 10

11:00 AM – 11:45 AM

IP7 Scientific Computing in the Movies and Virtual Surgery

Joseph Teran, *University of California, Los Angeles, USA*

11:45 AM – 12:30 PM

IP8 Customising Image Analysis Using Nonlinear Partial Differential Equations

Carola-Bibiane Schönlieb, *University of Cambridge, United Kingdom*

SIAM Activity Group on Analysis of Partial Differentioal Equations (SIAG/PDE)

www.siam.org/activity/pde

A GREAT WAY TO GET INVOLVED!

Collaborate and interact with mathematicians and applied scientists whose work involves analysis of partial differential equations

ACTIVITIES INCLUDE:

- Special sessions at SIAM meetings
- Biennial conference
- SIAG/PDE newsletter
- SIAG/PDE Prize
- PDE website

BENEFITS OF SIAG/PDE MEMBERSHIP:

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- Additional $10 discount on registration for the SIAM Conference on Analysis of Partial Differential Equations (excludes students)
- Electronic communications about recent developments in your specialty
- Eligibility for candidacy for SIAG/PDE office
- Participation in the selection of SIAG/PDE officers

ELIGIBILITY:

- Be a current SIAM member.

COST:

- $10 per year
- Student members can join two activity groups for free!

2014—2016 SIAG/PDE OFFICERS:

- Chair: Helena Nussenzveig Lopes
- Vice-Chair: Dejan Slepcev
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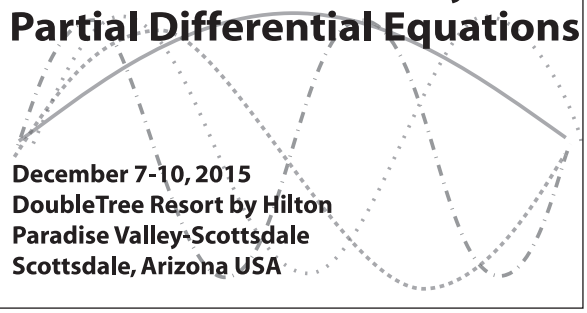
- Secretary: Becca Thomases

SIAM Conference on
Analysis of Partial Differential Equations



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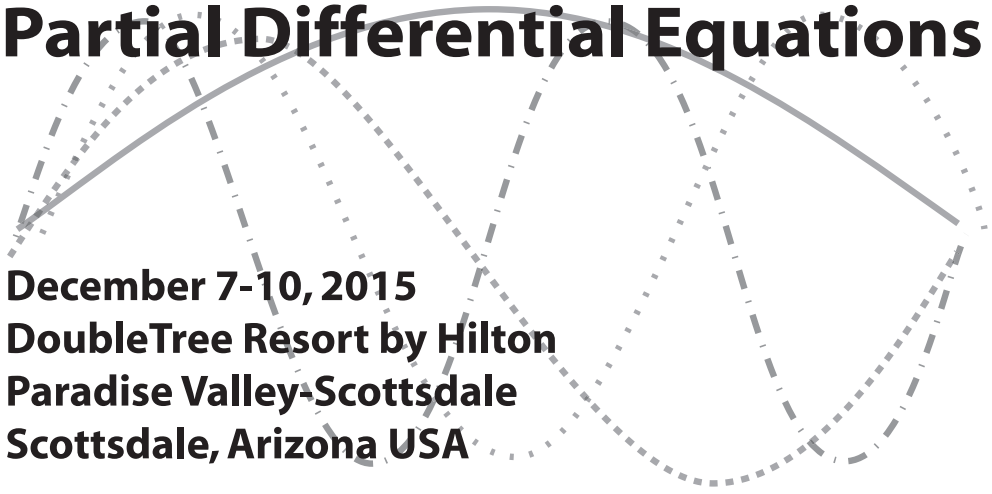
PD15 Program

SIAM Conference on

Analysis of Partial Differential Equations



December 7-10, 2015
DoubleTree Resort by Hilton
Paradise Valley-Scottsdale
Scottsdale, Arizona USA

Sunday, December 6

Registration

4:00 PM-8:00 PM

Room:Grand Ballroom Foyer - Main Level

PP1

Welcome Reception and Poster Session

6:00 PM-8:00 PM

Room:Forum - Lower Level

Four-Step Hybrid Type Method with Vanished Phase-Lag and Its First Derivatives for Each Level for the Approximate Integration of the Schrodinger Equation
Ibraheem Alolyan, King Saud University, Saudia Arabia

Phase Slip Solutions in Magnetically Modulated Taylor-Couette Flow
Farzana Khan, Quaid-i-Azam University, Islamabad, Pakistan; Rainer Hollerbach, Leeds University, United Kingdom

Charged Boundary-Layer Domain Walls in Thin Ferromagnetic Films
Ross Lund and Cyrill B. Muratov, New Jersey Institute of Technology, USA; Valeriy Slastikov, University of Bristol, United Kingdom

Frechet Differentiability in the Optimal Control of Parabolic Free Boundary Problems
Jessica Pillow, Rhodes College, USA; Ugur G. Abdulla, Florida Institute of Technology, USA; Dylanger Pittman, Williams College, USA; Jonathan Goldfarb, Florida Institute of Technology, USA

Monday, December 7

Registration

7:30 AM-5:30 PM

Room:Grand Ballroom Foyer - Main Level

Monday, December 7

MS1

Partial Differential Equations in Image Analysis and Processing - Part I of II

8:30 AM-10:30 AM

Room:Forum - Lower Level

For Part 2 see MS17

Nonlinear partial differential equations and non-smooth variational methods constitute one of the main analytical tools for modelling, analyzing and processing images. Apart from them being powerful computational tools for processing images, they are interesting mathematical objects whose analysis often requires very sophisticated tools from nonlinear PDE analysis, variational calculus, geometric measure theory and functional analysis. In this minisymposium we showcase some recent approaches that include transport equations for image restoration, PDEs on graphs for data clustering, free discontinuity approaches for image segmentation and non-smooth variational approaches for multi-channel image processing.

Organizer: Carola B. Schoenlieb
University of Cambridge, United Kingdom

Organizer: Laird Robert Hocking
University of Cambridge, United Kingdom

8:30-8:55 Reverse Engineering a Pde from An Image Inpainting Algorithm
Laird Robert Hocking, University of Cambridge, United Kingdom

9:00-9:25 Geometric Graph Based Algorithms
Andrea L. Bertozzi, University of California, Los Angeles, USA

9:30-9:55 A Chromaticity-Brightness Model for Color Images Denoising
Irene Fonseca, Carnegie Mellon University, USA

10:00-10:25 Variational Approach to Image Segmentation and Inpainting
Franco Tomarelli, Politecnico di Milano, Italy

Monday, December 7

MS2

Nonlocal Interaction Models: Dynamics, Asymptotics and Applications - Part I of II

8:30 AM-10:30 AM

Room:Rio Verde - Main Level

For Part 2 see MS15

A range of physical and biological systems — from biological swarms and granular media to crystallization and self-assembly of nano particles — can be described by mathematical models of nonlocal interactions. The purely nonlocal nature of these models presents a variety of mathematical challenges that require techniques from diverse areas applied mathematics to be combined in new ways. With this minisymposium, we aim to bring together young researchers and leading scholars who study nonlocal interaction models and their applications via variational, dynamical and asymptotic analysis.

Organizer: Katy Craig
University of California, Santa Barbara, USA

Organizer: Ihsan A. Topaloglu
McMaster University, Canada

8:30-8:55 Attractive-Repulsive Interaction of Sets and Height Constrained Densities
Ihsan A. Topaloglu, McMaster University, Canada

9:00-9:25 Existence and Geometry of Minimisers for the Interaction Energy
Francesco Patacchini, Imperial College London, United Kingdom

9:30-9:55 A New Method for Finding Approximate Global Minimizers to Pairwise Interaction Problems
David Shirokoff, New Jersey Institute of Technology, USA

10:00-10:25 Nonlocal Functionals and Dimensionality Reduction
Xin Yang Lu and *Dejan Slepcev*, Carnegie Mellon University, USA

Monday, December 7

MS3

Convex Integration and Degenerate Solutions to Nonlinear PDEs in Geometry and Physics - Part I of II

8:30 AM-10:30 AM

Room:Sonora - Main Level

For Part 2 see MS30

This minisymposium concerns questions of flexibility and rigidity of solutions to nonlinear pdes, with a focus on degenerate (flexible) weak solutions which can be obtained through methods of convex integration. Recent advances regarding Holder continuous dissipative solutions to Euler equations have renewed the interest in applying these methods to a wider range of problems, including the Monge-Ampere and transport equations. Similar efforts have also lead to progress regarding isometric immersions. Our objective is to bring together scientists involved with flexibility vs. rigidity in fluid dynamics and in geometric pdes, in order to investigate discuss advances and challenges from different perspectives

Organizer: Marta Lewicka
University of Pittsburgh, USA

Organizer: Reza Pakzad
University of Pittsburgh, USA

8:30-8:55 Convex Integration and Infinitely Many Weak Solutions to the Perona-Malik Equation in All Dimensions
Baisheng Yan, Michigan State University, USA; Seonghak Kim, Renmin University of China, China

9:00-9:25 Convex Integration for Active Scalar Equations
Philip Isett, Massachusetts Institute of Technology, USA

9:30-9:55 A Nash-Kuiper Theorem for $C^{1,1/5-\varepsilon}$ Embeddings of Surfaces in 3 Dimensions
Dominik Inauen and Camillo De Lellis, University of Zurich, Switzerland; László Jr. Székelyhidi, University of Leipzig, Germany

10:00-10:25 Convex Integration for the Monge-Ampere Equation
Marta Lewicka and Reza Pakzad, University of Pittsburgh, USA

Monday, December 7

MS4

Fluid Models, Turbulence and Data Assimilation - Part I of II

8:30 AM-10:30 AM

Room:Sedona - Main Level

For Part 2 see MS18

Many dissipative dynamical systems of practical interest arise in the context of geophysical flows related to the atmosphere and ocean. The dynamics of such models are generically chaotic and "turbulent," calling for a probabilistic framework to properly analyze the underlying phenomena. Moreover, due to the imprecise knowledge of the initial condition for the governing equations, it can be helpful to dynamically update the solution with data collected continuously-in-time to improve prediction. This symposium will therefore focus on the interplay of topics such as regularity, data assimilation, asymptotic dynamics and statistical/stochastic solutions in analyzing turbulence in dissipative dynamical systems.

Organizer: Vincent R. Martinez
Tulane University, USA

Organizer: Michael S. Jolly
Indiana University, USA

Organizer: Animikh Biswas
University of Maryland, Baltimore County, USA

8:30-8:55 A Data Assimilation Algorithm for the Hyperdissipative Sqg Equation
Vincent R. Martinez, Tulane University, USA; Michael S. Jolly, Indiana University, USA; Edriss Titi, Texas A&M University, USA

9:00-9:25 Backward in Time Behavior of Nonlinear Dissipative Equations – The Effect of Energy Spectra
Yanqiu Guo, Weizmann Institute of Science, Israel; *Edriss S. Titi*, Texas A&M University, USA and Weizmann Institute of Science, Israel

continued on next page

Monday, December 7

MS4

Fluid Models, Turbulence and Data Assimilation - Part I of II

8:30 AM-10:30 AM

Room:Sedona - Main Level

continued

9:30-9:55 The Regularized 3D Boussinesq Equations with Fractional Laplacian and No Diffusion
Hakima Bessaih, University of Wyoming, USA

10:00-10:25 Analyticity Properties of the Navier-Stokes and Euler Equations
Igor Kukavica, University of Southern California, USA

Monday, December 7

MS5

Analysis and Control of Fluid Models and Flow-coupled Systems - Part I of IV

8:30 AM-10:30 AM

Room:Palomas - Main Level

For Part 2 see MS19
This minisymposium will serve to promote and disseminate recent developments on evolution PDEs, especially those describing fluid or gas flows and their interaction with other types of dynamics such as plates or elastic solids, with fixed or moving interfaces. Questions on modeling, well-posedness, control, stability, optimization and numerical simulations will be of primary interest.

Organizer: Marcelo Disconzi
Vanderbilt University, USA

Organizer: Irena M. Lasiecka
University of Memphis, USA

Organizer: Daniel Toundykov
University of Nebraska-Lincoln, USA

Organizer: Justin T. Webster
North Carolina State University, USA

8:30-8:55 An Energy-Conserving One-Dimensional Model of 3D Euler
Stephen Preston, University of Colorado Boulder, USA

9:00-9:25 Long Time Solutions for Two Dimensional Water Waves
Mihaela Ifrim, McMaster University, Canada; Daniel Tataru, University of California, Berkeley, USA; John Hunter, University of California, Davis, USA

9:30-9:55 Stabilization of a Boussinesq System for Surface Water Waves
Ademir Pazoto, Federal University of Rio de Janerio, Brazil; Sorin Micu, University of Craiova, Romania

10:00-10:25 On Nonlocal Differential Operators and Applications
Andrei Tarfulea, Princeton University, USA

Monday, December 7

MS6

Coherent Structures in Hamiltonian PDE - Part I of III

8:30 AM-10:30 AM

Room:Coronado - Main Level

For Part 2 see MS20
Hamiltonian partial differential equations appear in many fields including plasma physics, optics and fluid mechanics, where they can characterize wave phenomenon such as solitons, wave collapse and turbulence. Hamiltonian partial differential equations provide a variety of challenges, ranging from well-posedness to numerical methods. This session will survey recent advances in Hamiltonian Partial Differential Equations, including progress on blow-ups of nonlinear Schrodinger equations, rigorous derivation of focusing NLS from quantum many-body systems, and well-posedness of wave maps.

Organizer: Magdalena Czubak
Binghamton University, USA

Organizer: Gideon Simpson
Drexel University, USA

Organizer: Daniel Spirn
University of Minnesota, USA

Organizer: Catherine Sulem
University of Toronto, Canada

8:30-8:55 Effective Dynamics of Charged Interfaces
Kyle Thompson, University of Toronto, Canada

9:00-9:25 Canonical Transformations on Null Forms
Amanda French, Walter Craig, and Chi-Ru Yang, McMaster University, Canada

9:30-9:55 Wave Maps on Hyperbolic Space
Andrew Lawrie, University of California, Berkeley, USA

10:00-10:25 Recent Progress on the Wave Maps Equation on Hyperbolic Spaces
Sohrab Shahshahani, University of Michigan, USA

Monday, December 7

MS7

Ginzburg-Landau Theory and Related Topics - Part I of III

8:30 AM-10:30 AM

Room:Center Ballroom - Main Level

For Part 2 see MS21

The mathematical tools developed to study variational models for superconducting systems are often successfully used in other areas of materials science, to examine phenomena such as topological defects in liquid crystals and solids. The minisymposium will feature speakers with an interest and background in the analysis and modeling of superconducting materials. Research on both dynamic and stationary problems will be presented. Topics will include behavior of minimizers, vortex filaments, vortex scattering and traveling waves in Ginzburg- Landau and related models.

Organizer: Tiziana Giorgi
New Mexico State University, USA

Organizer: Dmitry Golovaty
University of Akron, USA

8:30-8:55 Some Geometric Ginzburg-Landau Problems
Robert Jerrard, University of Toronto, Canada

9:00-9:25 Defect Solutions in Vector-Valued Singular Problems
Andres A. Contreras, New Mexico State University, USA

9:30-9:55 Analysis of Minimizers of the Lawrence-Doniach Model for Layered Superconductors in Magnetic Fields
Guanying Peng, University of Cincinnati, USA; Patricia Bauman, Purdue University, USA

10:00-10:25 Vortex Scattering and the Gross-Pitaevskii Equation
Matthias Kurzke, University of Nottingham, United Kingdom; Jeremy L. Marzuola, University of North Carolina at Chapel Hill, USA; *Daniel Spirn*, University of Minnesota, USA

Monday, December 7

MS8

Multiscale Analysis, Modeling and Simulation for Applications in Material Science - Part I of III

8:30 AM-10:30 AM

Room:Bouchon - Main Level

For Part 2 see MS22

In recent years we have witnessed a tremendous growth of activity on developing methods for materials-related phenomena whose essential role extends over multiple scales in time and space. The proposed minisymposium will focus on multiscale modeling, analysis and simulation of the problems arising in composite and other heterogeneous media. In particular, topics that will be discussed include but not limited to are asymptotic analysis, homogenization, inverse problems, and computational tools for complex inhomogeneous media. The purpose of this section is to enable contact between researchers working on multiscale methods with an update on recent progress in this field.

Organizer: Silvia Jimenez Bolanos
Colgate University, USA

Organizer: Yuliya Gorb
University of Houston, USA

8:30-8:55 Homogenization of a Transmission Problem
Shari Moskow, Drexel University, USA

9:00-9:25 On Mathematical Modeling of Charged Laminate Materials
Burt S. Tilley, Worcester Polytechnic Institute, USA; Daniel Gendin, Boston University, USA

9:30-9:55 Equations for Poroelastic Materials
Miao-Jung Y. Ou, University of Delaware, USA

10:00-10:25 On Well Productivity Index for Compressible Fluid, and Applications
Lidia Bloshanskaya, State University of New York, New Paltz, USA; Eugenio Aulisa and Akif Ibragimov, Texas Tech University, USA

Monday, December 7

MS9

Transport Theory in Complex Particle Systems - Part I of II

8:30 AM-10:30 AM

Room:Rattlers - Main Level

For Part 2 see MS23

This minisymposium will focus on common issues associated with analytical methods for dispersive and dissipative nonlinear partial or integral transport equations arising in many areas of mathematical and statistical physics in the study of quantum and kinetic theories. These models arise in the study of microscopic dynamics of complex interacting systems derived into nonlinear and nonlocal quantum and kinetic systems and their macroscopic approximations into PDEs for classical dynamics. Discussions will focus on analytical properties of particle interacting transport models such as non-linear Schroedinger, Vlasov or Boltzmann type, by means of classical, probabilistic and stochastic analysis methods.

Organizer: Maja Taskovic
University of Texas at Austin, USA

Organizer: Irene M. Gamba
University of Texas at Austin, USA

Organizer: Natasa Pavlovic
University of Texas at Austin, USA

8:30-8:55 Random Versus Probabilistic Approach in the Study of Wave and Dispersive Equations
Gigliola Staffilani, Massachusetts Institute of Technology, USA

9:00-9:25 Many Body Dynamics, Nonlinear Dispersive PDE and Quantum De Finetti Theorems
Thomas Chen, University of Texas at Austin, USA; Christian Hainzl, University of Tuebingen, Germany; *Natasa Pavlovic*, University of Texas at Austin, USA; Robert Seiringer, Princeton University, USA

9:30-9:55 Dynamics of Fermions Near Thermal Equilibrium Interacting with Power Nonlinearities
Thomas Chen, Younghun Hong, and Natasa Pavlovic, University of Texas at Austin, USA

10:00-10:25 Global Behavior and Non-squeezing for the NLKG
Dana Mendelson, Massachusetts Institute of Technology, USA

Monday, December 7

MS10

Large-Time Dynamics of the Navier-Stokes Equations and Related Models

8:30 AM-10:30 AM

Room:Chambers Lecture Hall - Main Level

The accurate, reliable prediction of the long-time dynamical evolution of hydrodynamic systems has become increasingly important in the climatological, astrophysical, and geophysical sciences. Mathematically quantifying this behaviour allows for more accurate and cost-effective reduced models, and helps validate existing models, leading to more realistic real-time predictions for the long-time dynamics of such systems. This minisymposium will address the long-time dynamics of hydrodynamic models such as the Navier-Stokes equations and related models. Of particular interest are the study of the global attracting set, techniques in data assimilation, asymptotically reduced models, and the global well-posedness in time of these models.

Organizer: Adam Larios

University of Nebraska, Lincoln, USA

8:30-8:55 Determining Modes for 3D Navier-Stokes

Landon Kavlie, University of Illinois, Chicago, USA

9:00-9:25 Ergodicity Results for Stochastic Boussinesq Equations

Geordie Richards, University of Rochester, USA; Juraj Foldes, Université Libre de Bruxelles, Belgium; Nathan Glatt-Holtz, Virginia Tech, USA; Enrique A. Thomann, Oregon State University, USA

9:30-9:55 Statistical Solutions and the Asymptotic Behaviour of Evolutionary Systems

Ricardo Rosa, Universidade Federal do Rio De Janeiro, Brazil

10:00-10:25 Global Attractors for Discrete Dynamical Systems Which Approximate the Two-Dimensional Navier Stokes Equations and the Model Error in the Ns-Alpha Model.

Eric Olson, University of Nevada, Reno, USA

Monday, December 7

MS11

Advances in Theoretical and Numerical Analysis of Parametrized PDEs in High Dimension - Part I of II

8:30 AM-10:30 AM

Room:Four Peaks - Upper Level

For Part 2 see MS25

This minisymposium focuses on advances in numerical analysis of parametrized PDEs. Predicting the behavior of the solution map relies on constructing solutions in terms of high-dimensional spaces, particularly in the case when the input data depend on a large number of parameters. For higher accuracy, simulations must increase the number of dimensions, and expend more effort resolving smooth or even discontinuous behavior within each dimension. The resulting explosion in computational effort is a symptom of the curse of dimensionality. This mini-symposium aims at exploring recent breakthroughs in analysis of sparse sampling and representations, least squares projection, compressed sensing, low-rank approximations.

Organizer: Abdellah Chkifa

Oak Ridge National Laboratory, USA

Organizer: Hoang A. Tran

Oak Ridge National Laboratory, USA

Organizer: Clayton G. Webster

Oak Ridge National Laboratory, USA

Organizer: Guannan Zhang

Oak Ridge National Laboratory, USA

8:30-8:55 Multi-Level Monte Carlo with Control Variate for Elliptic Pdes with Log-Normal Coefficients.

Fabio Nobile, EPFL, Switzerland

9:00-9:25 High-Dimensional Approximation Using Equilibrium Measures

Akil Narayan, University of Massachusetts, Dartmouth, USA; John D. Jakeman, Sandia National Laboratories, USA; Tao Zhou, Chinese Academy of Sciences, China

9:30-9:55 A Multi-Level Compressed Sensing Petrov-Galerkin Method for the Approximation of Parametric PDEs

Jean-Luc Bouchot, Drexel University, USA; Benjamin Bykowski and Holger Rauhut, RWTH Aachen University, Germany; Christoph Schwab, ETH Zürich, Switzerland

10:00-10:25 Compressed Sensing Approaches for Polynomial Approximation of Hilbert-Valued Functions on Lower Sets

Clayton G. Webster, Abdellah Chkifa, and Hoang A. Tran, Oak Ridge National Laboratory, USA

continued in next column

Monday, December 7

MS12

Challenges in the Mechanics of Thin Elastic Structures - Part I of III

8:30 AM-10:30 AM

Room:Flagstaff A - Upper Level

For Part 2 see MS14

The mechanics of thin structures is a field where geometry and mechanics interact, leading to deep questions in PDE and the calculus of variations. Current issues include (i) understanding the patterns and defects produced by compressive loads in flat or cylindrical structures; (ii) understanding how growth, misfit, or crystalline defects influence the preferred shape of a thin structure; and (iii) understanding the emergence of localized structures such as folds and conical singularities. The talks in this 3-part minisymposium will address these and related problems, drawing on tools from geometry, mechanics, the calculus of variations, and PDE.

Organizer: Robert V. Kohn
Courant Institute of Mathematical Sciences, New York University, USA

8:30-8:55 Folding Patterns in Partially Delaminated Thin Films
Sergio Conti, Universität Bonn, Germany

9:00-9:25 Unstretchable Two-Dimensional Elastic Bodies: Kinematics and Energetics
Eliot Fried, Okinawa Institute of Science and Technology, Japan

9:30-9:55 Isometric Immersions and Self Similar Buckling in Non-Euclidean Elastic Sheets
John A. Gemmer, Brown University, USA; Shankar C. Venkataramani, University of Arizona, USA; Eran Sharon, The Hebrew University, Israel

10:00-10:25 Understanding Mechanisms of High Sensitivity of Buckling Loads to Imperfections.
Yury Grabovsky, Temple University, USA; Davit Harutyunyan, University of Utah, USA

Monday, December 7

MS13

Complex Systems Arising in Biology and Economics - Part I of II

8:30 AM-10:00 AM

Room:Flagstaff B - Upper Level

For Part 2 see MS26

Partial differential equation systems have become ubiquitous in modern science. Applications arising in Biology and Economics provide complex systems which are challenging from a modeling, numerical, and analytical perspective. In this minisymposium, we will discuss several such complex systems and their relationship with current PDE research.

Organizer: Daniel Brinkman
Arizona State University, USA

Organizer: Sebastien Motsch
Arizona State University, USA

8:30-8:55 Mathematics of Insurance: Continuous Time Approximations
Daniel Brinkman, Arizona State University, USA

9:00-9:25 Agent Based Simulations for Chip Sales to High-End Gamers
Andee Thatcher, Arizona State University, USA

9:30-9:55 Model Predictive Control for Many Agent Systems
Michael Herty, RWTH Aachen University, Germany

Monday, December 7

CP1

Elliptic Problems

8:30 AM-10:30 AM

Room:San Carlos - Main Level

Chair: Giles Auchmuty, University of Houston, USA

8:30-8:45 The Laplace Equation and The Numerical Analysis For Streamline Around a Circle
Jacobs Andreas Atohema Somnic, Bandung Institute of Technology, Indonesia

8:50-9:05 Steklov Eigenproblems and Representations of Solutions of Laplace's Equation
Giles Auchmuty, University of Houston, USA

9:10-9:25 Steklov Representations of Harmonic Functions and Applications
Giles Auchmuty and *Manki Cho*, University of Houston, USA

9:30-9:45 Computing the Thermal Properties of Ground Heat Exchangers
Paul Christodoulides and Georgios Florides, Cyprus University of Technology, Cyprus

9:50-10:05 Asymptotics for the Best Sobolev Constants and Their Extremal Functions
Grey Ercole and Gilberto Pereira, Universidade Federal de Minas Gerais, Brazil

10:10-10:25 Radial Eigenpairs of P-Laplacian Via Inverse Iterations
Julio Cesar Espirito Santo, Universidade Federal de Ouro Preto, Brazil; Grey Ercole, Universidade Federal de Minas Gerais, Brazil; Eder Marinho Martins, Universidade Federal de Ouro Preto, Brazil

Coffee Break

10:30 AM-10:55 AM 

Room:Forum - Lower Level

Welcome Remarks

10:55 AM-11:00 AM

Room:Forum - Lower Level

Monday, December 7

IP1

Tracing Genealogy Within an Invasion Wave

11:00 AM-11:45 AM

Room:Forum - Lower Level

Chair: Andrea L. Bertozzi, University of California, Los Angeles, USA

Cell invasion, whereby cells move and undergo cell division, occurs in tumor growth, wound healing and during embryonic development. Continuum models of cell invasion typically employ the well-known Fisher equation. This PDE supports travelling wave solutions, making the population-level behavior highly predictable. However, recent individual cell lineage experiments (within a predictable cell invasion wave) revealed a surprising result: the contribution of individual cells is highly unequal. This paradoxical behavior is examined using various tools, including PDEs to track of the number of divisions that cells undergo within an invasion wave. The method provides a potentially useful technique for deducing cell lineage data when imaging every cell is not feasible.

Kerry A. Landman

University of Melbourne, Australia

Monday, December 7

IP2

Regularity Properties of Euler Equations in Lagrangian Variables

11:45 AM-12:30 PM

Room:Forum - Lower Level

Chair: Jeremy L. Marzuola, University of North Carolina at Chapel Hill, USA

The Euler equations for ideal incompressible fluids have two formulations, an Eulerian and a Lagrangian one. These formulations are equivalent in the smooth regime (the velocity field lies in the Holder space $C^{1,\gamma}$ for some $\gamma \varepsilon (0,1)$, and the particle paths are just the characteristics associated to the Eulerian velocity fields. In this talk we discuss three instances when the classical solution of the Euler equations has some remarkably good regularity properties, when looked at in Lagrangian variables. In contrast, we then show that these regularity properties are false when looked at in Eulerian variables. Moreover, we prove that some Lagrangian regularity properties are natural for a large class of incompressible inviscid hydrodynamic models, with slightly better than Lipschitz velocity fields. This is part of joint works with Peter Constantin (Princeton), Igor Kukavica (USC), and Jiahong Wu (Oklahoma State).

Vlad C. Vicol

Princeton University, USA

Lunch Break

12:30 PM-2:30 PM

Attendees on their own

Monday, December 7

MS14

Challenges in the Mechanics of Thin Elastic Structures - Part II of III

2:30 PM-4:30 PM

Room:Forum - Lower Level

For Part 1 see MS12
For Part 3 see MS38

The mechanics of thin structures is a field where geometry and mechanics interact, leading to deep questions in PDE and the calculus of variations. Current issues include (i) understanding the patterns and defects produced by compressive loads in flat or cylindrical structures; (ii) understanding how growth, misfit, or crystalline defects influence the preferred shape of a thin structure; and (iii) understanding the emergence of localized structures such as folds and conical singularities. The talks in this 3-part minisymposium will address these and related problems, drawing on tools from geometry, mechanics, the calculus of variations, and PDE.

Organizer: Robert V. Kohn
Courant Institute of Mathematical Sciences, New York University, USA

2:30-2:55 Sharp Korn Inequalities in Thin Domains: the "First and a Half" Korn Inequality
Davit Harutyunyan, University of Utah, USA

3:00-3:25 Homogenization of Defects: the Emergence of Torsion
Raz Kupferman and Cy Maor, Hebrew University, Israel

3:30-3:55 Sobolev Rigidity of Convex Shells
Reza Pakzad and Luca Codenotti, University of Pittsburgh, USA

4:00-4:25 Energy Scaling for the Regular Cone in the von-Kármán Setting
Heiner Olbermann, University of Bonn, Germany

Monday, December 7

MS15

Nonlocal Interaction Models: Dynamics, Asymptotics and Applications - Part II of II

2:30 PM-4:30 PM

Room:Rio Verde - Main Level

For Part 1 see MS2

A range of physical and biological systems — from biological swarms and granular media to crystallization and self-assembly of nano particles — can be described by mathematical models of nonlocal interactions. The purely nonlocal nature of these models presents a variety of mathematical challenges that require techniques from diverse areas applied mathematics to be combined in new ways. With this minisymposium, we aim to bring together young researchers and leading scholars who study nonlocal interaction models and their applications via variational, dynamical and asymptotic analysis.

Organizer: Katy Craig
University of California, Santa Barbara, USA

Organizer: Ihsan A. Topaloglu
McMaster University, Canada

2:30-2:55 Energy Driven Pattern Formation in Planar Dipole-Dipole Systems in the Presence of Weak Noise

Andrew J. Bernoff, Harvey Mudd College, USA; Jaron Kent-Dobias, Cornell University, USA

3:00-3:25 Stationary Solution and Long-time Behavior of 2D Keller-Segel Model with Degenerate Diffusion

José Carrillo, Imperial College London, United Kingdom; Sabine Hittmeir, Johann Radon Institute for Computational and Applied Mathematics, Austria; Bruno Volzone, Parthenope University, Napoli, Italy; *Yao Yao*, University of Wisconsin, Madison, USA

3:30-3:55 Analysis of a Particle Method for the Aggregation Equation

Martin Campos Pinto, CNRS, France; José A. Carrillo, Imperial College London, United Kingdom; Frédérique Charles, Laboratoire Jacques-Louis Lions, France; *Young-Pil Choi*, Imperial College London, United Kingdom

4:00-4:25 Interaction Models with Nonlinear Diffusion

Razvan Fetecau, Simon Fraser University, Canada; Martin Burger, University of Muenster, Germany; Yanghong Huang, Imperial College London, United Kingdom

continued in next column

Monday, December 7

MS16

Pattern Formation in Nonlinear Systems - Part I of II

2:30 PM-5:00 PM

Room:Sonora - Main Level

For Part 2 see MS29

The general purpose of this special session is to bring together researchers who work on various issues related to nonlinear waves and patterns in partial differential equations that arise in physics, chemistry, and biology. More specifically, existence and stability of such solutions to partial differential equations in one and more dimensions will be discussed. The session will place a special emphasis on Evans function method and methods from bifurcation theory.

Organizer: Stephane Lafortune
College of Charleston, USA

Organizer: Vahagn Manukian
Miami University, USA

2:30-2:55 Numerical Bifurcation Study for Viscous Shock Waves

Blake Barker, Brown University, USA; Rafael Monteiro, and Kevin Zumbrun, Indiana University, USA

3:00-3:25 Hopf Bifurcation from Fronts in the Cahn-Hilliard Equation

Ryan Goh and Arnd Scheel, University of Minnesota, USA

3:30-3:55 Inhomogeneities in Spatially Extended Pattern Forming Systems

Gabriela Jaramillo, University of Minnesota, USA; Arnd Scheel, University of Minnesota, Minneapolis, USA

4:00-4:25 Coherent Structures in Nonlocal Equations

Arnd Scheel, University of Minnesota, USA; Gregory Faye, Universite de Toulouse, France

4:30-4:55 Dynamics and Bifurcation in Multicomponent Bilayer Membranes

Qiliang Wu and Promislow Keith, Michigan State University, USA

Monday, December 7

MS17

Partial Differential Equations in Image Analysis and Processing - Part II of II

2:30 PM-4:30 PM

Room:San Carlos - Main Level

For Part 1 see MS1

Nonlinear partial differential equations and non-smooth variational methods constitute one of the main analytical tools for modelling, analyzing and processing images. Apart from them being powerful computational tools for processing images, they are interesting mathematical objects whose analysis often requires very sophisticated tools from nonlinear PDE analysis, variational calculus, geometric measure theory and functional analysis. In this minisymposium we showcase some recent approaches that include transport equations for image restoration, PDEs on graphs for data clustering, free discontinuity approaches for image segmentation and non-smooth variational approaches for multi-channel image processing.

Organizer: Carola B. Schoenlieb

University of Cambridge, United Kingdom

Organizer: Laird Robert Hocking

University of Cambridge, United Kingdom

2:30-2:55 Discrete Varifolds, Point Clouds, and Surface Approximation

Simon Masnou, University of Lyon 1, France

3:00-3:25 Approximation of Curvature Dependent Functionals in Imaging

Selim Esedoglu, University of California, Los Angeles, USA

3:30-3:55 Limiting Aspects of Non-Convex TV^q Models in Image Processing

Michael Hintermüller, Humboldt University Berlin, Germany

4:00-4:25 On Convex Finite-Dimensional Variational Methods in Imaging Sciences, and Hamilton-Jacobi Equations

Jerome Darbon, ENS Cachan, France

Monday, December 7

MS18

Fluid Models, Turbulence and Data Assimilation - Part II of II

2:30 PM-4:30 PM

Room:Sedona - Main Level

For Part 1 see MS4

Many dissipative dynamical systems of practical interest arise in the context of geophysical flows related to the atmosphere and ocean. The dynamics of such models are generically chaotic and "turbulent," calling for a probabilistic framework to properly analyze the underlying phenomena. Moreover, due to the imprecise knowledge of the initial condition for the governing equations, it can be helpful to dynamically update the solution with data collected continuously-in-time to improve prediction. This symposium will therefore focus on the interplay of topics such as regularity, data assimilation, asymptotic dynamics and statistical/stochastic solutions in analyzing turbulence in dissipative dynamical systems.

Organizer: Vincent R. Martinez

Tulane University, USA

Organizer: Michael S. Jolly

Indiana University, USA

Organizer: Animikh Biswas

University of Maryland, Baltimore County, USA

2:30-2:55 Minimal Scaling Laws Induced by the Scale of Local Isotropic Diffusion in 3D NSE

Zoran Grujic, University of Virginia, USA

3:00-3:25 Data Assimilation Algorithms for the Bénard Convection Model and Other Models of Turbulence

Aseel Farhat, Indiana University Bloomington, USA; Michael S. Jolly, Indiana University, USA; Evelyn Lunasin, United States Naval Academy, USA; Edriss S. Titi, Texas A&M University, USA and Weizmann Institute of Science, Israel

3:30-3:55 Turbulence in Physical Scales of the Navier-Stokes Equations in the Presence of the Driving Force

Radu Dascaliuc, Oregon State University, USA

4:00-4:25 Statistical Behavior of a Data Assimilation Algorithm for the 2D Navier-Stokes Equations

Cecilia F. Mondaini and Ciprian Foias, Texas A&M University, USA; Edriss S. Titi, Texas A&M University, USA and Weizmann Institute of Science, Israel

continued in next column

Monday, December 7

MS19

Analysis and Control of Fluid Models and Flow-coupled Systems - Part II of IV

2:30 PM-4:30 PM

Room:Palomas - Main Level

For Part 1 see MS5
For Part 3 see MS31

This minisymposium will serve to promote and disseminate recent developments on evolution PDEs, especially those describing fluid or gas flows and their interaction with other types of dynamics such as plates or elastic solids, with fixed or moving interfaces. Questions on modeling, well-posedness, control, stability, optimization and numerical simulations will be of primary interest.

Organizer: Marcelo Disconzi
Vanderbilt University, USA

Organizer: Irena M. Lasiecka
University of Memphis, USA

Organizer: Daniel Toundykov
University of Nebraska-Lincoln, USA

Organizer: Justin T. Webster
North Carolina State University, USA

2:30-2:55 Porous Medium Equation with Heterogeneous Constraints and Advection
Malgorzata Peszynska and *Ralph E. Showalter*, Oregon State University, USA; Justin T. Webster, North Carolina State University, USA

3:00-3:25 Analysis of Nonlinear Poro-elastic and Poro-visco-elastic Models
Lorena Bociu, North Carolina State University, USA; Giovanna Guidoboni, Indiana University - Purdue University Indianapolis, USA; Riccardo Sacco, Politecnico di Milano, Italy; Justin T. Webster, North Carolina State University, USA

3:30-3:55 Analysis of the Flow of Landau-De Gennes Energy Functional under Weak Anchoring Conditions
Changyou Wang, Purdue University, USA

4:00-4:25 On the Evolution Equations of Free Liquid Fibers and Films
Thomas Hagen, University of Memphis, USA

Monday, December 7

MS20

Coherent Structures in Hamiltonian PDE - Part II of III

2:30 PM-4:30 PM

Room:Coronado - Main Level

For Part 1 see MS6
For Part 3 see MS32

Hamiltonian partial differential equations appear in many fields including plasma physics, optics and fluid mechanics, where they can characterize wave phenomenon such as solitons, wave collapse and turbulence. Hamiltonian partial differential equations provide a variety of challenges, ranging from well-posedness to numerical methods. This session will survey recent advances in Hamiltonian Partial Differential Equations, including progress on blow-ups of nonlinear Schrodinger equations, rigorous derivation of focusing NLS from quantum many-body systems, and well-posedness of wave maps.

Organizer: Magdalena Czubak
Binghamton University, USA

Organizer: Gideon Simpson
Drexel University, USA

Organizer: Daniel Spirn
University of Minnesota, USA

Organizer: Catherine Sulem
University of Toronto, Canada

2:30-2:55 Vortex Scattering Across Material Interfaces
Jeremy L. Marzuola, University of North Carolina at Chapel Hill, USA

3:00-3:25 Dirac Points in the Spectrum of Periodic Planar Networks
Michael Goldberg, University of Cincinnati, USA

3:30-3:55 Nonexistence of Small Doubly Periodic Coherent Structures
David Ambrose, Drexel University, USA

4:00-4:25 KdV Dynamics and Traveling Waves in Diatomic Fpu
J. Douglas Wright, Drexel University, USA

Monday, December 7

MS21

Ginzburg-Landau Theory and Related Topics - Part II of III

2:30 PM-4:30 PM

Room:Center Ballroom - Main Level

For Part 1 see MS7
For Part 3 see MS33

The mathematical tools developed to study variational models for superconducting systems are often successfully used in other areas of materials science, to examine phenomena such as topological defects in liquid crystals and solids. The minisymposium will feature speakers with an interest and background in the analysis and modeling of superconducting materials. Research on both dynamic and stationary problems will be presented. Topics will include behavior of minimizers, vortex filaments, vortex scattering and traveling waves in Ginzburg-Landau and related models.

Organizer: Tiziana Giorgi
New Mexico State University, USA

Organizer: Dmitry Golovaty
University of Akron, USA

2:30-2:55 Vortices in Liquid Crystals, Superconductivity, Optics, and Hydrodynamics: Siblings Or Not?
Ibrahim Fatkullin, University of Arizona, USA

3:00-3:25 Vortices in the Landau De Gennes Model for Chromonic Liquid Crystals
Dmitry Golovaty, University of Akron, USA

3:30-3:55 Stability of Point Defects in Liquid Crystals
Valeriy Slastikov, University of Bristol, United Kingdom

4:00-4:25 Gamma-Convergence Analysis of Columnar Phases in Bent-Core Liquid Crystals
Feras Yousef, New Mexico State University, USA

Monday, December 7

MS22

Multiscale Analysis, Modeling and Simulation for Applications in Material Science - Part II of III

2:30 PM-4:30 PM

Room:Bouchon - Main Level

For Part 1 see MS8
For Part 3 see MS37

In recent years we have witnessed a tremendous growth of activity on developing methods for materials-related phenomena whose essential role extends over multiple scales in time and space. The proposed minisymposium will focus on multiscale modeling, analysis and simulation of the problems arising in composite and other heterogeneous media. In particular, topics that will be discussed include but not limited to are asymptotic analysis, homogenization, inverse problems, and computational tools for complex inhomogeneous media. The purpose of this section is to enable contact between researchers working on multiscale methods with an update on recent progress in this field.

Organizer: Yuliya Gorb
University of Houston, USA

Organizer: Silvia Jimenez
Colgate University, USA

2:30-2:55 From Micro-imaging across Multiple Scales
Malgorzata Peszynska and Timothy Costa, Oregon State University, USA

3:00-3:25 Coupling Models for Darcy, Pre Darcy, and Post Darcy Flows in Porous Media-Analysis and Application
Akif Ibragimov, Texas Tech University, USA; Thinh T. Kieu, University of North Georgia, USA; Luan Hoang and *Emine Celik*, Texas Tech University, USA

3:30-3:55 Robust Optimization of Multiscale Viscoelastic Composites
Elena Cherkaev, University of Utah, USA

4:00-4:25 Hamilton-Jacobi and Eikonal Pdes from Iterated Homogenization Methods in Finite Elasticity
Oscar Lopez-Pamies, University of Illinois at Urbana-Champaign, USA

Monday, December 7

MS23

Transport Theory in Complex Particle Systems - Part II of II

2:30 PM-4:30 PM

Room:Rattlers - Main Level

For Part 1 see MS9

This minisymposium will focus on common issues associated with analytical methods for dispersive and dissipative nonlinear partial or integral transport equations arising in many areas of mathematical and statistical physics in the study of quantum and kinetic theories. These models arise in the study of microscopic dynamics of complex interacting systems derived into nonlinear and nonlocal quantum and kinetic systems and their macroscopic approximations into PDEs for classical dynamics. Discussions will focus on analytical properties of particle interacting transport models such as non-linear Schroedinger, Vlasov or Boltzmann type, by means of classical, probabilistic and stochastic analysis methods.

Organizer: Maja Taskovic
University of Texas at Austin, USA

Organizer: Irene M. Gamba
University of Texas at Austin, USA

Organizer: Natasa Pavlovic
University of Texas at Austin, USA

2:30-2:55 Some Recent Progress in Boundary Problem of Boltzmann Equation
Chanwoo Kim, University of Wisconsin, Madison, USA

3:00-3:25 Local Theory for the Boltzmann-Nordheim Equation in Non Isotropic Setting
Amit Einav, University of Cambridge, United Kingdom; Marc Briant, Brown University, USA

3:30-3:55 Anomalous Energy Transport in PFU-beta Chain
Sara Merino-Aceituno, Imperial College London, United Kingdom; Antoine Mellet, University of Maryland, USA

4:00-4:25 Exponential Tails for Solutions to the Homogeneous Boltzmann Equation
Maja Taskovic, University of Texas at Austin, USA; Ricardo J. Alonso, Pontificia Universidade Catolica Do Rio de Janeiro, Brazil; Irene M. Gamba and Natasa Pavlovic, University of Texas at Austin, USA

Monday, December 7

MS24

Modeling of Crowd Dynamics

2:30 PM-4:30 PM

Room:Chambers Lecture Hall - Main Level

Understanding the collective behavior of crowds and related groups of interacting individuals proves essential for industrial and urban planning. The design of evacuation routes in airplanes, buildings and public spaces, as well as the development of effective policing strategies, relies upon such an understanding. Researchers in mathematics and in physics have recently developed a set of models for collective human behavior that provide invaluable insight that contributes to the preparation for unexpected events. This session will bring together experimental and analytical researchers to discuss current developments of these models. The session will cover topics such as pedestrian dynamics and urban crime modeling.

Organizer: Chung-Min Lee
California State University, Long Beach, USA

Organizer: James von Brecht
California State University, Long Beach, USA

2:30-2:55 Anisotropic Interactions in First-Order Crowd Models
Joep Evers and Razvan Fetecau, Simon Fraser University, Canada; Lenya Ryzhik, Stanford University, USA

3:00-3:25 Hotspots in a Nonlocal Crime Model
Scott Mccalla, Montana State University, USA; Jonah Breslau, Pomona College, USA; Sorathan Chaturapruek, Harvey Mudd College, USA; Theodore Kolokolnikov, Dalhousie University, Canada; Daniel Yazdi, University of California, Los Angeles, USA

continued on next page

3:30-3:55 Contagion Shocks in One Dimension
Martin Short, Georgia Institute of Technology, USA; Li Wang, University of California, Los Angeles, USA; Jesus Rosado Linares, Universidad de Buenos Aires, Argentina; Andrea L. Bertozzi, University of California, Los Angeles, USA

4:00-4:25 Efficient Numerical Methods for Multiscale Human Crowd Dynamics with Emotional Contagion
Li Wang, University of California, Los Angeles, USA; Martin Short, Georgia Institute of Technology, USA; Andrea L. Bertozzi, University of California, Los Angeles, USA

Monday, December 7

MS25

Advances in Theoretical and Numerical Analysis of Parametrized PDEs in High Dimension - Part II of II

2:30 PM-4:30 PM

Room:Four Peaks - Upper Level

For Part 1 see MS11

This minisymposium focuses on advances in numerical analysis of parametrized PDEs. Predicting the behavior of the solution map relies on constructing solutions in terms of high-dimensional spaces, particularly in the case when the input data depend on a large number of parameters. For higher accuracy, simulations must increase the number of dimensions, and expend more effort resolving smooth or even discontinuous behavior within each dimension. The resulting explosion in computational effort is a symptom of the curse of dimensionality. This minisymposium aims at exploring recent breakthroughs in analysis of sparse sampling and representations, least squares projection, compressed sensing, low-rank approximations.

Organizer: Abdellah Chkifa
Oak Ridge National Laboratory, USA

Organizer: Hoang A. Tran
Oak Ridge National Laboratory, USA

Organizer: Clayton G. Webster
Oak Ridge National Laboratory, USA

Organizer: Guannan Zhang
Oak Ridge National Laboratory, USA

2:30-2:55 Polynomial Chaos Expansion Via Gradient-Enhanced ℓ_1-Minimization
Alireza Doostan, Jerrad Hampton, and Ji Peng, University of Colorado Boulder, USA

3:00-3:25 Structured and Unstructured Sampling Methods for the Approximation of Parametric PDEs
Abdellah Chkifa and Clayton G. Webster, Oak Ridge National Laboratory, USA

3:30-3:55 Least Squares Approximation in Multivariate Polynomial Spaces and Application to Elliptic PDEs with Stochastic Data
Giovanni Migliorati, Université Pierre et Marie Curie, France

4:00-4:25 Parameter Identification for PDEs with Random Data
Catalin S. Trenchea, University of Pittsburgh, USA

continued in next column

Monday, December 7

MS26

Complex Systems Arising in Biology and Economics - Part II of II

2:30 PM-4:00 PM

Room:Flagstaff B - Upper Level

For Part 1 see MS13

Partial differential equation systems have become ubiquitous in modern science. Applications arising in Biology and Economics provide complex systems which are challenging from a modeling, numerical, and analytical perspective. In this minisymposium, we will discuss several such complex systems and their relationship with current PDE research.

Organizer: Daniel Brinkman
Arizona State University, USA

Organizer: Sebastien Motsch
Arizona State University, USA

2:30-2:55 Coalescing Diffusion, and Composite Stochastic Particle-grid Methods for the Investigation of Blow-ups in the Keller-Segel and Similar PDEs
Gleb Zhelezov, University of Arizona, USA

3:00-3:25 Global Minimization with Interacting Particle Systems
Stephan Martin, Imperial College London, United Kingdom; Rene Pinnau, Claudia Totzeck, and Tse Oliver, Technische Universität Kaiserslautern, Germany

3:30-3:55 Multi-agent Dynamics Models for n-ary Markov Jump Processes on a Dense Graph
Juan Rodriguez and Irene M. Gamba, University of Texas at Austin, USA

Monday, December 7

CP2

Numerical Methods

2:30 PM-4:30 PM

Room:Flagstaff A - Upper Level

Chair: To Be Determined

2:30-2:45 Steady State and Sign Preserving Semi-Implicit Runge-Kutta Methods for ODEs with Stiff Damping Term
Tong Wu, Tulane University, USA

2:50-3:05 A Rbf-Descent Method for Wind Field Approximation
Miguel A. Moreles, Centro de Investigacion en Matematicas, Mexico; Daniel Cervantes and Pedro Gonzalez-Casanova, UNAM, Mexico

3:10-3:25 An Analysis of Blended Three-step BDF Time Stepping Scheme For Navier-Stokes Type System Related To Soret Convection
S.S. Ravindran, University of Alabama, Huntsville, USA

3:30-3:45 Finite Volume MUSCL Approximation for Transport Equation Originating in a Neuronal Model
Paramjeet Singh, Thapar University, India

3:50-4:05 A Theoretical and Computational Framework for Measure-Valued Solutions to Conservation Laws
Mohammad Zakerzadeh and Georg May, RWTH Aachen University, Germany

4:10-4:25 An Asymptotic Preserving Implicit-Explicit Scheme for All-Froude Flows
Hamed Zakerzadeh and Sebastian Noelle, RWTH Aachen University, Germany

Coffee Break

4:30 PM-5:00 PM

Room:Forum - Lower Level

Monday, December 7

MS27

Deterministic and Stochastic Aspects of Fluid Dynamics - Part I of II

5:00 PM-7:00 PM

Room:Forum - Lower Level

For Part 2 see MS41

Models of fluid dynamics (Navier-Stokes/ Euler equations, Primitive equations, etc...) are ubiquitous in science and play a significant role in subjects such as climate science, geophysics, and engineering. From the mathematical viewpoint, they provide a rich source of problems in partial differential equations, involving elements from analysis, probability theory, dynamical systems. Of great importance are questions ranging from global regularity to longtime behavior, with particular emphasis on statistical properties of solutions and their robustness with respect to singular and/or stochastic perturbations. This minisymposium will bring together researchers at all career stages to discuss recent advances in mathematical fluid dynamics.

Organizer: Michele Coti Zelati
University of Maryland, USA

Organizer: Honghu Liu
University of California, Los Angeles, USA

Organizer: Temam Roger
Indiana University Bloomington, USA

Organizer: Chuntian Wang
Indiana University Bloomington, USA

5:00-5:25 Numerical Analysis of the Stochastic Navier-Stokes Equations: Stability and Convergence
Nathan Glatt Holtz, Virginia Tech, USA; Roger M. Temam, Indiana University, USA; *Chuntian Wang*, Indiana University Bloomington, USA

5:30-5:55 Mean Oscillations of the Vorticity Direction and A Priori Bounds on the Vorticity in the 3D NSE
Zoran Grujic, University of Virginia, USA

6:00-6:25 The Free Boundary Euler Equation
Igor Kukavica, University of Southern California, USA

6:30-6:55 Particle Laden Flow on an Incline
Andrea L. Bertozzi, University of California, Los Angeles, USA

Monday, December 7

MS28

Dynamics of Partial Differential Equations - Part I of II

5:00 PM-7:30 PM

Room:Rio Verde - Main Level

For Part 2 see MS69

Complex systems described by partial differential equations (PDEs) pose great challenges to understanding natural phenomena. They involve the nonlinear dynamics in infinite dimensional spaces. Despite progresses made in the last 50 years, the mathematical tools succeed only modestly in analyzing the PDEs dynamics. Nonetheless, a wide range of methods and techniques have been created to attack the problems. This mini-symposium will bring together researchers from different branches of the field. It will cover various topics from abstract theory of dynamical systems in infinite dimensional spaces to their applications to PDEs in fluid mechanics, mathematical biology and quantum physics.

Organizer: Luan Hoang
Texas Tech University, USA

Organizer: Eric Olson
University of Nevada, Reno, USA

5:00-5:25 Generalized Gevrey Norms with Applications to Dissipative Equations
Animikh Biswas, University of Maryland, Baltimore County, USA

5:30-5:55 Navier-Stokes-alpha Model for Channel Flows
Bingsheng Zhang, Texas A&M University, USA

6:00-6:25 Turbulence in Vertically Averaged 3D Rayleigh-Benard Convection
Michael S. Jolly, Indiana University, USA

6:30-6:55 Spread of Phage Infection of Bacteria in a Petri Dish
Don Jones, *Hal L. Smith*, and Horst Thieme, Arizona State University, USA

7:00-7:25 Continuity of Attractors for Dynamical Systems
Luan Hoang, Texas Tech University, USA; Eric Olson, University of Nevada, Reno, USA; James Robinson, University of Warwick, United Kingdom

Monday, December 7

MS29

Pattern Formation in Nonlinear Systems - Part II of II

5:00 PM-7:00 PM

Room:Sonora - Main Level

For Part 1 see MS16

The general purpose of this special session is to bring together researchers who work on various issues related to nonlinear waves and patterns in partial differential equations that arise in physics, chemistry, and biology. More specifically, existence and stability of such solutions to partial differential equations in one and more dimensions will be discussed. The session will place a special emphasis on Evans function method and methods from bifurcation theory.

Organizer: Stephane Lafortune
College of Charleston, USA

Organizer: Vahagn Manukian
Miami University, USA

5:00-5:25 How Defects Are Born
Nicholas Ercolani, Nikola Kamburov, and *Joceline Lega*, University of Arizona, USA

5:30-5:55 Fast Pulses with Oscillatory Tails in the FitzHugh-Nagumo System
Paul Carter and Bjorn Sandstede, Brown University, USA

6:00-6:25 Oscillons Near Hopf Bifurcations of Planar Reaction Diffusion Equations
Kelly Mcquighan, Boston University, USA; Bjorn Sandstede, Brown University, USA

6:30-6:55 Stability of Traveling Waves in a Model for a Thin Liquid Film Flow
Anna Ghazaryan, Miami University, USA; Stéphane Lafortune, College of Charleston, USA; *Vahagn Manukian*, Miami University, USA

Monday, December 7

MS30

Convex Integration and Degenerate Solutions to Nonlinear PDEs in Geometry and Physics - Part II of II

5:00 PM-7:00 PM

Room:San Carlos - Main Level

For Part 1 see MS3

This minisymposium concerns questions of flexibility and rigidity of solutions to nonlinear pdes, with a focus on degenerate (flexible) weak solutions which can be obtained through methods of convex integration. Recent advances regarding Holder continuous dissipative solutions to Euler equations have renewed the interest in applying these methods to a wider range of problems, including the Monge-Ampere and transport equations. Similar efforts have also lead to progress regarding isometric immersions. Our objective is to bring together scientists involved with flexibility vs. rigidity in fluid dynamics and in geometric pdes, in order to investigate discuss advances and challenges from different perspectives

Organizer: Marta Lewicka
University of Pittsburgh, USA

Organizer: Reza Pakzad
University of Pittsburgh, USA

5:00-5:25 On Weak Solutions to the 2D Savage-Hutter Model of the Motion of a Gravity Driven Avalanche Flow
Agnieszka Swierczewska-Gwiazda, University of Warsaw, Poland

5:30-5:55 Recent Progress Towards Onsager's Conjecture
Tristan Buckmaster, Courant Institute of Mathematical Sciences, New York University, USA

6:00-6:25 Convex Integration and the Stationary Incompressible Euler Equations
Antoine Choffrut, University of Edinburgh, United Kingdom

6:30-6:55 Almost-isometric Deformations and Thin Elastic Sheets
Francesco Maggi, University of Texas at Austin, USA

Monday, December 7

MS31

Analysis and Control of Fluid Models and Flow-coupled Systems - Part III of IV

5:00 PM-6:30 PM

Room:Palomas - Main Level

For Part 2 see MS19
For Part 4 see MS45
This mini-symposium will serve to promote and disseminate recent developments on evolution PDEs, especially those describing fluid or gas flows and their interaction with other types of dynamics such as plates or elastic solids, with fixed or moving interfaces. Questions on modeling, well-posedness, control, stability, optimization and numerical simulations will be of primary interest.

Organizer: Justin T. Webster
North Carolina State University, USA

Organizer: Marcelo Disconzi
Vanderbilt University, USA

Organizer: Irena M. Lasiecka
University of Memphis, USA

Organizer: Daniel Toundykov
University of Nebraska-Lincoln, USA

5:00-5:25 Fluid-Elastic Structure Interaction with the Navier Slip Boundary Condition
Suncica Canic, University of Houston, USA; Boris Muha, University of Zagreb, Croatia

5:30-5:55 Uniform Stability to Non-Trivial Equilibrium of a Nonlinear Fluid-Structure Interaction Via Interface and Interior Feedback
Yongjin Lu, Virginia State University, USA

6:00-6:25 Decay Rates for Some Fluid-Structure Models
George Avalos, University of Nebraska, Lincoln, USA; Pelin Geredeli, Hacettepe Universýty, Turkey

Monday, December 7

MS32

Coherent Structures in Hamiltonian PDE- Part III of III

5:00 PM-7:00 PM

Room:Coronado - Main Level

For Part 2 see MS20
Hamiltonian partial differential equations appear in many fields including plasma physics, optics and fluid mechanics, where they can characterize wave phenomenon such as solitons, wave collapse and turbulence. Hamiltonian partial differential equations provide a variety of challenges, ranging from well-posedness to numerical methods. This session will survey recent advances in Hamiltonian Partial Differential Equations, including progress on blow-ups of nonlinear Schrodinger equations, rigorous derivation of focusing NLS from quantum many- body systems, and well-posedness of wave maps.

Organizer: Magdalena Czubak
Binghamton University, USA

Organizer: Gideon Simpson
Drexel University, USA

Organizer: Daniel Spirn
University of Minnesota, USA

Organizer: Catherine Sulem
University of Toronto, Canada

5:00-5:25 On-Site and Off-Site Solitary Waves of Discrete Nonlinear Schödinger Type Equations and the Peierls-Nabarro Barrier
Michael Jenkinson and Michael I. Weinstein, Columbia University, USA

5:30-5:55 Existence and Stability Considerations for Schrödinger-Poisson Excited States with a Potential
Jeremy L. Marzuola, University of North Carolina at Chapel Hill, USA; S*arah Raynor*, Wake Forest University, USA; Gideon Simpson, Drexel University, USA

6:00-6:25 On Dispersive Blow-Ups for Nonlinear Schrödinger Equations
Maja Taskovic and Younghun Hong, University of Texas at Austin, USA

6:30-6:55 The Rigorous Derivation of Focusing NLS from Quantum Many-Body Systems
Xuwen Chen and Justin Holmer, Brown University, USA

Monday, December 7

MS33

Ginzburg-Landau Theory and Related Topics - Part III of III

5:00 PM-7:00 PM

Room:Center Ballroom - Main Level

For Part 2 see MS21
The mathematical tools developed to study variational models for superconducting systems are often successfully used in other areas of materials science, to examine phenomena such as topological defects in liquid crystals and solids. The minisymposium will feature speakers with an interest and background in the analysis and modeling of superconducting materials. Research on both dynamic and stationary problems will be presented. Topics will include behavior of minimizers, vortex filaments, vortex scattering and traveling waves in Ginzburg- Landau and related models.

Organizer: Tiziana Giorgi
New Mexico State University, USA

Organizer: Dmitry Golovaty
University of Akron, USA

5:00-5:25 Spectral Analysis of a Complex Schrödinger Operator in the Semiclassical Limit
Yaniv Almog, Louisiana State University, USA

5:30-5:55 Distances Between Classes in $W^{1,1}(\Omega,S^1)$
Itai Shafrir, Technion Israel Institute of Technology, Israel

6:00-6:25 A Degenerate Isoperimetric Problem and Traveling Waves to a Hamiltonian System of Allen-Cahn Type
Peter Sternberg, Indiana University, USA

6:30-6:55 Title Not Available at Time of Publication
Nicholas Michalowski, New Mexico State University, USA

Monday, December 7

MS34

Quasilinear PDE in Models from Mathematical Physics - Part I of II

5:00 PM-7:00 PM

Room:Bouchon - Main Level

For Part 2 see MS47

Speakers will talk on new developments in analysis for PDE with strongly nonlinear effects.

Organizer: Jeremy L. Marzuola
University of North Carolina at Chapel Hill, USA

Organizer: Daniel Tataru
University of California, Berkeley, USA

5:00-5:25 Global Solutions for Some Fluid Models
Mihaela Ifrim, McMaster University, Canada

5:30-5:55 Quasilinear Dispersive Waves
John Hunter, University of California, Davis, USA

6:00-6:25 Long-Time Behavior of Models Arising in Water Waves
Benjamin Harrop-Griffiths, Courant Institute of Mathematical Sciences, New York University, USA

6:30-6:55 Nonlinear Stability of the Three Dimensional Couette Flow
Pierre Germain, New York University, USA

Monday, December 7

MS35

Singular Perturbations and Boundary Layers - Theory and Numerical Aspects - Part I of II

5:00 PM-7:00 PM

Room:Rattlers - Main Level

For Part 2 see MS49

The main purpose of this session is to bring together specialists in the field of singular perturbations and boundary layers. In the presence of boundaries, the behavior of the solutions to the Navier-Stokes in the limit of vanishing viscosity is still an outstanding problem in mathematical fluid dynamics. Similar problems occur in many other areas of sciences. Furthermore, numerical methods for singularly perturbed equations remain challenging problems. This mini symposium is meant to be a platform to exchange ideas on these problems.

Organizer: Gung-Min Gie
University of Louisville, USA

Organizer: YoungJoon Hong
Indiana University, USA

Organizer: Chang-Yeol Jung
Ulsan National Institute of Science and Technology, South Korea

Organizer: Roger M. Temam
Indiana University, USA

5:00-5:25 On the Long Time Existence of the Prandtl Equations
Mihaela Ignatova and *Vlad C. Vicol*, Princeton University, USA

5:30-5:55 Observations on the Vanishing Viscosity Limit
James P. Kelliher, University of California, Riverside, USA

6:00-6:25 Robust Numerical Methods for Boundary and Interior Layers in Parabolic Problems
Eugene O'Riordan, Dublin City University, Ireland

6:30-6:55 The Primitive Equations: Viscous and Inviscid Models
Makram Hamouda, Indiana University, USA

Monday, December 7

MS36

Nonlocal Continuum Models: Theory, Computation, and Applications

5:00 PM-7:00 PM

Room:Chambers Lecture Hall - Main Level

Nonlocal continuum theory has become a valuable tool to bridge atomistic and continuum models for mesoscale and nanoscale systems. Examples include crack propagation, diffusion through porous media, and electrostatic interactions between biomolecules. This minisymposium will provide a forum to discuss and present nonlocal theories in these diverse application areas, as well as computational methods for solving them. In particular, speakers will highlight theoretical frameworks for identifying and validating nonlocal models, tools for analyzing and characterizing nonlocal problems, key results, and emerging modeling challenges.

Organizer: Jaydeep Bardhan
Northeastern University, USA

Organizer: Pavel Bochev
Sandia National Laboratories, USA

5:00-5:25 Heterogeneous Domain Decomposition Methods for Non-local Problems
Pavel Bochev and *Marta D'Elia*, Sandia National Laboratories, USA

5:30-5:55 The Richness of Fractional Integro-Differential Operators Defined by Convolution with the Lé}vy Measure
David A. Benson, Colorado School of Mines, USA

6:00-6:25 Nonlocal Electrostatics in Molecular Biology: Water as a Structured Material
Jaydeep Bardhan, Northeastern University, USA; Matthew G. Knepley, University of Chicago, USA

6:30-6:55 Computing of Ion-ion Correlations with Nonlocal Density Functional Theory
Dirk Gillespie, Rush University Medical Center, USA

Monday, December 7

MS37

Multiscale Analysis, Modeling and Simulation for Applications in Material Science - Part III of III

5:00 PM-7:00 PM

Room:Four Peaks - Upper Level

For Part 2 see MS22

In recent years we have witnessed a tremendous growth of activity on developing methods for materials-related phenomena whose essential role extends over multiple scales in time and space. The proposed minisymposium will focus on multiscale modeling, analysis and simulation of the problems arising in composite and other heterogeneous media. In particular, topics that will be discussed include but not limited to are asymptotic analysis, homogenization, inverse problems, and computational tools for complex inhomogeneous media. The purpose of this section is to enable contact between researchers working on multiscale methods with an update on recent progress in this field.

Organizer: Silvia Jimenez

Colgate University, USA

Organizer: Yuliya Gorb

University of Houston, USA

5:00-5:25 Multiscale Mimetic Reduced-Order Models for Spectrally Accurate Wavefield Simulations

Vladimir L. Druskin, Schlumberger-Doll Research, USA; Alexander Mamonov, University of Houston, USA; Mikhail Zaslavsky, Schlumberger-Doll Research, USA

5:30-5:55 Homogenization of a Toy Model of Non-Linear Composites

Guillermo Goldsztein, Georgia Institute of Technology, USA

6:00-6:25 Some Recent Mathematics Progress on Negative Index Materials and Their Applications

Hoai-Minh Nguyen, École Polytechnique Fédérale de Lausanne, Switzerland

6:30-6:55 Optimal Approach for the Numerical Stochastic Homogenization of Elliptic Problems

Leila Taghizadeh and Caroline Geiersbach, Vienna University of Technology, Austria; Clemens F. Heitzinger, Arizona State University, USA and Vienna University of Technology, Austria

Monday, December 7

MS38

Challenges in the Mechanics of Thin Elastic Structures - Part III of III

5:00 PM-7:00 PM

Room:Flagstaff A - Upper Level

For Part 2 see MS14

The mechanics of thin structures is a field where geometry and mechanics interact, leading to deep questions in PDE and the calculus of variations. Current issues include (i) understanding the patterns and defects produced by compressive loads in flat or cylindrical structures; (ii) understanding how growth, misfit, or crystalline defects influence the preferred shape of a thin structure; and (iii) understanding the emergence of localized structures such as folds and conical singularities. The talks in this 3-part minisymposium will address these and related problems, drawing on tools from geometry, mechanics, the calculus of variations, and PDE.

Organizer: Robert V. Kohn

Courant Institute of Mathematical Sciences, New York University, USA

5:00-5:25 Limits of Elastic Energies of Converging Elastic Bodies

Cy Maor and Raz Kupferman, Hebrew University, Israel

5:30-5:55 Plates with Incompatible Prestrain of Higher Order

Diego Ricciotti and Marta Lewicka, University of Pittsburgh, USA; Annie Raoult, Université Paris Descartes, France

6:00-6:25 Energy Scaling Laws for an Axially Compressed Thin Elastic Cylinder

Ian Tobasco, Courant Institute of Mathematical Sciences, New York University, USA

6:30-6:55 The Metric-Restricted Inverse Design Problem

Marta Lewicka, University of Pittsburgh, USA

Monday, December 7

MS39

Partial Differential Equations and Geometric Analysis - Part I of II

5:00 PM-7:00 PM

Room:Flagstaff B - Upper Level

For Part 2 see MS53

This minisymposium emphasizes recent developments in analysis of non- linear elliptic and parabolic partial differential equations arising in differential geometry, and especially geometric flow equations, including mean curvature flow, Ricci flow, and Yang-Mills gradient flow, together with their applications to differential geometry and mathematical physics.

Organizer: Paul Feehan

Rutgers University, USA

5:00-5:25 Willmore Surface Equation for Radially Symmetric Solutions

Jingyi Chen, University of British Columbia, Canada

5:30-5:55 Curvature Flows on Homogeneous Spaces: Applications of the Bracket Flow

David G. Glickenstein, University of Arizona, USA

6:00-6:25 Asymptotic Rigidity of Shrinking Gradient Ricci Solitons

Brett L. Kotschwar, Arizona State University, USA

6:30-6:55 Łojasiewicz-Simon Gradient Inequalities with Applications to Yang-Mills Pairs and Harmonic Maps

Manousos Maridakis, Rutgers University, USA

Monday, December 7

CP3

5:00 PM-7:00 PM

Room:Sedona - Main Level

Chair: Erwin Suazo, University of Texas, Rio Grande Valley

5:00-5:15 Weak and Strong Probabilistic Solutions for a Class of Strongly Nonlinear Parabolic Problems
Zakaria Ali and Mamadou Sango, University of Pretoria, South Africa

5:20-5:35 Existence of Mild Solution for An Impulsive Neutral Stochastic Fractional Integro-Differential Inclusions with Infinite Delay
Alka Chadha and Dwijendra N. Pandey, Indian Institute of Technology Roorkee, India

5:40-5:55 Global Existence of Solutions to System of Isentropic Gas Dynamics in a Divergent Nozzle with Friction
Yunguang Lu, Hangzhou Normal University, China; Xuezhou Lu, CNRS, France

6:00-6:15 Elliptic and Parabolic Differential-Difference Operators with Incommesurable Shifts
Anton M. Selitskii, Russian Academy of Sciences, Russia

6:20-6:35 Generalized Variable-Coefficient Nonlinear Schroedinger Equation: Explicit Solutions and Finite-Time Blow-Up
Erwin Suazo, University of Texas, Rio Grande Valley, USA

6:40-6:55 Existence Results for Superlinear Elliptic Equations with Nonlinear Boundary Value Conditions
Xiaohui Yu, Shenzhen University, China

SIMA Editorial Board Meeting

7:30 PM-9:30 PM

Room:Chaparral - Main Level

Tuesday, December 8

Registration

8:00 AM-5:30 PM

Room:Grand Ballroom Foyer - Main Level

MS40

Equations of 3D Flows - Part I of II

8:30 AM-11:00 AM

Room:Forum - Lower Level

For Part 2 see MS55

This session is dedicated to mathematical analysis of partial differential equations arising in Fluid Mechanics. We want to bring together specialists working on various aspects of models of 3D flows, such as Navier-Stokes or Euler equations. We will present recent progress concerning the existence, asymptotic analysis and regularity of solutions. The aim is to compare the theory of strong and weak solutions, and to determine how the techniques of one may be used to find new results in the other.

Organizer: Piotr Mucha
Warsaw University, Poland

Organizer: Ewelina Zatorska
Warsaw University of Technology, Poland

8:30-8:55 Weak Vs. Strong Solutions to Complete Fluid Systems
Eduard Feireisl, Mathematical Institute ASCR, Prague, Czech Republic

9:00-9:25 Weak/Strong Uniqueness for the Compressible Euler System
Piotr Gwiazda, Warsaw University, Poland

9:30-9:55 Compressible Navier-Stokes Equations with Thermodynamically Unstable Pressure and Anisotropic Viscous Stress
Didier Bresch, Universite de Savoie, France

10:00-10:25 Existence of Global Strong Solution for the Korteweg System
Boris Haspot, Université Paris Dauphine, France

10:30-10:55 Two Velocity Formulation of the Navier-Stokes Equations
Ewelina Zatorska, Warsaw University of Technology, Poland

continued in next column

Tuesday, December 8

MS41

Deterministic and Stochastic Aspects of Fluid Dynamics - Part II of II

8:30 AM-10:30 AM

Room:Rio Verde - Main Level

For Part 1 see MS27

Models of fluid dynamics (Navier-Stokes/ Euler equations, Primitive equations, etc...) are ubiquitous in science and play a significant role in subjects such as climate science, geophysics, and engineering. From the mathematical viewpoint, they provide a rich source of problems in partial differential equations, involving elements from analysis, probability theory, dynamical systems. Of great importance are questions ranging from global regularity to longtime behavior, with particular emphasis on statistical properties of solutions and their robustness with respect to singular and/or stochastic perturbations. This minisymposium will bring together researchers at all career stages to discuss recent advances in mathematical fluid dynamics.

Organizer: Michele Coti Zelati
University of Maryland, USA

Organizer: Honghu Liu
University of California, Los Angeles, USA

Organizer: Temam Roger
Indiana University Bloomington, USA

Organizer: Chuntian Wang
Indiana University Bloomington, USA

8:30-8:55 Computation of Entropic Measure-Valued Solutions for Euler Equations

Eitan Tadmor, University of Maryland, USA

9:00-9:25 Wasserstein Metrics in Stochastic Partial Differential Equations

Nathan Glatt-Holtz, Virginia Tech, USA

9:30-9:55 Non-Markovian Reduced Equations for Stochastic PDEs

Mickael Chekroun, University of California, Los Angeles, USA

10:00-10:25 Shell Models for Turbulent Flows

Susan Friedlander, University of Southern California, USA; Nathan Glatt Holtz, Virginia Tech, USA; Vlad C. Vicol, Princeton University, USA

Tuesday, December 8

MS42

PDEs for Defects Problems in Materials Science - Part I of II

8:30 AM-10:30 AM

Room:Sonora - Main Level

For Part 2 see MS56

This minisymposium brings together experts in PDE modelling and analysis of defects in materials science, such as dislocations, cracks, grain boundaries, nucleation, etc. The minisymposium will focus on recent progress in this field and future directions.

Organizer: Jianfeng Lu
Duke University, USA

Organizer: Yang Xiang
Hong Kong University of Science and Technology, Hong Kong

8:30-8:55 Quantum Dots and Dislocations: Dynamics of Materials Defects

Irene Fonseca, Carnegie Mellon University, USA

9:00-9:25 Discrete and Continuum Models for the Long-range Elastic Effects of Stepped Epitaxial Surfaces

Yang Xiang and Tao Luo, Hong Kong University of Science and Technology, Hong Kong; Aaron Yip, Purdue University, USA

9:30-9:55 Beyond the Burton-Cabrera-Frank (BCF) Model of Surface Defects: A Study in 1+1 Dimensions

Dionisios Margetis, University of Maryland, College Park, USA

10:00-10:25 PDEs From Scaling Limits of Atomistic Models in Crystal Surface Evolution

Jeremy L. Marzuola, University of North Carolina at Chapel Hill, USA

Tuesday, December 8

MS43

Numerical Methods for PDE and Applications in Computational and Data Science - Part I of II

8:30 AM-10:30 AM

Room:San Carlos - Main Level

For Part 2 see MS57

Partial differential equations (PDE) are playing increasingly important roles in computational and data science problems. Applications of PDE require efficient and accurate numerical schemes, and this presents a new array of computational challenges and opportunities. This minisymposium will address recent advances in numerical schemes, as well as new applications of PDE in computational and data science. Some topics to be addressed include machine learning, crowd motion, optimal transportation, materials science, and numerical schemes for viscosity solutions.

Organizer: Jeff Calder
University of California, Berkeley, USA

Organizer: Adam M. Oberman
McGill University, Canada

8:30-8:55 Numerical Schemes for the Hamilton-Jacobi Equation Continuum Limit of Non-dominated Sorting

Jeff Calder, University of California, Berkeley, USA

9:00-9:25 Prediction Without Probability

Kangping Zhu, GSA Capital, USA; Robert V. Kohn, Courant Institute of Mathematical Sciences, New York University, USA

9:30-9:55 A PDE Approach to Prediction with Expert Advice

Nadejda Drenska, Courant Institute of Mathematical Sciences, New York University, USA

10:00-10:25 Congested Crowd Motion via the Height Constrained Aggregation Equation: Wasserstein Gradient Flow and Free Boundary Characterization

Katy Craig, University of California, Santa Barbara, USA

Tuesday, December 8

MS44

Mathematical Analysis of Liquid Crystals - Part I of III

8:30 AM-10:30 AM

Room:Sedona - Main Level

For Part 2 see MS78

Liquid crystals are the main entry point into the fascinating world of complex materials with complex micro-structural properties. Yet, despite being the simplest representative of such materials, and of enormous technological importance, liquid crystals are not understood at a basic, fundamental level of description. The proposed minisymposium aims to gather the main contributors to recent advances in the area and to set new directions by determining the major open problems.

Organizer: Valeriy Slastikov
University of Bristol, United Kingdom

Organizer: Arghir Zarnescu
University of Sussex, United Kingdom

8:30-8:55 Weak Anchoring for a Two-Dimensional Liquid Crystal
Lia Bronsard, McMaster University, Canada

9:00-9:25 Line Defects in the Asymptotic Analysis of Landau-De Gennes Minimizers
Giacomo Canevari, University of Oxford, United Kingdom

9:30-9:55 On the K13 Problem in the Oseen-Frank Theory of Nematic Liquid Crystals
Arghir Zarnescu, University of Sussex, United Kingdom

10:00-10:25 The Micro-Micro Description for Elastic Complex Fluids
Chun Liu, Pennsylvania State University, USA

Tuesday, December 8

MS45

Analysis and Control of Fluid Models and Flow-coupled Systems - Part IV of IV

8:30 AM-10:30 AM

Room:Palomas - Main Level

For Part 3 see MS31

This minisymposium will serve to promote and disseminate recent developments on evolution PDEs, especially those describing fluid or gas flows and their interaction with other types of dynamics such as plates or elastic solids, with fixed or moving interfaces. Questions on modeling, well-posedness, control, stability, optimization and numerical simulations will be of primary interest.

Organizer: Justin T. Webster
North Carolina State University, USA

Organizer: Marcelo Disconzi
Vanderbilt University, USA

Organizer: Irena M. Lasiecka
University of Memphis, USA

Organizer: Daniel Toundykov
University of Nebraska-Lincoln, USA

8:30-8:55 Controllability of a Cochlea Model and Related Fluid Elastic Systems
Scott Hansen, Iowa State University, USA

9:00-9:25 Interface Singularities in Fluid Dynamics
Steve Shkoller, University of California, Davis, USA; Daniel Coutand, Heriot-Watt University, United Kingdom

9:30-9:55 Global Existence for a Fluid-structure Model
Mihaela Ignatova, Princeton University, USA; Igor Kukavica, University of Southern California, USA; Irena M. Lasiecka, University of Memphis, USA; Amjad Tuffaha, The Petroleum Institute of Abu Dhabi, United Arab Emirates

10:00-10:25 Fluid-structure Interaction with Strongly Damped Structure: Optimal Regularity Under Control Acting at the Interface
Roberto Triggiani and Irena M. Lasiecka, University of Memphis, USA

Tuesday, December 8

MS46

Large-Time Dynamics of the Navier-Stokes Equations and Related PDEs - Part I of II

8:30 AM-10:30 AM

Room:Coronado - Main Level

For Part 2 see MS60

The accurate, reliable prediction of the long-time dynamical evolution of hydrodynamic systems has become increasingly important in the climatological, astrophysical, and geophysical sciences. Mathematically quantifying this behaviour allows for more accurate and cost-effective reduced models, and helps validate existing models, leading to more realistic real-time predictions for the long-time dynamics of such systems. This minisymposium will address the long-time dynamics of hydrodynamic models such as the Navier-Stokes equations and related models. Of particular interest are the study of the global attracting set, techniques in data assimilation, asymptotically reduced models, and the global well-posedness in time of these models.

Organizer: Jared P. Whitehead
Brigham Young University, USA

8:30-8:55 Recent Advances in the Pseudospectral Method
John C. Bowman, University of Alberta, Canada

9:00-9:25 Uniformly Attracting Invariant Sets for Critical SQG Equations
Peter Constantin, Princeton University, USA; *Michele Coti Zelati*, University of Maryland, USA; Vlad C. Vicol, Princeton University, USA

9:30-9:55 Data Assimilation Using Approximate Inertial Manifolds
Michael S. Jolly, Indiana University, USA

10:00-10:25 A Diffuse Interface Model for Two-Phase Groundwater Flow
Daozhi Han, Florida State University, USA

Tuesday, December 8

MS47

Quasilinear PDE in Models from Mathematical Physics - Part II of II

8:30 AM-10:00 AM

Room:Center Ballroom - Main Level

For Part 1 see MS34
Speakers will talk on new developments in analysis for PDE with strongly nonlinear effects.

Organizer: Jeremy L. Marzuola
University of North Carolina at Chapel Hill, USA

Organizer: Daniel Tataru
University of California, Berkeley, USA

8:30-8:55 The Euler-Maxwell and Related Models
Benoit Pausader, Brown University, USA

9:00-9:25 Title Not Available at Time of Publication
Benjamin Dodson, Johns Hopkins University, USA

9:30-9:55 Title Not Available at Time of Publication
Herbert Koch, Bonn University, Germany

Tuesday, December 8

MS48

Singularities of High Order PDEs Describing Liquid Jets and Films - Part I of II

8:30 AM-10:30 AM

Room:Bouchon - Main Level

For Part 2 see MS61
Liquid films and jets of micro- or nanoscale thickness occur widely in nature and industrial processes. Mathematical models describing them are often represented by high order coupled PDEs of parabolic or mixed type. Interplay between nonlinear curvature and viscosity terms with those describing intermolecular interactions leads to formation of sophisticated analytical and geometric singularities of their solutions, e.g. finite time jet breakup, film rupture, cusps or moving contact lines with singular asymptotics. Self-similar structure of these singularities can be analyzed using asymptotical analysis and nonlinear simulations. The minisymposium provides a platform to investigate these questions from analytical and numerical perspectives.

Organizer: Marco A. Fontelos
Institute for Mathematics, CSIC, Spain

Organizer: Georgy Kitavtsev
University of Bristol, United Kingdom

8:30-8:55 Singularities in Jet and Bubble Breakup and Related Applications
Marco A. Fontelos, Institute for Mathematics, CSIC, Spain

9:00-9:25 Healing Capillary Films
Zhong Zheng, Princeton University, USA; Marco A. Fontelos, Institute for Mathematics, CSIC, Spain; Sangwoo Shin and Howard A Stone, Princeton University, USA

9:30-9:55 Existence and Application of Cusps and Cuspidal Edges at Fluid Interfaces
Rouslan Krechetnikov, University of Alberta, Canada

10:00-10:25 Higher-Order PDE Describing Two-Phase Flow in Porous Media
Melissa Strait and Michael Shearer, North Carolina State University, USA

Tuesday, December 8

MS49

Singular Perturbations and Boundary Layers - Theory and Numerical Aspects - Part II of II

8:30 AM-10:30 AM

Room:Rattlers - Main Level

For Part 1 see MS35
The main purpose of this session is to bring together specialists in the field of singular perturbations and boundary layers. In the presence of boundaries, the behavior of the solutions to the Navier-Stokes in the limit of vanishing viscosity is still an outstanding problem in mathematical fluid dynamics. Similar problems occur in many other areas of sciences. Furthermore, numerical methods for singularly perturbed equations remain challenging problems. This minisymposium is meant to be a platform to exchange ideas on these problems.

Organizer: Gung-Min Gie
University of Louisville, USA

Organizer: YoungJoon Hong
Indiana University, USA

Organizer: Chang-Yeol Jung
Ulsan National Institute of Science and Technology, South Korea

Organizer: Roger M. Temam
Indiana University, USA

8:30-8:55 Sharp Interface Limit of the Coupled Cahn-Hilliard-Stokes-Darcy System
Xiaoming Wang, Florida State University, USA

9:00-9:25 Stability of Time Periodic Solutions of the Navier-Stokes-Maxwell System?
Slim Ibrahim, University of Victoria, Canada; Nader Masmoudi, Courant Institute of Mathematical Sciences, New York University, USA; Pierre-Gilles Lemarie, University of Evry-Val-d'Essonne, France

9:30-9:55 Title Not Available at Time of Publication
Xiaobing H. Feng, University of Tennessee, USA

10:00-10:25 Initial-Boundary Layer Associated with the Darcy-Brinkman-Oberbeck-Boussinesq Model for Convection in Porous Medium
Daozhi Han, Florida State University, USA

Tuesday, December 8

MS50

Recent Development in Modeling, Control, Theoretical and Numerical Analysis of Complex Systems with Dynamic Boundaries - Part I of II

8:30 AM-11:00 AM

Room:Chambers Lecture Hall - Main Level

For Part 2 see MS64

Many outstanding open problems of modern science and engineering involve free boundaries whose dynamics are determined as a part of the solution. The analysis of the underlying PDE systems poses significant mathematical challenges. This minisymposium will highlight some recent advances in analytical and computational studies for such systems. Examples include inverse free boundary problems, optimal control of phase transition processes, multi-phase fluid mixture flow, inverse scattering problems, stochastic differential equations and optimal control, viscoelastic fluid simulation, interfaces for nonlinear degenerate and singular parabolic PDEs, electrical impedance tomography based cancer detection model.

Organizer: Ugur G. Abdulla
Florida Institute of Technology, USA

Organizer: Jian Du
Florida Institute of Technology, USA

Organizer: Vladislav Bukshtynov
Florida Institute of Technology, USA

8:30-8:55 On the Optimal Control of Parabolic Free Boundary Problems
Ugur G. Abdulla, Florida Institute of Technology, USA

9:00-9:25 SDEs and Optimal Control, a Method of Evolving Junction
Haomin Zhou, Georgia Institute of Technology, USA

9:30-9:55 Reconstruction in Phaseless Inverse Scattering Problems
Michael V. Klibanov, University of North Carolina, Charlotte, USA

10:00-10:25 A Necessary and Sufficient Condition for the Continuity of Local Minima of Parabolic Variational Integrals with Linear Growth
Colin James Klaus, Vanderbilt University, USA

10:30-10:55 On the Optimal Control of the Inverse Multiphase Stefan Problem
Bruno Poggi Cevallos, University of Minnesota, USA; Ugur G. Abdulla, Florida Institute of Technology, USA

continued in next column

Tuesday, December 8

MS51

Self-organization Phenomena in Elliptic and Parabolic Systems - Part I of II

8:30 AM-10:30 AM

Room:Four Peaks - Upper Level

For Part 2 see MS65

This minisymposium is devoted to studies of solutions to elliptic and parabolic PDE systems arising from physical and biological systems, often of multiple constituents, with self-organizing properties. Examples include Giere-Meinhardt type reaction diffusion equations, Ohta-Kawasaki block copolymer problems, and equations of Micro-Electromechanical Systems. Recently developed analytic, asymptotic, and computational techniques will be presented. These methods capture many geometric structures in the PDE solutions. The geometric structures may appear as a single object, or as multiple components in an assembly. In the latter case one can often identify an growth property and an inhibition property that drive pattern formation.

Organizer: Xiaofeng Ren
George Washington University, USA

8:30-8:55 Bilayers and Multilayers in Copolymer-solvent Blends
Karl Glasner, University of Arizona, USA

9:00-9:25 Continuum Model of Cyanobacteria Motion
Theo Kolokolnikov, University of British Columbia, Canada

9:30-9:55 Vibrational Patterns of Thin Plates with Clamped Patches
Alan E. Lindsay, University of Notre Dame, USA

10:00-10:25 Refined Stability Thresholds for Steady-State Multi-Spot Solutions to Reaction-Diffusion Systems in Finite 2-D Domains
Michael Ward, University of British Columbia, Canada

Tuesday, December 8

MS52

Inverse Scattering and Dispersive Nonlinear Equations - Part I of II

8:30 AM-10:30 AM

Room:Flagstaff A - Upper Level

For Part 2 see MS54

This symposium will gather junior and senior researchers at the interface of dispersive nonlinear equations and completely integrable systems, with an emphasis on the use of inverse scattering methods to prove global existence of solutions and characterize long-time and small-dispersion limits of the completely integrable PDE's. Emphasis will be given to the work of young researchers, with senior researchers to guide the discussion and place the work in a larger context.

Organizer: Peter A. Perry

University of Kentucky, USA

Organizer: Catherine Sulem

University of Toronto, Canada

8:30-8:55 D-Bar Problems: Computation, Asymptotics, and Applications

Ken McLaughlin, University of Arizona, USA

9:00-9:25 A Spectral Problem Related to the Scattering Transform of the Benjamin-Ono Equation

Yilun Wu, University of Indiana, USA

9:30-9:55 Direct Scattering and Small Dispersion for the Benjamin-Ono Equation with Rational Initial Data

Alfredo N. Wetzel and Peter D. Miller, University of Michigan, Ann Arbor, USA

10:00-10:25 Global Solutions for the Zero-Energy Novikov-Veselov Equation by Inverse Scattering

Michael Music and Peter A. Perry, University of Kentucky, USA

Tuesday, December 8

MS53

Partial Differential Equations and Geometric Analysis - Part II of II

8:30 AM-10:30 AM

Room:Flagstaff B - Upper Level

For Part 1 see MS39

This minisymposium emphasizes recent developments in analysis of non- linear elliptic and parabolic partial differential equations arising in differential geometry, and especially geometric flow equations, including mean curvature flow, Ricci flow, and Yang-Mills gradient flow, together with their applications to differential geometry and mathematical physics.

Organizer: Paul Feehan

Rutgers University, USA

8:30-8:55 The Quilted Atiyah-Floer Conjecture and the Yang-Mills Heat Flow

David Duncan, McMaster University, Canada

9:00-9:25 Global Existence and Convergence of Smooth Solutions to Yang-Mills Gradient Flow over Compact Four-Manifolds

Paul Feehan, Rutgers University, USA

9:30-9:55 Higher Order Yang-Mills Flow

Casey Lynn Kelleher, University of California, Irvine, USA

10:00-10:25 Generalized Kahler Ricci Flow

Jeffrey Streets, University of California, Irvine, USA

Coffee Break

10:30 AM-10:55 AM

Room:Forum - Lower Level

Announcements

10:55 AM-11:00 AM

Room:Forum - Lower Level

Tuesday, December 8

IP3

Hypersurfaces with Almost Constant Mean Curvature and Capillarity Theory

11:00 AM-11:45 AM

Room:Forum - Lower Level

Chair: Robert V. Kohn, Courant Institute of Mathematical Sciences, New York University, USA

Alexandrov's theorem asserts that a (bounded, embedded) constant mean curvature (cmc) hypersurface must be a sphere. It is well-known that if this condition is relaxed and the mean curvature is just assumed to be close to a constant, then the corresponding hypersurfaces does not need to be close to a sphere. Indeed any family of nearby spheres with equal radii connected by short catenoidal necks can be slightly perturbed to obtain examples of almost-cmc hypersurfaces. We show that these examples actually capture the only possible behavior of almost-cmc hypersurfaces, by proving various quantitative bounds on the distance between an almost-cmc hypersurface and a collection of tangent spheres of equal radii in terms of their mean curvature oscillation. This is a joint work with G. Ciraolo (U Palermo). We next discuss these issues for the nonlocal mean curvature introduced by Caffarelli and Souganidis, showing in particular a remarkable rigidity property of the nonlocal problem which prevents bubbling phenomena, in other words, every nonlocal almost-cmc hypersurface must be close to a single sphere. This is a joint work with G. Ciraolo, A. Figalli (UT Austin) and M. Novaga (U Pisa).

Francesco Maggi

University of Texas at Austin, USA

Tuesday, December 8

IP4

Long Time Dynamics for Two Dimensional Water Wave Models

11:45 AM-12:30 PM

Room:Forum - Lower Level

Chair: Robert V. Kohn, Courant Institute of Mathematical Sciences, New York University, USA

The water wave type equations describe the evolution of the free surface of an inviscid, incompressible fluid evolving under the action of gravity, surface tension, etc. Understanding the long time dynamics for such fluid models is a challenging yet very interesting problem. The aim of this talk is to present some recent ideas and results in this direction for two dimensional fluids. This work is joint with Mihaela Ifrim, and also in part with John Hunter and Benjamin Harrop-Griffiths.

Daniel Tataru
University of California, Berkeley, USA

Lunch Break

12:30 PM-2:30 PM

Attendees on their own

Tuesday, December 8

MS54

Inverse Scattering and Dispersive Nonlinear Equations - Part II of II

2:30 PM-4:30 PM

Room:Forum - Lower Level

For Part 1 see MS52

This symposium will gather junior and senior researchers at the interface of dispersive nonlinear equations and completely integrable systems, with an emphasis on the use of inverse scattering methods to prove global existence of solutions and characterize long-time and small-dispersion limits of the completely integrable PDE's. Emphasis will be given to the work of young researchers, with senior researchers to guide the discussion and place the work in a larger context.

Organizer: Peter A. Perry
University of Kentucky, USA

Organizer: Catherine Sulem
University of Toronto, Canada

2:30-2:55 The Nonlinear Stage of the Modulational Instability
Gino Biondini, State University of New York at Buffalo, USA

3:00-3:25 Inverse Scattering and Long-Time Asymptotics for the Derivative Nonlinear Schrodinger Equation
Jiaqi Liu and Peter A. Perry, University of Kentucky, USA; Catherine Sulem, University of Toronto, Canada

3:30-3:55 Forward Scattering for the Semiclassical Three Wave Equation
Robert J. Buckingham, University of Cincinnati, USA; Robert Jenkins, University of Arizona, USA; Peter D. Miller, University of Michigan, Ann Arbor, USA

4:00-4:25 Initial-Boundary Value Problems of Integrable Systems
Stephanos Venakides, Duke University, USA

Tuesday, December 8

MS55

Equations of 3D Flows - Part II of II

2:30 PM-4:30 PM

Room:Rio Verde - Main Level

For Part 1 see MS40

This session is dedicated to mathematical analysis of partial differential equations arising in Fluid Mechanics. We want to bring together specialists working on various aspects of models of 3D flows, such as Navier-Stokes or Euler equations. We will present recent progress concerning the existence, asymptotic analysis and regularity of solutions. The aim is to compare the theory of strong and weak solutions, and to determine how the techniques of one may be used to find new results in the other.

Organizer: Piotr Mucha
Warsaw University, Poland

Organizer: Ewelina Zatorska
Warsaw University of Technology, Poland

2:30-2:55 Global Existence of Solutions to the 3D Navier-Stokes Equations with Degenerate Viscosities
Alexis F. Vasseur, University of Texas at Austin, USA; Cheng Yu, University of Texas, USA

3:00-3:25 Primitive Equations and Convergence to the 3D-Quasi-Geostrophic Model
Frederic Charve, Université Paris-Est, France

3:30-3:55 On Multiphase Flows: Modeling and Analysis
Konstantina Trivisa, University of Maryland, USA

4:00-4:25 Navier-Stokes Equations of Slightly Compressible Flows
Piotr Mucha, Warsaw University, Poland

Tuesday, December 8

MS56

PDEs for Defects Problems in Materials Science - Part II of II

2:30 PM-4:30 PM

Room:Sonora - Main Level

For Part 1 see MS42

This minisymposium brings together experts in PDE modelling and analysis of defects in materials science, such as dislocations, cracks, grain boundaries, nucleation, etc. The minisymposium will focus on recent progress in this field and future directions.

Organizer: Jianfeng Lu
Duke University, USA

Organizer: Yang Xiang
Hong Kong University of Science and Technology, Hong Kong

2:30-2:55 Motion by Mean Curvature for a Second Order Gradient Theory

Drew Swartz and *Aaron Yip*, Purdue University, USA

3:00-3:25 Variational Models for Crystal Image Analysis

Jianfeng Lu, Duke University, USA

3:30-3:55 Hölder Gradient Estimates for Parabolic Homogeneous *p*-Laplacian Equations

Tianling Jin, Hong Kong University of Science and Technology, Hong Kong; Luis Silvestre, University of Chicago, USA

4:00-4:25 A Non-local Variational Problem Arising from Studies of Nonlinear Charge Screening in Graphene Monolayers

Jianfeng Lu, Duke University, USA; Vitaly Moroz, Swansea University of South Wales, United Kingdom; *Cyrill B. Muratov*, New Jersey Institute of Technology, USA

Tuesday, December 8

MS57

Numerical Methods for PDE and Applications in Computational and Data Science - Part II of II

2:30 PM-4:30 PM

Room:San Carlos - Main Level

For Part 1 see MS43

Partial differential equations (PDE) are playing increasingly important roles in computational and data science problems. Applications of PDE require efficient and accurate numerical schemes, and this presents a new array of computational challenges and opportunities. This minisymposium will address recent advances in numerical schemes, as well as new applications of PDE in computational and data science. Some topics to be addressed include machine learning, crowd motion, optimal transportation, materials science, and numerical schemes for viscosity solutions.

Organizer: Jeff Calder
University of California, Berkeley, USA

Organizer: Adam M. Oberman
McGill University, Canada

2:30-2:55 Novel Techniques for Integrating over Implicitly Defined Curves and Surfaces

Catherine M. Kublik, University of Dayton, USA

3:00-3:25 Numerical Methods for Anisotropic Curvature Flow of Networks of Surfaces

Selim Esedoglu, University of California, Los Angeles, USA

3:30-3:55 Numerical Methods for the 2-Hessian Elliptic Partial Differential Equation

Brittany Froese, University of Texas at Austin, USA; Adam M. Oberman and *Tiago Salvador*, McGill University, Canada

4:00-4:25 Fast Numerical Methods for Optimal Transportation for General Costs

Yuanlong Ruan and Adam M. Oberman, McGill University, Canada

Tuesday, December 8

MS58

Analytical Methods in Fluid Mechanics - Part I of II

2:30 PM-4:30 PM

Room:Sedona - Main Level

For Part 2 see MS70

The main purpose of this minisymposium is to bring together junior researchers who have already established themselves as specialists and, in some cases, leaders in the field of mathematical fluid mechanics. The complementary yet cohesive nature of the speakers' expertise, that is, the use of similar analytical tools in the study of the classical and geophysical fluid mechanics, gives focus and purpose to the minisymposium. This minisymposium is meant as a platform to exchange ideas on a variety of problems concerning the behavior of fluids.

Organizer: Gung-Min Gie
University of Louisville, USA

Organizer: James P. Kelliher
University of California, Riverside, USA

Organizer: Anna L. Mazzucato
Pennsylvania State University, USA

2:30-2:55 Recent Developments on the Magnetohydrodynamics and Related Systems

Kazuo Yamazaki, Washington State University, USA

3:00-3:25 An Anisotropic Partial Regularity Criterion for the 3D Incompressible Navier-Stokes Equations

Walter Rusin, Oklahoma State University, USA

3:30-3:55 Recent Progress on the Exterior Domain Problem on a Hyperbolic Plane

Magdalena Czubak, Binghamton University, USA

4:00-4:25 Small Moving Rigid Body into a Viscous Fluid

Christophe Lacave, Universite Paris 7-Denis Diderot, France

Tuesday, December 8

MS59

PDE Models and Control of Swarm Dynamics - Part I of II

2:30 PM-4:30 PM

Room:Palomas - Main Level

For Part 2 see MS71

PDEs can be used to model the spatiotemporal dynamics of large collectives, or "swarms," of discrete individuals. These models enable the prediction, analysis, and control of swarm dynamics in multi-robot tasks, multi-vehicle coordination, and the study of self-organized behaviors in biological, social, and economic systems. The reliable use of PDEs in swarm applications requires further research on differences between discrete and continuum models and the controllability of the models. To facilitate discussions on these problems, this minisymposium will bring together mathematicians and engineers who apply techniques from kinetic theory, network science, numerical analysis, and optimal control to swarm PDE models.

Organizer: Andrea L. Bertozzi
University of California, Los Angeles, USA

Organizer: Spring M. Berman
Arizona State University, USA

2:30-2:55 Control of PDE Models of Robotic Swarms with Stochastic Behaviors
Spring M. Berman, Arizona State University, USA

3:00-3:25 Large System Limits in Control of Multi-Vehicular Formations
Bassam A. Bamieh, University of California, Santa Barbara, USA

3:30-3:55 Phase Transitions in a Kinetic Cucker-Smale Model with Preferred Speed and Diffusion
Alethea Barbaro, Case Western Reserve University, USA; Jose Canizo, University of Birmingham, United Kingdom; Jose Carrillo and Pierre Degond, Imperial College London, United Kingdom

4:00-4:25 A Blob Method for the Aggregation Equation
Katy Craig, University of California, Santa Barbara, USA; Andrea L. Bertozzi, University of California, Los Angeles, USA

Tuesday, December 8

MS60

Large-Time Dynamics of the Navier-Stokes Equations and related PDEs - Part II of II

2:30 PM-4:30 PM

Room:Coronado - Main Level

For Part 1 see MS46

The accurate, reliable prediction of the long-time dynamical evolution of hydrodynamic systems has become increasingly important in the climatological, astrophysical, and geophysical sciences. Mathematically quantifying this behaviour allows for more accurate and cost-effective reduced models, and helps validate existing models, leading to more realistic real-time predictions for the long-time dynamics of such systems. This minisymposium will address the long-time dynamics of hydrodynamic models such as the Navier-Stokes equations and related models. Of particular interest are the study of the global attracting set, techniques in data assimilation, asymptotically reduced models, and the global well-posedness in time of these models.

Organizer: Jared P. Whitehead
Brigham Young University, USA

2:30-2:55 On the Serrin-type Regularity Criteria of the Navier-Stokes Equations and MHD Equations
Yuan Pei, University of Nebraska, Lincoln, USA

3:00-3:25 On the Attractor for the Semi-dissipative Boussinesq Equations
Animikh Biswas, University of Maryland, Baltimore County, USA

3:30-3:55 Forward Discretely Self-Similar Solutions of the Navier-Stokes Equations
Zachary Bradshaw and Tai-Peng Tsai, University of British Columbia, Canada

4:00-4:25 Finite Dimensionality of the Global Attractor for the Solutions to the 3D Primitive Equations with Viscosity
Ning Ju, Oklahoma State University, USA

Tuesday, December 8

MS61

Singularities of High Order PDEs Describing Liquid Jets and Films - Part II of II

2:30 PM-4:30 PM

Room:Center Ballroom - Main Level

For Part 1 see MS48

Liquid films and jets of micro- or nanoscale thickness occur widely in nature and industrial processes. Mathematical models describing them are often represented by high order coupled PDEs of parabolic or mixed type. Interplay between nonlinear curvature and viscosity terms with those describing intermolecular interactions leads to formation of sophisticated analytical and geometric singularities of their solutions, e.g. finite time jet breakup, film rupture, cusps or moving contact lines with singular asymptotics. Self-similar structure of these singularities can be analyzed using asymptotical analysis and nonlinear simulations. The minisymposium provides a platform to investigate these questions from analytical and numerical perspectives.

Organizer: Marco A. Fontelos
Institute for Mathematics, CSIC, Spain

Organizer: Georgy Kitavtsev
University of Bristol, United Kingdom

2:30-2:55 Asymptotical Decay and Rupture of Solutions to Thin Film Equations
Georgy Kitavtsev, University of Bristol, United Kingdom; Roman Taranets, University of California, Los Angeles, USA

3:00-3:25 The Thin Film Equation Close to Self-similarity
Christian Seis, Universität Bonn, Germany

3:30-3:55 Rigorous Asymptotics of Traveling-Wave Solutions to the Thin-Film Equation and Tanner's Law
Manuel V. Gnann, University of Michigan, USA; Lorenzo Giacomelli, University of Rome La Sapienza, Italy; Felix Otto, Max Planck Institute for Mathematics in the Sciences, Germany

4:00-4:25 Dispersive and Diffusive Shock Waves
Michael Shearer, North Carolina State University, USA; Mark Hoefer, University of Colorado Boulder, USA; Gennady El, Loughborough Universoty, United Kingdom

Tuesday, December 8

MS62

Water Waves - Part I of II

2:30 PM-4:30 PM

Room:Bouchon - Main Level

For Part 2 see MS74

The last decade has seen an impressive advance in the understanding of both permanent progressive waves (steady water waves) and the evolution of general initial data. Theories have been developed to incorporate such physical effects as vorticity, wind, stagnation and internal waves. Mathematically, water waves are generally governed by nonlinear nonlocal equations. In steady form, these become (degenerate) elliptic problems, while in time-dependent form they exhibit hyperbolic behavior (such as finite-time singularities). In this minisymposium particular attention will be paid to the free surface Euler equations, but contributions related to other dispersive models of water waves are also welcome.

Organizer: Mats Ehrnstrom

Norwegian University of Science and Technology, Norway

Organizer: Samuel Walsh

University of Missouri, USA

2:30-2:55 The Dynamics of Floating Structures

David Lannes, Universite de Bordeaux I, France

3:00-3:25 Three-Dimensional Solitary Water Waves with Weak Surface Tension

Mark D. Groves, Universität des Saarlandes, Germany

3:30-3:55 On the Highest Wave for the Whitham Equation

Erik Wahlen, Lund University, Sweden; Mats Ehrnstrom, Norwegian University of Science and Technology, Norway

4:00-4:25 Existence and Qualitative Theory for Solitary Stratified Water Waves

Samuel Walsh, University of Missouri, USA; Ming Chen, University of Pittsburgh, USA; Miles Wheeler, Courant Institute of Mathematical Sciences, New York University, USA

Tuesday, December 8

MS63

New Trends in Elliptic and Partial Differential Equations - Part I of II

2:30 PM-4:30 PM

Room:Rattlers - Main Level

For Part 2 see MS75

This minisymposium aims to gather specialists on various closely related topics in parabolic and elliptic differential equations. The speakers will present on free boundary problems, homogeneization, variational methods, and fractional diffusion. These areas of research are often interrelated and borrow and lend techniques, approaches, and methods from each other. Furthermore, many of the presentations will address problems that involve more than one of the aforementioned areas. The presentations will present new trends in these topics as well as the techniques and methods developed to drive these topics forward.

Organizer: Francesco Maggi

University of Texas at Austin, USA

Organizer: Mark Allen

University of Texas at Austin, USA

2:30-2:55 Parabolic Problems with a Fractional Time Derivative

Mark Allen, Luis Caffarelli, and Alexis F. Vasseur, University of Texas at Austin, USA

3:00-3:25 The Obstacle Problem for the Fractional Laplacian with Drift

Camelia Pop, University of Minnesota, USA; Nicola Garofalo, Universita di Padova, Italy; Arshak Petrosyan, Purdue University, USA; Mariana Smit Vega Garcia, University of Duisburg-Essen, Germany

3:30-3:55 Regularity for Boundary Nonlocal Equations

Pablo R. Stinga, University of Texas at Austin, USA

4:00-4:25 Singular Points in Two-Phase Free Boundary Problems for Harmonic Measure

Matthew Badger, University of Connecticut, USA; Max Engelstein, University of Chicago, USA; Tatiana Toro, University of Washington, USA

Tuesday, December 8

MS64

Recent Development in Modeling, Control, Theoretical and Numerical Analysis of Complex Systems with Dynamic Boundaries - Part II of II

2:30 PM-4:30 PM

Room:Chambers Lecture Hall - Main Level

For Part 1 see MS50

Many outstanding open problems of modern science and engineering involve free boundaries whose dynamics are determined as a part of the solution. The analysis of the underlying PDE systems poses significant mathematical challenges. This minisymposium will highlight some recent advances in analytical and computational studies for such systems. Examples include inverse free boundary problems, optimal control of phase transition processes, multi-phase fluid mixture flow, inverse scattering problems, stochastic differential equations and optimal control, viscoelastic fluid simulation, interfaces for nonlinear degenerate and singular parabolic PDEs, electrical impedance tomography based cancer detection model.

Organizer: Ugur G. Abdulla

Florida Institute of Technology, USA

Organizer: Jian Du

Florida Institute of Technology, USA

Organizer: Vladislav Bukshtynov

Florida Institute of Technology, USA

2:30-2:55 Computational Studies on Dynamical Boundaries in Two-Phase Gels

Jian Du, Florida Institute of Technology, USA; Aaron L. Fogelson, University of Utah, USA; Robert D. Guy, University of California, Davis, USA

3:00-3:25 On the Optimal Control of the Stefan Problem

Jonathan Goldfarb and Ugur G. Abdulla, Florida Institute of Technology, USA

continued on next page

3:30-3:55 Breast Cancer Detection Through Electrical Impedance Tomography: Variational Method Through Optimal Control Theory
Vladislav Bukshtynov and Ugur G. Abdulla, Florida Institute of Technology, USA

4:00-4:25 A Flexible, High Order Numerical Method for Viscoelastic Fluid Simulation Using FFT-Based Spectral Methods in Complex Domains
David Stein, Robert Guy, and Becca Thomases, University of California, Davis, USA

Tuesday, December 8

MS65

Self-organization Phenomena in Elliptic and Parabolic Systems - Part II of II

2:30 PM-4:30 PM

Room:Four Peaks - Upper Level

For Part 1 see MS51
This minisymposium is devoted to studies of solutions to elliptic and parabolic PDE systems arising from physical and biological systems, often of multiple constituents, with self-organizing properties. Examples include Giere-Meinhardt type reaction diffusion equations, Ohta-Kawasaki block copolymer problems, and equations of Micro-Electromechanical Systems. Recently developed analytic, asymptotic, and computational techniques will be presented. These methods capture many geometric structures in the PDE solutions. The geometric structures may appear as a single object, or as multiple components in an assembly. In the latter case one can often identify an growth property and an inhibition property that drive pattern formation.

Organizer: Xiaofeng Ren
George Washington University, USA

2:30-2:55 Minimizers of an Energy Modelling Nanoparticle-Polymer Blends
Ihsan A. Topaloglu, McMaster University, Canada

3:00-3:25 Stationary Points of Binary and Ternary Inhibitory Systems
Xiaofeng Ren, George Washington University, USA

3:30-3:55 The Impact of the Domain Boundary on An Inhibitory System: Boundary Half Discs in Stationary Assemblies
David Shoup, Alvernia University, USA

4:00-4:25 Emergent Parabolic Scaling of Nano-Faceting Crystal Growth
Stephen J. Watson, University of Glasgow, Scotland, United Kingdom

Tuesday, December 8

MS66

Free Boundary Problems Involving Interfaces and/or Elastic Deformations - Part I of II

2:30 PM-4:30 PM

Room:Flagstaff A - Upper Level

For Part 2 see MS82
The behavior of free surfaces has long been of both mathematical and physical interest. This minisymposium will bring together an interdisciplinary group of researchers working on understanding the underlying principles governing free boundary problems and cover a variety of applications such as the encapsulation of liquid drops by elastic sheets, the dynamics of grain boundary networks, and the modeling of the earth's crust. Common to all these diverse problems is the presence strong nonlinearities and small scale parameters, which leads to a unifying challenge of trying to understand and predict the nature of solutions across multiple scales.

Organizer: Nicholas D. Brubaker
University of Arizona, USA

Organizer: John A. Gemmer
Brown University, USA

2:30-2:55 Capillary Induced Deflections of a Thin Elastic Plate
Nicholas D. Brubaker, University of Arizona, USA

3:00-3:25 Surfaces Produced at Vapor-to-Particle Nucleation and Growth Interfaces
Patrick Shipman, Colorado State University, USA

3:30-3:55 Low Energy Deformations of Thin Elastic Shells
Christian Santangelo, University of Massachusetts, Amherst, USA

4:00-4:25 Phyllotaxis: A Dynamical Systems Approach
Matthew Pennybacker, University of New Mexico, USA

Tuesday, December 8

CP4

Geometric and Evolution Problems

2:30 PM-4:30 PM

Room:Flagstaff B - Upper Level

Chair: Matteo Rinaldi

Carnegie Mellon University, USA

2:30-2:45 On the Cheeger Constant of An Annulus

Hamilton Bueno and Grey Ercole, Universidade Federal de Minas Gerais, Brazil; Shirley Macedo, Universidade Federal de Ouro Preto, Brazil

2:50-3:05 Stationary Disk Assemblies on Inhibitory Vesicles

Yeyao Hu and Xiaofeng Ren, George Washington University, USA

3:10-3:25 Asymptotics for Dilute Emulsions with Surface Tension

Grigor Nika and Bogdan M. Vernescu, Worcester Polytechnic Institute, USA

3:30-3:45 Slow Motion for the Nonlocal Allen-Cahn in *N* Dimensions

Matteo Rinaldi and Ryan Murray, Carnegie Mellon University, USA

3:50-4:05 Conservative Parabolic Problems

Max O. Souza, Universidade Federal Fluminense, Brazil; Olga Danilkina, University of Dodoma, Tanzania; Fabio Chalub, Universidade Nova de Lisboa, Portugal

4:10-4:25 Method of Evolving Junctions and the Shortest Path Problem.

Haomin Zhou, Georgia Institute of Technology, USA

Coffee Break

4:30 PM-5:00 PM

Room:Forum - Lower Level

Tuesday, December 8

MT1

PDE Aspects of Mean Field Games

5:00 PM-7:00 PM

Room:Forum - Lower Level

The purpose of the Minitutorial is to briefly describe the various PDEs appearing in Mean Field Games, show examples of applications, discuss the numerical analysis and conclude with open problems.

Organizer: Pierre Cardaliaguet
Université Paris Dauphine, France

Speaker:

Pierre Cardaliaguet, Université Paris Dauphine, France

Intermission

7:00 PM-7:15 PM

SIAG/APDE Business Meeting

(open to SIAG/APDE members)

7:15 PM-8:00 PM

Room:Forum - Lower Level

Complimentary beer and wine will be served.

Wednesday, December 9

Registration

8:00 AM-5:30 PM

Room:Grand Ballroom Foyer - Main Level

Wednesday, December 9

MS67

Recent Advances in Theoretical and Numerical Aero- and Hydrodynamics? - Part I of III

8:30 AM-11:00 AM

Room:Forum - Lower Level

For Part 2 see MS83

The Navier-Stokes and Euler equations are the fundamental equations modeling the behavior of fluids. They have a broad range of applications in aerodynamics, geophysics, meteorology and engineering. Despite the fact that the mathematical analysis of these equations has a long and rich history, yet many important and interesting problems remain challenging and far to be well understood. Our symposium will be an opportunity to see and share, among its participants and attendees, the recent progress in the theory of incompressible Navier-Stokes and Euler equations and related systems. In particular, the focus will be on the two main axes: Boundary Layer theory and well-posedness issues in hydrodynamics.

Organizer: Slim Ibrahim
University of Victoria, Canada

Organizer: Makram Hamouda
Indiana University, USA

8:30-8:55 Well-posedness of Initial and Boundary-value Problems for the Inviscid Linear and Non-linear Shallow Water Equations. Connection with the Primitive Equations
Roger M. Temam and Aimin Huang, Indiana University, USA

9:00-9:25 Approximating Long-time Statistical Behavior of Dissipative Systems
Xiaoming Wang, Florida State University, USA

9:30-9:55 Theoretical and Numerical Studies of Staggered-grid Schemes on Unstructured Meshes
Qingshan Chen, Clemson University, USA

10:00-10:25 New Time Differencing Methods for Stiff Problems and Applications
Chang-Yeol Jung and Thien Binh Nguyen, Ulsan National Institute of Science and Technology, South Korea

10:30-10:55 Invariant Measures for Passive Scalars in the Small Noise Inviscid Limit
Michele Coti Zelati and Jacob Bedrossian, University of Maryland, USA; Nathan Glatt-Holtz, Virginia Tech, USA

Wednesday, December 9

MS68

Numerical Approximation of Spectra and Computer-assisted Proof - Part I of II

8:30 AM-10:30 AM

Room:Rio Verde - Main Level

For Part 2 see MS81

This minisymposium seeks to explore the interfaces between numerical approximation, computer-assisted proof, and stability of travelling waves. For many physically relevant systems, spectral stability or instability has only been determined for a limited portion of the parameter space for which waves exist. Recent advances in both numerical approximation algorithms and computer-assisted proof are providing new approaches to the study of stability of travelling waves. These numerical methods do not provide a paper and pencil proof, but do provide rigorous verification of stability properties. This minisymposium seeks to bring together experts from both communities to further accelerate development of this emerging subfield.

Organizer: Kevin Zumbrun
Indiana University, USA

Organizer: Blake Barker
Brown University, USA

8:30-8:55 Rigorous Computation of Unstable Manifolds for Nonlinear Parabolic Pdes Via the Parametrization Method
Christian P. Reinhardt, VU University, Amsterdam, Netherlands; Jason Mireles-James, Florida Atlantic University, USA

9:00-9:25 Validated Numerics and Connecting Orbits for Parabolic Partial Differential Equations
Jason Mireles-James, Florida Atlantic University, USA

continued in next column

9:30-9:55 Nonlinear Partial Differential Equations: Grassmann Flows, Computing Spectra and Maslov Index
Simon Malham, Heriot-Watt University, United Kingdom

10:00-10:25 Evans Function Computation for Planar Viscous Shocks in Reactive Navier-Stokes
Joshua Lytle, Brigham Young University, USA; Blake Barker, Brown University, USA; Jeffrey Humpherys, Brigham Young University, USA; Gregory Lyng, University of Wyoming, USA; Kevin Zumbrun, Indiana University, USA

Wednesday, December 9

MS69

Dynamics of Partial Differential Equations - Part II of II

8:30 AM-11:00 AM

Room:Sonora - Main Level

For Part 1 see MS28

Complex systems described by partial differential equations (PDEs) pose great challenges to understanding natural phenomena. They involve the nonlinear dynamics in infinite dimensional spaces. Despite progresses made in the last 50 years, the mathematical tools succeed only modestly in analyzing the PDEs dynamics. Nonetheless, a wide range of methods and techniques have been created to attack the problems. This minisymposium will bring together researchers from different branches of the field. It will cover various topics from abstract theory of dynamical systems in infinite dimensional spaces to their applications to PDEs in fluid mechanics, mathematical biology and quantum physics.

Organizer: Luan Hoang
Texas Tech University, USA

Organizer: Eric Olson
University of Nevada, Reno, USA

8:30-8:55 Asymptotic Stability of Solitary Waves in 1-D Nonlinear Dirac Equation
Tuoc Van Phan, University of Tennessee, Knoxville, USA

9:00-9:25 On the Kolmogorov Entropy of the Weak Global Attractor of the 3D Navier-Stokes Equations
Cecilia F. Mondaini, Ciprian Foias, and Bingsheng Zhang, Texas A&M University, USA

9:30-9:55 Global Solutions to the Derivative NLS Equation with the Inverse Scattering Transform Method
Dmitry Pelinovsky and *Yusuke Shimabukuro*, McMaster University, Canada

10:00-10:25 Determining Wavenumber for Fluid Equations
Alexey Cheskidov, University of Illinois, Chicago, USA

10:30-10:55 On the Inviscid Limit
Peter Constantin, Princeton University, USA

Wednesday, December 9

MS70

Analytical Methods in Fluid Mechanics - Part II of II

8:30 AM-10:30 AM

Room:Sedona - Main Level

For Part 1 see MS58

The main purpose of this minisymposium is to bring together junior researchers who have already established themselves as specialists and, in some cases, leaders in the field of mathematical fluid mechanics. The complementary yet cohesive nature of the speakers' expertise, that is, the use of similar analytical tools in the study of the classical and geophysical fluid mechanics, gives focus and purpose to the minisymposium. This minisymposium is meant as a platform to exchange ideas on a variety of problems concerning the behavior of fluids.

Organizer: Gung-Min Gie
University of Louisville, USA

Organizer: James P. Kelliher
University of California, Riverside, USA

Organizer: Anna L. Mazzucato
Pennsylvania State University, USA

8:30-8:55 On Global Existence for Euler-Maxwell System
Benoit Pausader, Princeton University, USA

9:00-9:25 Incompressible Euler Equations and the Effect of Changes at a Distance
Elaine Cozzi, Oregon State University, USA; James P. Kelliher, University of California, Riverside, USA

9:30-9:55 Rigorous Bounds on the Transport of Heat in Rayleigh-Bénard Convection at Infinite Prandtl Number
Jared P. Whitehead, Brigham Young University, USA

10:00-10:25 Title Not Available at Time of Publication
Gung-Min Gie, University of Louisville, USA

Wednesday, December 9

MS71

PDE Models and Control of Swarm Dynamics - Part II of II

8:30 AM-10:30 AM

Room:Palomas - Main Level

For Part 1 see MS59

PDEs can be used to model the spatiotemporal dynamics of large collectives, or "swarms," of discrete individuals. These models enable the prediction, analysis, and control of swarm dynamics in multi-robot tasks, multi-vehicle coordination, and the study of self-organized behaviors in biological, social, and economic systems. The reliable use of PDEs in swarm applications requires further research on differences between discrete and continuum models and the controllability of the models. To facilitate discussions on these problems, this minisymposium will bring together mathematicians and engineers who apply techniques from kinetic theory, network science, numerical analysis, and optimal control to swarm PDE models.

Organizer: Andrea L. Bertozzi
University of California, Los Angeles, USA

Organizer: Spring M. Berman
Arizona State University, USA

8:30-8:55 Inhomogeneous Boltzmann-Type Equations Modeling Opinion Leadership and Political Segregation
Bertram Düring, University of Sussex, United Kingdom

9:00-9:25 Adaptive Control of Multiscale Dynamical Systems
Silvia Ferrari, Cornell University, USA; Pingping Zhu, Duke University, USA

9:30-9:55 Macroscopic PDEs for Flocking Dynamics
Sebastien Motsch, Arizona State University, USA

10:00-10:25 Kinetic Models for Differential Games
Christian Ringhofer, Arizona State University, USA

Wednesday, December 9

MS72

Nonlinear Parabolic Equations and Applications - Part I of IV

8:30 AM-10:30 AM

Room:Coronado - Main Level

For Part 2 see MS85

Nonlinear parabolic differential equations play an important role in many applications, including fluid dynamics, phase transitions, image processing, materials sciences, and geometry. This session focuses on recent developments in these areas, with an emphasis on well-posedness, qualitative behavior, and numerical analysis of solutions.

Organizer: Gieri Simonett
Vanderbilt University, USA

Organizer: Patrick Guidotti
University of California, Irvine, USA

Organizer: Yuanzhen Shao
Vanderbilt University, USA

8:30-8:55 Coupling Einstein and Navier-Stokes Equations
Marcelo Disconzi, Vanderbilt University, USA

9:00-9:25 On Minimizers of the Landau-De Gennes Energy Functional under Weak Anchoring Boundary Conditions
Changyou Wang, Purdue University, USA

9:30-9:55 Doubling Estimates, Vanishing Order and Nodal Sets of Steklov Eigenfunctions
Jiuyi Zhu, Chris Sogge, and Xing Wang, Johns Hopkins University, USA

10:00-10:25 Well-Posedness for Nonlinear Wave Equations
Geng Chen, Georgia Institute of Technology, USA

Wednesday, December 9

MS73

Recent Developments in the Analysis of the Navier-Stokes, Euler, and Related Models: Part I of III

8:30 AM-10:30 AM

Room:Center Ballroom - Main Level

For Part 2 see MS95

The emphasis will be on the analysis of the Navier-Stokes equation, Euler equation, and related models, describing for instance the interaction with solid bodies immersed in the fluid, the effect of having a magnetized fluid, or the influence of boundaries. These equations are used to model various physical phenomena ranging from the theory of turbulence to oceanography. Besides the fundamental questions of existence and uniqueness of solutions, the talks in this session will address central qualitative properties of equations, such as regularity, (in)stability, long time dynamics, analysis of special solutions (self-similar, axis-symmetric), the behavior in singular limit regimes (the inviscid limit of the Navier-Stokes equation).

Organizer: Igor Kukavica
University of Southern California, USA

Organizer: Christophe Lacave
Universite Paris 7-Denis Diderot, France

Organizer: Vlad C. Vicol
Princeton University, USA

8:30-8:55 Complex Fluids and Electroconvection
Peter Constantin, Princeton University, USA

9:00-9:25 Very Weak Solutions to the Stokes Problem in a Convex Polygon
Roger M. Temam, Makram Hamouda, and Le Zhang, Indiana University, USA

9:30-9:55 Spectral Gaps and Bloch Decomposition for the Linearized Water-Waves Equations
Maxime Gazeau, University of Toronto, Canada

10:00-10:25 Almost Global Existence of the Prandtl Equations
Mihaela Ignatova and Vlad C. Vicol, Princeton University, USA

Wednesday, December 9

MS74

Water Waves - Part II of II

8:30 AM-10:30 AM

Room:Bouchon - Main Level

For Part 1 see MS62

The last decade has seen an impressive advance in the understanding of both permanent progressive waves (steady water waves) and the evolution of general initial data. Theories have been developed to incorporate such physical effects as vorticity, wind, stagnation and internal waves. Mathematically, water waves are generally governed by nonlinear nonlocal equations. In steady form, these become (degenerate) elliptic problems, while in time-dependent form they exhibit hyperbolic behavior (such as finite-time singularities). In this minisymposium particular attention will be paid to the free surface Euler equations, but contributions related to other dispersive models of water waves are also welcome.

Organizer: Mats Ehrnstrom
Norwegian University of Science and Technology, Norway

Organizer: Samuel Walsh
University of Missouri, USA

8:30-8:55 On the Slope of Steady Water Waves
Walter Strauss, Brown University, USA

9:00-9:25 Instabilities in some shallow water models
Vera Mikyoung Hur, Ashish Pandey, and Lizheng Tao, University of Illinois at Urbana-Champaign, USA

9:30-9:55 Blow Up of Solutions to Some Quasilinear Equations Arising from Water Waves
Robin Ming Chen, University of Pittsburgh, USA; Fei Guo, Nanjing Normal University, China; Yue Liu, University of Texas at Arlington, USA; Changzheng Qu, Ningbo University, China

10:00-10:25 Multi-Dimensional Bifurcation in Steady Water Waves with Vorticity
Mats Ehrnstrom, Norwegian University of Science and Technology, Norway

Wednesday, December 9

MS75

New Trends in Elliptic and Partial Differential Equations - Part II of II

8:30 AM-10:30 AM

Room:Rattlers - Main Level

For Part 1 see MS63

This minisymposium aims to gather specialists on various closely related topics in parabolic and elliptic differential equations. The speakers will present on free boundary problems, homogeneization, variational methods, and fractional diffusion. These areas of research are often interrelated and borrow and lend techniques, approaches, and methods from each other. Furthermore, many of the presentations will address problems that involve more than one of the aforementioned areas. The presentations will present new trends in these topics as well as the techniques and methods developed to drive these topics forward.

Organizer: Francesco Maggi

University of Texas at Austin, USA

Organizer: Mark Allen

University of Texas at Austin, USA

8:30-8:55 Homogenization of the Peierls-Nabarro Model for Dislocation Dynamics

Stefania Patrizi, WIAS, Berlin, Germany

9:00-9:25 Poincare Inequalities and Diffusion Along Ergodic Flows

Stefan Steinerberger, Yale University, USA

9:30-9:55 Some Inverse Problems in Periodic Homogenization of Hamilton-Jacobi Equations

Hung Tran, University of Chicago, USA

10:00-10:25 Second-Order Gamma-Limit for the Cahn-Hilliard Functional with Applications to Slow Motion of Phase Boundaries

Ryan Murray, Giovanni Leoni, and Matteo Rinaldi, Carnegie Mellon University, USA

Wednesday, December 9

MS76

Uncertainty Quantification for Hyperbolic and Kinetic Equations - Part I of II

8:30 AM-10:30 AM

Room:Chambers Lecture Hall - Main Level

For Part 2 see MS89

Hyperbolic and kinetic equations often contain uncertain parameters due to inaccurate modeling, measurements, or empirical constitutive relations. A proper quantification of these uncertainties is therefore of practical importance to obtain reliable predictions to solutions of such equations. Moreover, the nonlinear nature of these problems poses great challenges in designing and analyzing efficient numerical/computational methods. We will report recent progress of uncertainty quantification for hyperbolic, kinetic, and related problems.

Organizer: Alina Chertock

North Carolina State University, USA

Organizer: Jingwei Hu

Purdue University, USA

Organizer: Alexander Kurganov

Tulane University, USA

8:30-8:55 A Stochastic Galerkin Method for Nonlinear Systems of Hyperbolic Conservation Laws with Uncertainty

Alina Chertock, North Carolina State University, USA; Alexander Kurganov, Tulane University, USA; Shi Jin, Shanghai Jiao Tong University, China, and the University of Wisconsin-Madison, USA

9:00-9:25 Numerical Methods for Quantification of Model-form Uncertainty

YanYan He and *Dongbin Xiu*, University of Utah, USA

continued in next column

9:30-9:55 Stochastic Galerkin Formulations of Conservation Laws: Challenges in the Generalization of Deterministic Solvers to New Systems of PDEs

Per Pettersson, University of Bergen, Norway

10:00-10:25 Uncertainty Quantification with Limited Data

Xiu Yang, Huan Lei, and Nathan Baker, Pacific Northwest National Laboratory, USA; Guang Lin, Purdue University, USA

Wednesday, December 9

MS77

Control of Partial Differential Equations and Applications

8:30 AM-10:30 AM

Room:Four Peaks - Upper Level

The objective of this MS on "Control of PDE's and Applications" is to gather four high-level talks by experts of the subject, giving an overview of some techniques used to control complex processes modeled by partial differential equations: The four talks are well-balanced between theoretical aspects (how to prove that a given PDE is controllable: for instance, Boussinesq or Euler equation), qualitative results (such as turnpike properties for controlled PDE's), and concrete motivating applications (for instance, design of feedback in production models).

Organizer: Emmanuel Trelat

Université Pierre et Marie Curie, France

8:30-8:55 Feedback Control and Optimization of Release and Dispatch Policies in Production Models

Dieter Armbruster, Arizona State University, USA

9:00-9:25 On the Control of the Improved Boussinesq Equation

Eduardo Cerpa, Universidad Técnica Federico Santa María, Chile

9:30-9:55 A Controllability Result for the the Non-Isentropic 1-D Euler Equation

Olivier Glass, Université Paris Dauphine, France

10:00-10:25 Turnpike Property for the Optimal Control of Partial Differential Equations

Can Zhang, Université Paris 6, France

Wednesday, December 9

MS78

Mathematical Analysis of Liquid Crystals - Part II of III

8:30 AM-10:00 AM

Room:Flagstaff A - Upper Level

For Part 1 see MS44
For Part 3 see MS111

Liquid crystals are the main entry point into the fascinating world of complex materials with complex micro-structural properties. Yet, despite being the simplest representative of such materials, and of enormous technological importance, liquid crystals are not understood at a basic, fundamental level of description. The proposed minisymposium aims to gather the main contributors to recent advances in the area and to set new directions by determining the major open problems.

Organizer: Valeriy Slastikov

University of Bristol, United Kingdom

Organizer: Arghir Zarnescu

University of Sussex, United Kingdom

8:30-8:55 Dimension Reduction for the Landau-De Gennes Model in Planar Thin Films

Peter Sternberg, Indiana University, USA

9:00-9:25 Active Liquid Crystal Models and Their Applications in Life Science

Qi Wang, University of South Carolina, USA and Beijing Computational Science Research Center, China; Jia Zhao, University of North Carolina at Chapel Hill, USA; Xiaogang Yang, Beijing Computational Science Research Center, China

9:30-9:55 Vorticity Driven Dynamics in Nematic Liquid Crystals

Xiaoyu Zheng, Kent State University, USA; Peter Palffy-Muhoray, Kent State University, USA

Wednesday, December 9

MS79

The Mathematics of Optics and Photonics - Part I of II

8:30 AM-10:30 AM

Room:Flagstaff B - Upper Level

For Part 2 see MS92

Driven by spectacular advances in the design capabilities of materials at the nanoscale, there has been recent exponetial growth in the fields of plasmonics and nano-optics. Once exotic phenomena such as extraordinary optical transmission, surface-enhanced Raman scattering, and surface plasmon resonances are now at the heart everyday technologies. As evidenced by a recent NRC report and an upcoming IMA program, the time is ripe for mathematicians to contribute. The goal of this session is to bring together world experts in the modeling, rigorous analysis, and numerical simulation of Maxwell's equations to further advance the progress which has already been made.

Organizer: David P. Nicholls

University of Illinois, Chicago, USA

8:30-8:55 Surface Plasmon Resonance Biosensors: Analysis and Numerical Simulation

David P. Nicholls, University of Illinois, Chicago, USA

9:00-9:25 Integral Equations for Maxwell's Equations

Catalin Turc, New Jersey Institute of Technology, USA

9:30-9:55 Near-field Imaging with Far-field Data

Peijun Li, Purdue University, USA

10:00-10:25 Perturbations of Transmission Eigenvalues Due to Small Inhomogeneities in the Medium

Shari Moskow, Drexel University, USA

Wednesday, December 9

CP5

Modeling

8:30 AM-10:30 AM

Room:San Carlos - Main Level

Chair: TBD

8:30-8:45 Modeling Semi-Arid Deserts Through (in)stabilities of Localized Structure
Thomas Bellsky, University of Maine, USA

8:50-9:05 Analytical and Numerical Modeling of Ground Heat Exchangers
Paul Christodoulides, Lazaros Aresti, *Georgios Florides*, and Vassilios Messaritis, Cyprus University of Technology, Cyprus

9:10-9:25 Modeling Blood Flow and Mass Transport by a Drug Eluting Stent in 3D
Elias A. Gudiño and Adélia Sequeira, University of Lisbon, Portugal

9:30-9:45 An Advection and Age-Structured Approach to Modeling Bird Migration and Indirect Transmission of Avian Influenza
Rachel L. Jennings and Rongsong Liu, University of Wyoming, USA; Stephen Gourley, University of Surrey, United Kingdom

9:50-10:05 Turing Pattern Formation in a Host-Parasitoid-Hyper Parasitoid System
Nitu Kumari, Indian Institute of Technology Mandi, India

10:10-10:25 A Stationary Core-Shell Assembly in a Ternary Inhibitory System
Chong Wang and Xiaofeng Ren, George Washington University, USA

Coffee Break

10:30 AM-10:55 AM

Room:Forum - Lower Level

Wednesday, December 9

Announcements

10:55 AM-11:00 AM

Room:Forum - Lower Level

IP5

Optimal Shape and Location of Sensors or Actuators in PDE Models

11:00 AM-11:45 AM

Room:Forum - Lower Level

Chair: Piermarco Cannarsa, University of Rome II, Tor Vergata, Italy

We consider the problem of optimizing the shape and the location of sensors or actuators for systems whose evolution is driven by a linear PDE model. This problem is frequently encountered in applications where one wants for instance to maximize the quality of the reconstruction of solutions by using only partial observations. For example, we model and solve the following informal question: What is the optimal shape and location of a thermometer? We stress that we want to optimize not only the placement but also the shape of the observation domain, over the class of all possible measurable subsets of the domain having a prescribed measure. We model this optimal design problem as the one of maximizing a functional that we call the randomized observability constant, which reflects what happens for random initial data, and which is of a spectral nature. Solving this problem is then strongly dependent on the PDE model under consideration. For parabolic equations, we prove the existence and uniqueness of a best domain, regular enough, and whose algorithmic construction depends in general on a finite number of modes. In contrast, for wave or Schrodinger equations, relaxation may occur, and our analysis reveals intimate relations with quantum chaos, more precisely with quantum ergodicity properties of the eigenfunctions. These works are in collaboration with Y. Privat (Paris 6) and E. Zuazua (BCAM Bilbao).

Emmanuel Trélat

Université Pierre et Marie Curie, France

Wednesday, December 9

IP6

The Abelian Sandpile and Circle Packings

11:45 AM-12:30 PM

Room:Forum - Lower Level

Chair: Govind Menon, Brown University, USA

The Abelian sandpile is a simple and deterministic diffusion process on graphs, devised as a model of self-organized criticality by Bak, Tang, and Weisenfeld. The scaling limit of the sandpile on a periodic graph is a nonlinear elliptic partial differential equation with complicated algebraic structure. I will discuss the sandpile, the algebraic structure of its scaling limit, and explicit descriptions of the fractals it approximates.

Charles Smart

Cornell University, USA

Lunch Break

12:30 PM-2:00 PM

Attendees on their own

Wednesday, December 9

SP1

SIAG/Analysis of Partial Differential Equations Prize Lecture

Slow Modulation and Large-time Dynamics Near Periodic Waves

2:00 PM-2:45 PM

Room: Forum - Lower Level

Chair: To Be Determined

Partly motivated by applications to surface waves over thin film flows we have recently addressed two related questions. (1) For parabolic systems --- including those parabolic in the hypocoercive sense of Kawashima or even some being so only in some averaged sense --- in which sense can one prove that spectrally stable periodic traveling (or standing) waves are nonlinearly stable ? (2) Is it possible to prove that the large-time dynamics near such waves is asymptotically driven at leading order by some averaged equations formally derived through some nonlinear WKB process (known as Whitham's two-timing method)?

By answering those equations we put the mathematical theory of periodic waves of parabolic systems on a par with the one for asymptotically-constant waves such as fronts, shocks, kinks or solitary waves... On the road we have coined a sharp notion of nonlinear stability and some corresponding set of null conditions, respectively space-modulated orbital stability and phase-decoupling.

Joint work with Mathew Johnson, University of Kansas, USA, Pascal Noble, University of Toulouse, France and Kevin Zumbrun, Indiana University, USA.

Miguel Rodrigues
Université de Rennes 1, France

Intermission

2:45 PM-3:00 PM

Wednesday, December 9

MS80

Scaling Limits of Particle Systems

3:00 PM-5:00 PM

Room:Forum - Lower Level

The purpose of this minisymposium is to survey recent progress on problems at the interface between partial differential equations, kinetic theory and probability theory. The talks in this minisymposium treat scaling limits of interacting particle systems and connections between PDE with random data and stochastic processes that describe both branching and coagulation.

Organizer: Govind Menon
Brown University, USA

Organizer: Charles Smart
Massachusetts Institute of Technology, USA

3:00-3:25 A Derivation of the Kinetic Wave Equation
Pierre Germain, New York University, USA

3:30-3:55 On Deriving Stochastic Burgers Equations from a Class of Particle Systems
Sunder Sethuraman, University of Arizona, USA

4:00-4:25 Scalar Conservation Laws with Markov Initial Data
David Kaspar, Brown University, USA

4:30-4:55 Coagulation Dynamics in Branching Processes
Robert Pego, Carnegie Mellon University, USA

Wednesday, December 9

MS81

Numerical Approximation of Spectra and Computer-assisted Proof - Part II of II

3:00 PM-5:00 PM

Room:Rio Verde - Main Level

For Part 1 see MS68
This minisymposium seeks to explore the interfaces between numerical approximation, computer-assisted proof, and stability of travelling waves. For many physically relevant systems, spectral stability or instability has only been determined for a limited portion of the parameter space for which waves exist. Recent advances in both numerical approximation algorithms and computer-assisted proof are providing new approaches to the study of stability of travelling waves. These numerical methods do not provide a paper and pencil proof, but do provide rigorous verification of stability properties. This mini symposium seeks to bring together experts from both communities to further accelerate development of this emerging subfield.

Organizer: Kevin Zumbrun
Indiana University, USA

Organizer: Blake Barker
Brown University, USA

3:00-3:25 Computational Evans-Function Techniques for the Spectral Stability of Viscous Detonation Waves
Gregory Lyng, University of Wyoming, USA

3:30-3:55 Spectra, Stability and Numerical Continuation
Jens Rademacher, University of Bremen, Germany

4:00-4:25 Error Estimates for Numerical Evans Approximation
Kevin Zumbrun, Indiana University, USA

4:30-4:55 Rigorous Verification of Stability of Traveling Waves Via Computer Assisted Proof
Blake Barker, Brown University, USA

Wednesday, December 9

MS82

Free Boundary Problems Involving Interfaces and/or Elastic Deformations - Part II of II

3:00 PM-5:00 PM

Room:Sonora - Main Level

For Part 1 see MS66

The behavior of free surfaces has long been of both mathematical and physical interest. This minisymposium will bring together an interdisciplinary group of researchers working on understanding the underlying principles governing free boundary problems and cover a variety of applications such as the encapsulation of liquid drops by elastic sheets, the dynamics of grain boundary networks, and the modeling of the earth's crust. Common to all these diverse problems is the presence strong nonlinearities and small scale parameters, which leads to a unifying challenge of trying to understand and predict the nature of solutions across multiple scales.

Organizer: Nicholas D. Brubaker
University of Arizona, USA

Organizer: John A. Gemmer
Brown University, USA

3:00-3:25 Nonlinear Spatio-Temporal Instability Regime for Electrically Forced Viscous Jets
Saulo Orizaga, University of Arizona, USA; Daniel N. Riahi, University of Illinois at Urbana-Champaign, USA

3:30-3:55 Shapes of One-Phase Free Boundaries in the Plane
Nikola Kamburov, University of Arizona, USA; David Jerison, Massachusetts Institute of Technology, USA

4:00-4:25 Minimizers of Anisotropic Surface Tensions under Gravity from a Symmetrization Viewpoint
Eric Baer, University of Wisconsin, Madison, USA

4:30-4:55 Comparison Theorems for a Class of Degenerate Elliptic Operators
Lotfi Hermi, University of Arizona, USA

Wednesday, December 9

MS83

Recent Advances in Theoretical and Numerical Aero- and Hydrodynamics? - Part II of III

3:00 PM-5:00 PM

Room:San Carlos - Main Level

For Part 1 see MS67
For Part 3 see MS98

The Navier-Stokes and Euler equations are the fundamental equations modeling the behavior of fluids. They have a broad range of applications in aerodynamics, geophysics, meteorology and engineering. Despite the fact that the mathematical analysis of these equations has a long and rich history, yet many important and interesting problems remain challenging and far to be well understood. Our symposium will be an opportunity to see and share, among its participants and attendees, the recent progress in the theory of incompressible Navier-Stokes and Euler equations and related systems. In particular, the focus will be on the two main axes: Boundary Layer theory and well-posedness issues in hydrodynamics.

Organizer: Slim Ibrahim
University of Victoria, Canada

Organizer: Makram Hamouda
Indiana University, USA

3:00-3:25 Well-Posedness and Regularity for a Class of Thin-Film Free Boundary Problems
Manuel V. Gnann, University of Michigan, USA

3:30-3:55 Ill-posedness Results for Transport Equations
Tarek M. Elgindi, Princeton University, USA

4:00-4:25 Some Recent Progresses in Boundary Layer Analysis
Gung-Min Gie, University of Louisville, USA

4:30-4:55 Singular Perturbation Analysis of the Scattering Problem
Youngjoon Hong, University of Ilinois at Chicago, USA

Wednesday, December 9

MS84

Polymer Models

3:00 PM-5:00 PM

Room:Palomas - Main Level

Complete fluid systems are usually in form of coupled equations of Navier-Stokes type with nonlinear equations e.g. of transport type, (degenerate) parabolic or kinetic type. For various equations being components of the systems there are developed and well established the methods and functional spaces structure. However, coupling these equations together gives rise to completely new problems. Flows of polymers, multi-component mixtures, collective dynamics to name a few, are such examples. Precise understanding the interplay between the basic properties of the fluid, transport phenomena and diffusion is a crucial step in analysis of such systems.

Organizer: Piotr Gwiazda
Warsaw University, Poland

3:00-3:25 On Concentrated Polymers Model
Piotr Gwiazda, Warsaw University, Poland

3:30-3:55 Estimating Fragmentation in Polymerization Equations
Marie Doumic, INRIA Rocquencourt, France

4:00-4:25 Weak Solutions to Cucker-Smale System
Piotr Mucha, Warsaw University, Poland

4:30-4:55 Kinetic Models for the Description of Sedimenting Suspensions
Athanasios Tzavaras, King Abdullah University of Science & Technology (KAUST), Saudi Arabia

Wednesday, December 9

MS85

Nonlinear Parabolic Equations and Applications - Part II of IV

3:00 PM-5:00 PM

Room:Coronado - Main Level

For Part 1 see MS72
For Part 3 see MS99
Nonlinear parabolic differential equations play an important role in many applications, including fluid dynamics, phase transitions, image processing, materials sciences, and geometry. This session focuses on recent developments in these areas, with an emphasis on well-posedness, qualitative behavior, and numerical analysis of solutions.

Organizer: Gieri Simonett
Vanderbilt University, USA

Organizer: Patrick Guidotti
University of California, Irvine, USA

Organizer: Yuanzhen Shao
Vanderbilt University, USA

3:00-3:25 Existence and Stability of Weak Solutions for a Degenerate Parabolic System of Thin Film Type
Joachim Escher, Leibniz University Hannover, Germany

3:30-3:55 A Free Boundary Problem for MEMS
Christoph Walker, Leibniz University Hannover, Germany

4:00-4:25 On Qualitative Properties of Solutions to Microelectromechanical Systems with General Permittivity
Christina Lienstromberg, Leibniz University Hannover, Germany

4:30-4:55 Stability of Cylinders in Surface Diffusion Flow under General Perturbations
Jeremy LeCrone, Kansas State University, USA

Wednesday, December 9

MS86

PDE Methods for Problems in Materials Science - Part I of II

3:00 PM-5:00 PM

Room:Center Ballroom - Main Level

For Part 2 see MS100
The minisymposium is intended for an audience interested in the analysis, numerics and modeling of PDE applied to materials science, with an emphasis in soft matter systems. Research related to the mathematical description of materials via energy functionals will be presented and questions of minimizers structures will be addressed. Topics will include analysis of defect structures in liquid crystals, numerical approximation of pattern formation in smectic liquid crystals, dynamics of chevron structures in smectic materials, phase transiiton in nanoparticle-block blends, and existence of solutions to the Chan-Hilliard equation with phase-dependent diffusion mobility.

Organizer: Lia Bronsard
McMaster University, Canada

Organizer: Tiziana Giorgi
New Mexico State University, USA

3:00-3:25 Recent Results on the Analysis of Liquid Crystals
Patricia Bauman, Purdue University, USA

3:30-3:55 Weak Solutions for the Cahn-Hilliard Equation with Phase-Dependent Diffusion Mobility
Shibin Dai, New Mexico State University, USA; Qiang Du, Pennsylvania State University, USA

4:00-4:25 Dynamic Analysis of Chevron Structures in Liquid Crystal Cells
Lidia Mrad and Daniel Phillips, Purdue University, USA

4:30-4:55 Sawtooth Profile in Smectic A Liquid Crystals
Sookyung Joo, Old Dominion University, USA

Wednesday, December 9

MS87

Non-local Equations - Part I of II

3:00 PM-5:00 PM

Room:Bouchon - Main Level

For Part 2 see MS101
Motivated by the study of Lévy processes or coming from various applications, so-called anomalous diffusion appears now in many models. We can mention for instance dislocation dynamics, hydraulic fractures and fluid dynamics among many others. The corresponding partial differential equations involve (singular) integral terms such as the fractional Laplacian. These equations raise new analytical challenges and their study attracted a lot of attention in recent years. For instance, to address regularity issues in the case of parabolic/elliptic equations, many new tools and techniques were introduced in the last fifteen years.

Organizer: Cyril Imbert
CNRS and École Normale Supérieure, Paris, France

3:00-3:25 On Neumann Type Problems for Non-Local Equations
Emmanuel Chasseigne, Guy Barles, and Christine Georgelin, Universite François Rabelais, France; Espen Jakobsen, NTNU, Norway

3:30-3:55 Global Well-Posedness of a Non-local Burgers Equation
Cyril Imbert, CNRS and École Normale Supérieure, Paris, France; Roman Shvydkoy, University of Illinois, Chicago, USA; *François Vigneron*, Université Paris-Est, France

4:00-4:25 Global Regularity for 2D Muskat Problem with Finite Slope
Roman Shvydkoy, University of Illinois, Chicago, USA; Peter Constantin and Vlad C. Vicol, Princeton University, USA; Francisco Gancedo, University of Seville, Spain

4:30-4:55 A Non-local Porous Medium Equation
Piotr Biler, Uniwersytet Wroclawski, Poland; *Cyril Imbert*, CNRS and École Normale Supérieure, Paris, France; Grzegorz Karch, University of Wroclaw, Poland

Wednesday, December 9

MS88

Vortices: Analysis and Simulation - Part I of II

3:00 PM-5:00 PM

Room:Rattlers - Main Level

For Part 2 see MS102

This minisymposium will cover analysis and simulations of vortices in areas ranging from continuum to quantum mechanics. It addresses questions of stability, localization, mean field limit, and blowup of solutions to GL, BCE, and the Euler Equations, as well as numerical methods for vortex dynamics on the sphere, and the generation and separation of vorticity at walls. The symposium brings together senior researchers with a range of expertise as well as more junior scientists.

Organizer: Monika Nitsche

University of New Mexico, USA

3:00-3:25 A Mean Field Limit of Bec Vortices

Daniel Spirn, University of Minnesota, USA

3:30-3:55 Blow-Up Criteria for the 3D Incompressible Euler Equations Based on the Voigt Regularization

Adam Larios, University of Nebraska, Lincoln, USA

4:00-4:25 Vorticity Dynamics in Rotating Flow: Geophysical Applications

Peter A. Bosler, Sandia National Laboratories, USA

4:30-4:55 Deflection of Vortex Dipoles by a Flat Plate, With and Without Viscosity

Monika Nitsche, University of New Mexico, USA

Wednesday, December 9

MS89

Uncertainty Quantification for Hyperbolic and Kinetic Equations - Part II of II

3:00 PM-5:00 PM

Room:Chambers Lecture Hall - Main Level

For Part 1 see MS76

Hyperbolic and kinetic equations often contain uncertain parameters due to inaccurate modeling, measurements, or empirical constitutive relations. A proper quantification of these uncertainties is therefore of practical importance to obtain reliable predictions to solutions of such equations. Moreover, the nonlinear nature of these problems poses great challenges in designing and analyzing efficient numerical/computational methods. We will report recent progress of uncertainty quantification for hyperbolic, kinetic, and related problems.

Organizer: Alina Chertock

North Carolina State University, USA

Organizer: Jingwei Hu

Purdue University, USA

Organizer: Alexander Kurganov

Tulane University, USA

3:00-3:25 A Stochastic Galerkin Method for the Boltzmann Equation with Uncertainty Efficient in the Fluid Regime

Jingwei Hu, Purdue University, USA; Shi Jin, Shanghai Jiao Tong University, China, and the University of Wisconsin-Madison, USA

3:30-3:55 Advances in the Modeling of UQ for Kinetic and Scalar Equations

Bruno Despres, University of Paris VI, France; Benoit Perthame, Université Pierre et Marie Curie - Paris VI, France

4:00-4:25 Analysis and Approximation of Parametric Hyperbolic Pde

Peter Jantsch, University of Tennessee, USA; Clayton G. Webster, Oak Ridge National Laboratory, USA

4:30-4:55 A Path-based Method for Simulating Large Deviations and Rare Events in Stochastic Nonlinear Schroedinger Equations

Jinglai Li, Shanghai Jiao Tong University, China

Wednesday, December 9

MS90

Analysis of Hamilton-Jacobi Equation: Optimization, Dynamics and Control - Part I of II

3:00 PM-5:00 PM

Room:Four Peaks - Upper Level

For Part 2 see MS93

Hamilton-Jacobi equation and its manifold applications represent an important crossroads of many areas of research in pure and applied mathematics: PDEs, dynamical systems, optimal transport, control, stochastic analysis, etc… The interaction and the combination of these diverse points of view have revealed extremely fruitful over recent years and have led to important advancements in this field. The aim of this minisymposium is to bring together important experts working on the subject from different perspectives, with the goal of informing the participants about the present state of research, discussing recent developments and proposing new lines of investigation and collaborations.

Organizer: Alfonso Sorrentino

University of Rome II, Tor Vergata, Italy

Organizer: Piermarco Cannarsa

University of Rome II, Tor Vergata, Italy

3:00-3:25 Homogenization of Equivariant Hamilton-Jacobi Equations

Alfonso Sorrentino, University of Rome II, Tor Vergata, Italy

3:30-3:55 Regularity of Solutions of Hamilton Jacobi Equation on a Domain

Albert Fathi, Ecole Normale Superieure de Lyon, France

4:00-4:25 Regularity of Weak Kam Solutions

Ludovic Rifford, Université de Nice, Sophia Antipolis, France

4:30-4:55 Weak Kam Theory on the Infinite Symmetric Product of the Torus

Wilfrid Gangbo, Georgia Institute of Technology, USA

Wednesday, December 9

MS91

Minisymposium

3:00 PM-5:00 PM

Room:Flagstaff A - Upper Level

Organizer: Luis Vega
Basque Center for Applied Mathematics, Spain

3:00-3:25 On the Leapfrogging Phenomena in Fluid Mechanics
Didier Smets, Université Pierre et Marie Curie, France

3:30-3:55 Vortex Filaments in the Euler Equation
Robert Jerrard, University of Toronto, Canada

4:00-4:25 The Evolution of the Vortex Filament Equation for a Regular Polygon
Francisco de la Hoz, University of the Basque Country, Spain

4:30-4:55 Nearly Parallel Vortex Filaments in the Ginzburg-Landau Equations
Andres A. Contreras, New Mexico State University, USA

Wednesday, December 9

MS92

The Mathematics of Optics and Photonics - Part II of II

3:00 PM-3:30 PM

Room:Flagstaff B - Upper Level

For Part 1 see MS79

Driven by spectacular advances in the design capabilities of materials at the nanoscale, there has been recent exponetial growth in the fields of plasmonics and nano-optics. Once exotic phenomena such as extraordinary optical transmission, surface-enhanced Raman scattering, and surface plasmon resonances are now at the heart everyday technologies. As evidenced by a recent NRC report and an upcoming IMA program, the time is ripe for mathematicians to contribute. The goal of this session is to bring together world experts in the modeling, rigorous analysis, and numerical simulation of Maxwell's equations to further advance the progress which has already been made.

Organizer: David P. Nicholls
University of Illinois, Chicago, USA

3:00-3:25 Field Enhancement in Nanogaps
Junshan Lin, Auburn University, USA

Wednesday, December 9

CP6

3:00 PM-5:20 PM

Room:Sedona - Main Level

Chair: Taige Wang, Virginia Tech, USA

3:00-3:15 Unified Method to Solve the Heat Equation
Byoungseon Choi, Seoul National University, Korea; DAUN Jeong, Samsung Advanced Institute of Technology, Korea; M.Y. Choi, Seoul National University, Korea

3:20-3:35 Lattice Model of a Fracture in a Composite Infinite Strip
Aleksandr Smirnov, Louisiana State University, USA

3:40-3:55 Self-focusing of Co-propagating Optical Beams
Alexey Sukhinin, Southern Methodist University, USA

4:00-4:15 Linearized Problem for Viscous Free Surface Flow
Kyoko Tomoeda and Yoshiaki Teramoto, Setsunan University, Japan

4:20-4:35 Investigation and Numerical Solution of the Difference Analogue of One Nonlinear Parabolic Equation
Mikheil Tutberidze, Ilia State University, Georgia

4:40-4:55 Dimension Reduction, Stochastic Parametrization and Data Assimilation for Transport in the Ocean
Shankar C. Venkataramani, University of Arizona, USA; Clint Dawson, University of Texas at Austin, USA; Juan M. Restrepo, Oregon State University, USA; William Rosenthal, Pacific Northwest National Laboratory, USA

5:00-5:15 Development of Shear Banding of PEC Model in Poiseuille Flow
Taige Wang and Michael Renardy, Virginia Tech, USA

Coffee Break

5:00 PM-5:15 PM

Room:Forum - Lower Level

Wednesday, December 9

MT2

Simulating Stochastic Systems

5:15 PM-7:15 PM

Room:Forum - Lower Level

Organizer: Jonathan Weare

University of Chicago, USA

This minitutorial will introduce the simulation of stochastic processes for a variety of important tasks in the physical and biological sciences. Mathematically these tasks can be characterized as the estimation of very high dimensional integrals and the only practical approaches to solving them involve random sampling. We will focus on the computer simulation of diffusion processes. Special attention will be paid to important complicating factors such as conditioning and rare events.

Speaker

Jonathan Weare, University of Chicago, USA

Thursday, December 10

Registration

8:00 AM-3:00 PM

Room:Grand Ballroom Foyer - Main Level

Thursday, December 10

MS93

Analysis of Hamilton-Jacobi Equation: Optimization, Dynamics and Control - Part II of II

8:30 AM-10:30 AM

Room:Forum - Lower Level

For Part 1 see MS90

Hamilton-Jacobi equation and its manifold applications represent an important crossroads of many areas of research in pure and applied mathematics: PDEs, dynamical systems, optimal transport, control, stochastic analysis, etc… The interaction and the combination of these diverse points of view have revealed extremely fruitful over recent years and have led to important advancements in this field. The aim of this minisymposium is to bring together important experts working on the subject from different perspectives, with the goal of informing the participants about the present state of research, discussing recent developments and proposing new lines of investigation and collaborations.

Organizer: Alfonso Sorrentino

University of Rome II, Tor Vergata, Italy

Organizer: Piermarco Cannarsa

University of Rome II, Tor Vergata, Italy

8:30-8:55 Compactness Estimates for Hamilton-Jacobi Equations

Piermarco Cannarsa, University of Rome II, Tor Vergata, Italy

9:00-9:25 Stochastic Homogenization of Non Convex Hamilton-Jacobi Equations

Pierre Cardaliaguet, Université Paris Dauphine, France

9:30-9:55 On the Global Behavior of Generalized Characteristics of Hamilton-Jacobi Equations

Wei Cheng, Nanjing University, China

10:00-10:25 An Abstract K.A.M. Theorem with Applications to Pdes

Michela Procesi, Università di Roma "La Sapienza", Italy

Thursday, December 10

MS94

Advances in Numerical Methods for PDEs with Applications - Part I of II

8:30 AM-10:30 AM

Room:Rio Verde - Main Level

For Part 2 see MS107

This minisymposium is focused on numerical methods for solving PDEs using finite element methods, boundary element methods and fast solvers. These techniques are widely applicable due to their conformation with geometry and allows us to work with minimal regularity assumptions. Part of the focus will be on PDE constrained optimization problems. The field of PDE constrained optimization requires expertise in PDEs, continuous and discrete optimization, linear and non-linear functional analysis, numerical analysis, and scientific computing. Several applications ranging from acoustic and elastic wave propagation, to free boundary problems will be discussed.

Organizer: Harbir Antil

George Mason University, USA

Organizer: Lise-Marie Imbert-Gerard

Courant Institute of Mathematical Sciences, New York University, USA

8:30-8:55 Direct Scattering by a Penetrable Media

Lise-Marie Imbert-Gerard, Sivaram Ambikasaran, and Carlos C. Borges, Courant Institute of Mathematical Sciences, New York University, USA; Leslie Greengard, Simons Foundation and Courant Institute of Mathematical Sciences, New York University, USA

9:00-9:25 Sub-Linear Solver for the 2D High-Frequency Helmholtz Equation

Leonardo Zepeda-Núñez and Laurent Demanet, Massachusetts Institute of Technology, USA

9:30-9:55 Numerical Methods for Time Domain Two-dimensional Wave-structure Interaction

Tonatiuh Sanchez-Vizuet and Francisco J. J. Sayas, University of Delaware, USA

10:00-10:25 Droplet Footprint Control

Shawn W. Walker, Louisiana State University, USA

Thursday, December 10

MS95

Recent Developments in the Analysis of the Navier-Stokes, Euler, and Related Models: Part II of III

8:30 AM-10:30 AM

Room:Sonora - Main Level

For Part 1 see MS73
For Part 3 see MS108

The emphasis will be on the analysis of the Navier-Stokes equation, Euler equation, and related models, describing for instance the interaction with solid bodies immersed in the fluid, the effect of having a magnetized fluid, or the influence of boundaries. These equations are used to model various physical phenomena ranging from the theory of turbulence to oceanography. Besides the fundamental questions of existence and uniqueness of solutions, the talks in this session will address central qualitative properties of equations, such as regularity, (in)stability, long time dynamics, analysis of special solutions (self-similar, axis-symmetric), the behavior in singular limit regimes (the inviscid limit of the Navier-Stokes equation).

Organizer: Igor Kukavica

University of Southern California, USA

Organizer: Christophe Lacave

Universite Paris 7-Denis Diderot, France

Organizer: Vlad C. Vicol

Princeton University, USA

8:30-8:55 Striated Regularity of Velocity for the Euler Equations

James P. Kelliher, University of California, Riverside, USA; Hantaek Bae, Ulsan National Institute of Science and Technology, South Korea

9:00-9:25 How to Control Flutter Arising in Flow Structure Interactions

Irena M. Lasiecka, University of Memphis, USA

9:30-9:55 Weak Vorticity Formulation, Circulation, Net force and Torque

Dragos Iftimie, Universite de Lyon 1, France; Milton Lopes Filho, Federal University of Rio de Janerio, Brazil; *Helena J. Nussenzveig Lopes*, Universidade Federal do Rio De Janeiro, Brazil; Franck Sueur, Université Pierre et Marie Curie, France

10:00-10:25 Optimal Mixing Rates

Anna L. Mazzucato, Pennsylvania State University, USA

Thursday, December 10

MS96

Data Assimilation for PDE Models - Part I of II

8:30 AM-10:30 AM

Room:San Carlos - Main Level

For Part 2 see MS109

One may aim to update the state and/or parameters of a PDE model in the presence of observations. For time-dependent problems in which the observations arrive sequentially, and the update needs to be done online, this is referred to as Data Assimilation. The Data Assimilation problem enjoys a rich interplay between Control Theory and Probability and for PDE models it is quite challenging. Furthermore, the field is still relatively young with much potential for contributions. This minisymposium will bring together experts in both theoretical and computational aspects of Data Assimilation for PDE models.

Organizer: Kody Law

Oak Ridge National Laboratory, USA

Organizer: Fabio Nobile

EPFL, Switzerland

8:30-8:55 Bayesian Filtering as Transportation

Alessio Spantini, Tarek Moselhy, and Youssef M. Marzouk, Massachusetts Institute of Technology, USA

9:00-9:25 Accuracy of Suboptimal Bayesian Filters in the Presence of Model Error

Michal Branicki, University of Edinburgh, United Kingdom; K Law, King Abdullah University of Science & Technology (KAUST), Saudi Arabia; A Majda, Courant Institute of Mathematical Sciences, New York University, USA; A. Stuart, University of Warwick, United Kingdom

9:30-9:55 Stratification of Markov Processes for Rare Event Simulation

Jonathan Weare, University of Chicago, USA

10:00-10:25 Continuous Data Assimilation for Modified 3D Navier-Stokes Equations

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

Thursday, December 10

MS97

Around Euler Equations - Part I of II

8:30 AM-10:30 AM

Room:Sedona - Main Level

For Part 2 see MS110

The Euler equations, which govern inviscid flow, form a system of hyperbolic conservation laws. It is known that their solutions are not smooth even for regular initial data. For that reason the concept of weak solutions has become a successful tool in the modern studies in hydrodynamics. The last years brought a significant progress in the studies on Euler equations. We will concentrate on the recent advances on Euler and similar systems including the results using the method of convex integration, methods of optimal transport theory, et al.

Organizer: Agnieszka Swierczewska-Gwiazda

University of Warsaw, Poland

8:30-8:55 Recent Advances Concerning the Three-dimensional Primitive Equations of Atmospheric and Oceanic Dynamics

Chongsheng Cao, Florida International University, USA; Jinkai Li, Weizmann Institute of Science, Israel; *Edriss S. Titi*, Texas A&M University, USA and Weizmann Institute of Science, Israel

9:00-9:25 A Variational Time Discretization for the Compressible Euler Equations

Michael Westdickenberg, RWTH Aachen University, Germany

9:30-9:55 Surprising Solutions to the Isentropic System of Gas Dynamics

Elisabetta Chiodarolli, École Polytechnique Fédérale de Lausanne, Switzerland

10:00-10:25 Uniqueness of Rarefaction Waves in Multidimensional Compressible Euler Systems

Ondrej Kreml, Mathematical Institute ASCR, Prague, Czech Republic

Thursday, December 10

MS98

Recent Advances in Theoretical and Numerical Aero- and Hydrodynamics? - Part III of III

8:30 AM-10:00 AM

Room:Palomas - Main Level

For Part 2 see MS83

The Navier-Stokes and Euler equations are the fundamental equations modeling the behavior of fluids. They have a broad range of applications in aerodynamics, geophysics, meteorology and engineering. Despite the fact that the mathematical analysis of these equations has a long and rich history, yet many important and interesting problems remain challenging and far to be well understood. Our symposium will be an opportunity to see and share, among its participants and attendees, the recent progress in the theory of incompressible Navier-Stokes and Euler equations and related systems. In particular, the focus will be on the two main axes: Boundary Layer theory and well-posedness issues in hydrodynamics.

Organizer: Slim Ibrahim

University of Victoria, Canada

Organizer: Makram Hamouda

Indiana University, USA

8:30-8:55 Long Time Stability of the Implicit Euler Scheme for An Incompressible Two-Phase Flow Model

Florentina Tone, University of West Florida, USA; Theodore Tachim Medjo, Florida International University, USA

9:00-9:25 Global Well Posedness For A Two-Fluid Model

Shengyi Shen and Slim Ibrahim, University of Victoria, Canada; Yoshikazu Giga, University of Tokyo, Japan; Tsuyoshi Yoneda, University of Victoria, Canada

9:30-9:55 Global Existence Results for the Stable Muskat Equation

Omar Lazar and Diego Córdoba, Consejo Superior Investigaciones Cientificas, Spain

Thursday, December 10

MS99

Nonlinear Parabolic Equations and Applications - Part III of IV

8:30 AM-10:30 AM

Room:Coronado - Main Level

For Part 2 see MS85
For Part 4 see MS112

Nonlinear parabolic differential equations play an important role in many applications, including fluid dynamics, phase transitions, image processing, materials sciences, and geometry. This session focuses on recent developments in these areas, with an emphasis on well-posedness, qualitative behavior, and numerical analysis of solutions.

Organizer: Patrick Guidotti

University of California, Irvine, USA

Organizer: Yuanzhen Shao

Vanderbilt University, USA

Organizer: Gieri Simonett

Vanderbilt University, USA

8:30-8:55 Some Degenerate Parabolic Equations Inspired by Image Processing

Patrick Guidotti, University of California, Irvine, USA

9:00-9:25 High-Order Time Stepping for Nonlinear PDE Through Componentwise Approximation of Matrix Functions

James V. Lambers, University of Southern Mississippi, USA

9:30-9:55 Traveling Wave Solutions for Some Reaction Diffusion Equations with Fractional Laplacians

Changfeng Gui, University of Connecticut, USA

10:00-10:25 Finite-Time Blow Up and Long-Wave Unstable Thin-Film Equations

Marina Chugunova, Claremont Graduate University, USA

Thursday, December 10

MS100

PDE Methods for Problems in Materials Science - Part II of II

8:30 AM-10:30 AM

Room:Center Ballroom - Main Level

For Part 1 see MS86

The minisymposium is intended for an audience interested in the analysis, numerics and modeling of PDE applied to materials science, with an emphasis in soft matter systems. Research related to the mathematical description of materials via energy functionals will be presented and questions of minimizers structures will be addressed. Topics will include analysis of defect structures in liquid crystals, numerical approximation of pattern formation in smectic liquid crystals, dynamics of chevron structures in smectic materials, phase transiiton in nanoparticle-block blends, and existence of solutions to the Chan-Hilliard equation with phase-dependent diffusion mobility.

Organizer: Lia Bronsard

McMaster University, Canada

Organizer: Tiziana Giorgi

New Mexico State University, USA

8:30-8:55 Wetting-Driven Phase Transition in a Nanoparticle-Block Copolymer Blend

Stan Alama, Lia Bronsard, and *Ihsan A. Topaloglu*, McMaster University, Canada

9:00-9:25 Minimizers of the Landau-De Gennes Energy Around a Spherical Colloid Particle

Stan Alama, McMaster University, Canada

9:30-9:55 The Landau-De Gennes Model for Nematic Liquid Crystalline Films

Dmitry Golovaty, University of Akron, USA; Alberto Montero, Pontificia Universidad Católica de Chile, Chile; Peter Sternberg, Indiana University, USA

10:00-10:25 Properties of Minimizers for the Maier-Saupe Energy

Daniel Phillips, Purdue University, USA

Thursday, December 10

MS101

Non-local Equations - Part II of II

8:30 AM-10:30 AM

Room:Bouchon - Main Level

For Part 1 see MS87

Motivated by the study of Lévy processes or coming from various applications, so-called anomalous diffusion appears now in many models. We can mention for instance dislocation dynamics, hydraulic fractures and fluid dynamics among many others. The corresponding partial differential equations involve (singular) integral terms such as the fractional Laplacian. These equations raise new analytical challenges and their study attracted a lot of attention in recent years. For instance, to address regularity issues in the case of parabolic/elliptic equations, many new tools and techniques were introduced in the last fifteen years.

Organizer: Cyril Imbert

CNRS and École Normale Supérieure, Paris, France

8:30-8:55 Crystal Dislocations with Different Orientation and Collisions

Stefania Patrizi, WIAS, Berlin, Germany

9:00-9:25 A Family of Higher Order Parabolic Non-Local Equations

Rana Tarhini, Université Paris-Est, France

9:30-9:55 Propagation in Some Nonlocal Population Dynamics Models

Matthieu Alfaro, Université Montpellier II, France

10:00-10:25 On a Fractional Thin Film Equation for Hydraulic Fractures

Antoine Mellet, University of Maryland, USA

Thursday, December 10

MS102

Vortices: Analysis and Simulation - Part II of II

8:30 AM-10:30 AM

Room:Rattlers - Main Level

For Part 1 see MS88

This minisymposium will cover analysis and simulations of vortices in areas ranging from continuum to quantum mechanics. It addresses questions of stability, localization, mean field limit, and blowup of solutions to GL, BCE, and the Euler Equations, as well as numerical methods for vortex dynamics on the sphere, and the generation and separation of vorticity at walls. The symposium brings together senior researchers with a range of expertise as well as more junior scientists.

Organizer: Monika Nitsche

University of New Mexico, USA

8:30-8:55 Hovering in Oscillatory Flows

Eva Kanso, University of Southern California, USA

9:00-9:25 Data-driven Vortex Modeling of Separated Flows

Jeff D. Eldredge, University of California, Los Angeles, USA

9:30-9:55 Vortex Shedding from Smooth Two-Dimensional Objects Using Boundary Layers

Shreyas Mandre, Xinjun Guo, and Ponnulakshmi Kartheeswaran, Brown University, USA

10:00-10:25 Numerical Study of Hierarchical Vorticity Separations of Viscous Flow Past Wedges

Ling Xu, University of Michigan, USA

Thursday, December 10

MS103

Numerical Approximation of Boundary Value Problems Involving Fractional Differential Operators

8:30 AM-10:30 AM

Room:Chambers Lecture Hall - Main Level

Boundary value problems involving non-local operators arise from modeling a number of physical processes including porous media flow, Levy diffusion processes, geostropic models. In this symposium, we consider the stability and approximation of boundary value problems involving fractional differential operators.

Organizer: Joseph Pasciak
Texas A&M University, USA

8:30-8:55 Approximation of Fractional Powers of Accretive Operators.
Joseph Pasciak and Andrea Bonito, Texas A&M University, USA

9:00-9:25 A Petrov-Galerkin Finite Element Method for Fractional Convection-Diffusion Equations
Bangti Jin, University College London, United Kingdom; *Zhi Zhou*, Columbia University, USA

9:30-9:55 A PDE Approach to Fractional Diffusion
Abner J. Salgado, University of Tennessee, USA

10:00-10:25 On the Wellposedness of Boundary-Value Problems of Fdes
Hong Wang, University of South Carolina, USA

Thursday, December 10

MS104

Nonlinear Waves and Patterns - Part I of II

8:30 AM-10:30 AM

Room:Flagstaff A - Upper Level

For Part 2 see MS113
This minisymposium presents new advances in the theory of nonlinear waves and patterns for a wide range of model equations. The speakers will discuss both Hamiltonian and dissipative systems, posed on discrete and continuous spatial domains.

Organizer: Hermen Jan Hupkes
University of Leiden, The Netherlands

Organizer: Martina Chirilus-Bruckner
University of Leiden, The Netherlands

8:30-8:55 Appropriate Discretization Schemes for Travelling Waves in Bistable Reaction-Diffusion Problems
Hermen Jan Hupkes, University of Leiden, The Netherlands; Erik Van Vleck, University of Kansas, USA

9:00-9:25 Waves Traveling Through Obstacles in Lattice Differential Equations
Aaron Hoffman, Franklin W. Olin College of Engineering, USA; Hermen Jan Hupkes, University of Leiden, The Netherlands

9:30-9:55 Nonlinear Schrodinger Equation on Quantum Graphs
Dmitry Pelinovsky, McMaster University, Canada

10:00-10:25 Agent-Based and Continuum Models for Stripe Formation in Zebrafish
Alexandria Volkening and Bjorn Sandstede, Brown University, USA

Thursday, December 10

MS105

Structure Preserving Numerical Methods for Kinetic and Wave Equations - Part I of II

8:30 AM-10:30 AM

Room:Flagstaff B - Upper Level

For Part 2 see MS114
Speakers will address topics of current interest in the broad area of numerical analysis for kinetic and wave equations. There will be particular emphasis on structure preserving, such as energy preserving, entropy satisfying, bound preserving, asymptotic preserving, numerical methods. The topics will span a range from theoretical results to novel algorithms, and will include talks focused on a variety of interesting application areas.

Organizer: Hailiang Liu
Iowa State University, USA

Organizer: Yulong Xing
Oak Ridge National Laboratory, USA

Organizer: Hui Yu
RWTH Aachen University, Germany

8:30-8:55 Entropy Satisfying Methods for Competition Dynamics
Hailiang Liu, Iowa State University, USA

9:00-9:25 Entropy Satisfying Methods for Fokker-Planck Equations
Hui Yu, RWTH Aachen University, Germany; Hailiang Liu, Iowa State University, USA

9:30-9:55 Asymptotic Preserving Methods for Kinetic Chemotaxis Systems
Alexander Kurganov, Tulane University, USA

10:00-10:25 Positivity-preservation in a Class of Locally-implicit Discontinuous Galerkin Schemes
James A. Rossmanith and Pierson Guthrey, Iowa State University, USA

Thursday, December 10

CP7

8:30 AM-10:30 AM

Room:Four Peaks - Upper Level

Chair: To Be Determined

8:30-8:45 Optimal Design of Energy Conversion Devices
Lincoln Collins and Kaushik Bhattacharya, California Institute of Technology, USA

8:50-9:05 On the Existence of Maximizers for Airy-Strichartz Inequalities
Luiz G. Farah, Universidade Federal de Minas Gerais, Brazil

9:10-9:25 Stability and Bifurcation of a Flexible Loop Spanned by a Fluid Film
Eliot Fried, Okinawa Institute of Science and Technology, Japan

9:30-9:45 Positive Solution for a Class of Coupled (p,q)-Laplacian Nonlinear Systems
Eder M. Martins and Wenderson Ferreira, Universidade Federal de Ouro Preto, Brazil

9:50-10:05 Uniqueness of Viscosity Solutions for a Class of Integro-Differential Equations
Chenchen Mou and Andrzej J. Swiech, Georgia Institute of Technology, USA

10:10-10:25 The Fourth-Order Dispersive Nonlinear Schödinger Equation: Orbital Stability of a Standing Wave
Fabio Natali, State University of Maringa, Brazil; Ademir Pastor, State University of Campinas, Brazil

Coffee Break

10:30 AM-10:55 AM

Room:Forum - Lower Level

Closing Remarks

10:55 AM-11:00 AM

Room:Forum - Lower Level

Thursday, December 10

IP7

Scientific Computing in the Movies and Virtual Surgery

11:00 AM-11:45 AM

Room:Forum - Lower Level

Chair: Fabio Nobile, EPFL, Switzerland

New applications of scientific computing for solid and fluid mechanics problems include simulation of virtual materials for movie special effects and virtual surgery. Both disciplines demand physically realistic dynamics for such materials as water, smoke, fire, and brittle and elastic objects. These demands are different than those traditionally encountered and new algorithms are required. Teran's talk will address the simulation techniques needed in these fields and some recent results including: simulated surgical repair of biomechanical soft tissues, extreme deformation of elastic objects with contact, high resolution incompressible flow, clothing and hair dynamics. Also included is discussion of a new algorithm used for simulating the dynamics of snow in Disney's animated feature film, "Frozen".

Joseph Teran

University of California, Los Angeles, USA

Thursday, December 10

IP8

Customising Image Analysis Using Nonlinear Partial Differential Equations

11:45 AM-12:30 PM

Room:Forum - Lower Level

Chair: To Be Determined

When assigned with the task of extracting information from given image data the first challenge one faces is the derivation of a truthful model for both the information and the data. Such a model can be determined by the a-priori knowledge about the image (information), the data and their relation to each other. The source of this knowledge is either our understanding of the type of images we want to reconstruct and of the physics behind the acquisition of the data or we can thrive to learn parametric models from the data itself. The common question arises: how can we customise our model choice to a particular application? Or better how can we make our model adaptive to the given data?

Starting from the first modelling strategy this talk will lead us from nonlinear diffusion equations and subdifferential inclusions of total variation type functionals as the most successful image model today to non-smooth second- and third-order variational models, with data models for Gaussian and Poisson distributed data as well as impulse noise. These models exhibit solution-dependent adaptivities in form of nonlinearities or non-smooth terms in the PDE or the variational problem, respectively. Applications for image denoising, inpainting and surface reconstruction are given. After a critical discussion of these different image and data models we will turn towards the second modelling strategy and propose to combine it with the first one using a PDE constrained optimisation method that customises a parametrised form of the model by learning from examples. In particular, we will consider optimal parameter derivation for total variation denoising with multiple noise distributions and optimising total generalised variation regularisation for its application in photography.

Carola-Bibiane Schönlieb

University of Cambridge, United Kingdom

Lunch Break

12:30 PM-2:30 PM

Attendees on their own

Thursday, December 10

MS106

Complex Analysis and PDEs

2:30 PM-4:30 PM

Room:Forum - Lower Level

This is a period of burgeoning activity in many aspects of complex analysis including (1) Riemann-Hilbert problems and applications to random matrix theory and nonlinear wave equations; (2) Singularity analysis of complexified real equations; (3) Conformal mappings for multiply-connected domains and Riemann surfaces; (4) Interface motion in two dimensions and connections to integrable systems; and (5) Developments in numerical conformal mapping techniques. This minisymposium will feature the interplay between, and applications of, many of these recent developments to PDE/free boundary problems.

Organizer: Shankar C. Venkataramani
University of Arizona, USA

2:30-2:55 Multi-Scale Conformal Maps for Singular Interfaces in Free Boundary Problems
Shankar C. Venkataramani, University of Arizona, USA; Stuart Kent, Detroit Labs, USA

3:00-3:25 Conformal Mapping Technique for a Supercavitating Flow Around a Wedge Or a Hydrofoil
Anna Zemlyanova, Kansas State University, USA

3:30-3:55 Weak Solutions for Integrable Free-Boundary Dynamics in Two Dimensions
Razvan Teodorescu, University of South Florida, Tampa, USA

4:00-4:25 Burgers Equation in the Complex Plane and Random Matrix Theory
Govind Menon, Brown University, USA

Thursday, December 10

MS107

Advances in Numerical Methods for PDEs with Applications - Part II of II

2:30 PM-4:30 PM

Room:Rio Verde - Main Level

For Part 1 see MS94
This mini-symposium is focused on numerical methods for solving PDEs using finite element methods, boundary element methods and fast solvers. These techniques are widely applicable due to their conformation with geometry and allows us to work with minimal regularity assumptions. Part of the focus will be on PDE constrained optimization problems. The field of PDE constrained optimization requires expertise in PDEs, continuous and discrete optimization, linear and non-linear functional analysis, numerical analysis, and scientific computing. Several applications ranging from acoustic and elastic wave propagation, to free boundary problems will be discussed.

Organizer: Harbir Antil
George Mason University, USA

Organizer: Lise-Marie Imbert-Gerard
Courant Institute of Mathematical Sciences, New York University, USA

2:30-2:55 A Fractional Space-time Optimal Control Problem: Analysis and Discretization
Harbir Antil, George Mason University, USA; Enrique Otarola, University of Maryland and George Mason University, USA; Abner J. Salgado, University of Tennessee, Knoxville, USA

3:00-3:25 The State of the Art in Polytopal Finite Element Methods
Andrew Gillette, University of Texas at Austin, USA

3:30-3:55 C^0 DG Methods for Elliptic Problems in Non-divergence Form
Michael J. Neilan, University of Pittsburgh, USA

4:00-4:25 Finite Element Approximation of the Isaacs Equation
Abner J. Salgado, University of Tennessee, USA; Wujun Zhang, University of Maryland, USA

Thursday, December 10

MS108

Recent Developments in the Analysis of the Navier-Stokes, Euler, and Related Models: Part III of III

2:30 PM-4:30 PM

Room:Sonora - Main Level

For Part 2 see MS95
The emphasis will be on the analysis of the Navier-Stokes equation, Euler equation, and related models, describing for instance the interaction with solid bodies immersed in the fluid, the effect of having a magnetized fluid, or the influence of boundaries. These equations are used to model various physical phenomena ranging from the theory of turbulence to oceanography. Besides the fundamental questions of existence and uniqueness of solutions, the talks in this session will address central qualitative properties of equations, such as regularity, (in)stability, long time dynamics, analysis of special solutions (self-similar, axis-symmetric), the behavior in singular limit regimes (the inviscid limit of the Navier-Stokes equation).

Organizer: Igor Kukavica
University of Southern California, USA

Organizer: Christophe Lacave
Universite Paris 7-Denis Diderot, France

Organizer: Vlad C. Vicol
Princeton University, USA

2:30-2:55 A New Analytic Approach to Wave Turbulence
Tristan Buckmaster, Courant Institute of Mathematical Sciences, New York University, USA

3:00-3:25 Normal Form Transformations for Capillary-Gravity Water Waves
Catherine Sulem, University of Toronto, Canada

3:30-3:55 Well/Ill-Posedness for Transport Equations
Tarek M. Elgindi, Princeton University, USA

4:00-4:25 Persistence of Regularity for Solutions of the Boussinesq Equations in Sobolev Spaces
Fei Wang, University of Southern California, USA

Thursday, December 10

MS109

Data Assimilation for PDE Models - Part II of II

2:30 PM-4:30 PM

Room:San Carlos - Main Level

For Part 1 see MS96

One may aim to update the state and/ or parameters of a PDE model in the presence of observations. For time-dependent problems in which the observations arrive sequentially, and the update needs to be done online, this is referred to as Data Assimilation. The Data Assimilation problem enjoys a rich interplay between Control Theory and Probability and for PDE models it is quite challenging. Furthermore, the field is still relatively young with much potential for contributions. This minisymposium will bring together experts in both theoretical and computational aspects of Data Assimilation for PDE models.

Organizer: Kody Law

Oak Ridge National Laboratory, USA

Organizer: Fabio Nobile

EPFL, Switzerland

2:30-2:55 Sequential Data Assimilation for Urban Crime Model

Naratip Santitissadeekorn, University of Surrey, United Kingdom

3:00-3:25 Continuous Data Assimilation with Stochastically Noisy Data

Hakima Bessaih, University of Wyoming, USA; Eric Olson, University of Nevada, Reno, USA; Edriss S. Titi, Texas A&M University, USA and Weizmann Institute of Science, Israel

3:30-3:55 Title Not Available at Time of Publication

Viet Ha Hoang, Nanyang Technological University, Singapore

4:00-4:25 Kalman Filtering and Inverse Problems with Infinitely Dimensional Data

Jan Mandel, University of Colorado at Denver, USA

Thursday, December 10

MS110

Around Euler Equations - Part II of II

2:30 PM-4:30 PM

Room:Sedona - Main Level

For Part 1 see MS97

The Euler equations, which govern inviscid flow, form a system of hyperbolic conservation laws. It is known that their solutions are not smooth even for regular initial data. For that reason the concept of weak solutions has become a successful tool in the modern studies in hydrodynamics. The last years brought a significant progress in the studies on Euler equations. We will concentrate on the recent advances on Euler and similar systems including the results using the method of convex integration, methods of optimal transport theory, et al.

Organizer: Agnieszka Swierczewska-Gwiazda

University of Warsaw, Poland

2:30-2:55 Weak-Strong Uniqueness for Inviscid Flows

Emil Wiedemann, University of Bonn, Germany

3:00-3:25 Conservative Weak Solutions of the 2D Euler Equations

Milton Lopes Filho, Universidade Federal do Rio De Janeiro, Brazil

3:30-3:55 Entropy Stable Methods for Numerical Solutions of the Multidimensional Euler and Ideal Magnetohydrodynamics Equations

Christian Klingenberg, Wurzburg University, Germany

4:00-4:25 The Cauchy Problem for the Pressureless Euler/ Isentropic Navier-Stokes Equations

Young-Pil Choi, Imperial College London, United Kingdom; Bongsuk Kwon, Ulsan National Institute of Science and Technology, South Korea

Thursday, December 10

MS111

Mathematical Analysis of Liquid Crystals - Part III of III

2:30 PM-4:30 PM

Room:Palomas - Main Level

For Part 2 see MS78

Liquid crystals are the main entry point into the fascinating world of complex materials with complex microstructural properties. Yet, despite being the simplest representative of such materials, and of enormous technological importance, liquid crystals are not understood at a basic, fundamental level of description. The proposed minisymposium aims to gather the main contributors to recent advances in the area and to set new directions by determining the major open problems.

Organizer: Valeriy Slastikov

University of Bristol, United Kingdom

Organizer: Arghir Zarnescu

University of Sussex, United Kingdom

2:30-2:55 Modeling the Motion and Locomotion of Liquid Crystal Elastomers

Peter Palffy-Muhoray, Fred Minkowski, Mykhailo Pevnyi, and Xiaoyu Zheng, Kent State University, USA

3:00-3:25 Features of Minimizers to Liquid Crystals Energies

Daniel Phillips, Purdue University, USA

3:30-3:55 On the Classical and Statistical Dynamics of Hard, Non-Spherical Particle Systems

Mark Wilkinson, Courant Institute of Mathematical Sciences, New York University, USA

4:00-4:25 Aggregation Models for Liquid Crystals with Polydispersity

Ibrahim Fatkullin, University of Arizona, USA; Valeriy Slastikov, University of Bristol, United Kingdom

Thursday, December 10

MS112

Nonlinear Parabolic Equations and Applications - Part IV of IV

2:30 PM-4:30 PM

Room:Coronado - Main Level

For Part 3 see MS99

Nonlinear parabolic differential equations play an important role in many applications, including fluid dynamics, phase transitions, image processing, materials sciences, and geometry. This session focuses on recent developments in these areas, with an emphasis on well-posedness, qualitative behavior, and numerical analysis of solutions.

Organizer: Yuanzhen Shao
Vanderbilt University, USA

Organizer: Patrick Guidotti
University of California, Irvine, USA

Organizer: Gieri Simonett
Vanderbilt University, USA

2:30-2:55 Maximal Regularity Theory on Manifolds with Singularity
Yuanzhen Shao, Vanderbilt University, USA

3:00-3:25 Existence and Maximal L^p-Regularity of Solutions for the Porous Medium Equation on Manifolds with Conical Singularities
Elmar Schrohe, Leibniz University Hannover, Germany

3:30-3:55 On Fluid Flows and Phase Transitions
Gieri Simonett, Vanderbilt University, USA

4:00-4:25 Liouville Theorems for the Navier Stokes Equation on a Hyperbolic Space
Magdalena Czubak, Binghamton University, USA

Thursday, December 10

MS113

Nonlinear Waves and Patterns - Part II of II

2:30 PM-4:30 PM

Room:Flagstaff A - Upper Level

For Part 1 see MS104

This minisymposium presents new advances in the theory of nonlinear waves and patterns for a wide range of model equations. The speakers will discuss both Hamiltonian and dissipative systems, posed on discrete and continuous spatial domains.

Organizer: Hermen Jan Hupkes
University of Leiden, The Netherlands

Organizer: Martina Chirilus-Bruckner
University of Leiden, The Netherlands

2:30-2:55 Structure and Stability in Localized Patterns
Elizabeth J. Makrides and Bjorn Sandstede, Brown University, USA

3:00-3:25 Traveling Fronts in Holling-Tanner Model with Slow Diffusion
Anna Ghazaryan, Miami University, USA

3:30-3:55 Nonlinear Damping Estimates and Stability of Large-amplitude Periodic Wave Trains
Kevin Zumbrun, Indiana University, USA

4:00-4:25 Evolution and Interaction of Localized Structures with Oscillatory Tails
Martina Chirilus-Bruckner, University of Leiden, The Netherlands

Thursday, December 10

MS114

Structure Preserving Numerical Methods for Kinetic and Wave Equations - Part II of II

2:30 PM-4:30 PM

Room:Flagstaff B - Upper Level

For Part 1 see MS105

Speakers will address topics of current interest in the broad area of numerical analysis for kinetic and wave equations. There will be particular emphasis on structure preserving, such as energy preserving, entropy satisfying, bound preserving, asymptotic preserving, numerical methods. The topics will span a range from theoretical results to novel algorithms, and will include talks focused on a variety of interesting application areas.

Organizer: Hailiang Liu
Iowa State University, USA

Organizer: Yulong Xing
Oak Ridge National Laboratory, USA

Organizer: Hui Yu
RWTH Aachen University, Germany

2:30-2:55 L2 Stable Discontinuous Galerkin Methods for One-dimensional Two-way Wave Equations
Yulong Xing, University of Tennessee and Oak Ridge National Laboratory, USA

3:00-3:25 An Asymptotic Preserving Maxwell Solver Resulting in the Darwin Limit
Andrew J. Christlieb, Michigan State University, USA

3:30-3:55 Multi-Level Monte Carlo Methods for Computing Uncertain Systems of Conservation Laws.
Kjetil Lye and Siddhartha Mishra, ETH Zürich, Switzerland

4:00-4:25 Velocity Scaling Methods for Kinetic Equations with Nonlocal Interactions
Changhui Tan, Rice University, USA

Thursday, December 10

CP8

Hyperbolic and Flow Problems

2:30 PM-4:30 PM

Room:Center Ballroom - Main Level

Chair: To Be Determined

2:30-2:45 Nonuniqueness of Solutions to the Euler-Smoluchowski System for Compressible Fluids
Joshua Ballew, Carnegie Mellon University, USA

2:50-3:05 Central-Upwind Scheme for Shallow Water Equations with Discontinuous Bottom Topography
Andrew Bernstein and Alina Chertock, North Carolina State University, USA; Alexander Kurganov, Tulane University, USA

3:10-3:25 Nonlinear Wave-Diffraction in Real Fuids
Neelam Gupta and Vishnu D. Sharma, Indian Institute of Technology-Bombay, India

3:30-3:45 Exact Two-Point Water Saturation Cdf for Stochastic Two-Phase Immiscible Flows
Fayadhoi Ibrahima and Hamdi Tchelepi, Stanford University, USA

3:50-4:05 Homogenization of Linear Hyperbolic Stochastic Partial Differential Equation with Rapidly Oscillating Coefficients: The Two Scale Convergence Method
Mogtaba A. Mohammed and Mamadou Sango, University of Pretoria, South Africa

4:10-4:25 Approximate Controllability of Fractional Parabolic Integrodifferential Equations
Anurag Shukla, *N Sukavanam*, and D.N. Pandey, Indian Institute of Technology Roorkee, India

Thursday, December 10

CP9

2:30 PM-4:30 PM

Room:Bouchon - Main Level

Chair: Kristoffer Varholm, Norwegian University of Science and Technology, Norway

2:30-2:45 Symmetry Properties and A Priori Decay Estimate for Traveling Wave Solutions to the Whitham Equation
Long Pei, NTNU, Norway; Gabriele Brull, Leibniz University Hannover, Germany; Mats Ehrnstrom, Norwegian University of Science and Technology, Norway

2:50-3:05 Nonclassical Shocks in Hall-Mhd Flow
Triveni P. Shukla and Vishnu D. Sharma, Indian Institute of Technology-Bombay, India

3:10-3:25 Optimal Dirichlet Type Boundary Condition Control for the 1D Wave Equation: Finite Horizon, Infinite Horizon
Ilya Smirnov, Lomonosov Moscow State University, Russia

3:30-3:45 Steady State and Dynamical Radially-Symmetric Solutions of 2D Nonlinear Viscoelasticity
Alexey Stepanov, University of Maryland, USA; Stuart Antman, University of Maryland, College Park, USA

3:50-4:05 Traveling Water Waves with Point Vortices
Kristoffer Varholm, Norwegian University of Science and Technology, Norway

4:10-4:25 Asymmetric Shape Transitions in Epitaxial Quantum Dots from Pyramid to Multifaceted Dome
Chaozhen Wei and Brian J. Spencer, State University of New York at Buffalo, USA

Thursday, December 10

CP10

Solitary, Shock Waves, Atmospheric Problems

2:30 PM-3:50 PM

Room:Chambers Lecture Hall - Main Level

Chair: Eric Stachura
Temple University, USA

2:30-2:45 On Ellipticity of Balance Equations for Atmosphere Dynamics
Andrei Bourchtein and Ludmila Bourchtein, Pelotas State University, Brazil

2:50-3:05 Almost Automorphic Mild Solutions for Abstract Differential Equations with Iterated Deviating Arguments
Vikram Singh, Dwijendra Pandey, and Alka Chadda, Indian Institute of Technology Roorkee, India

3:10-3:25 Uniform Refraction in Negative Refractive Index Materials
Eric Stachura and Cristian Gutierrez, Temple University, USA

3:30-3:45 On the Nonlinear Elliptic Equation Connected with the Solitary Waves
Nino Khatiashvili, Tbilisi State University, Republic of Georgia

Thursday, December 10

CP11

Stochastic Problems

2:30 PM-4:30 PM

Room:Four Peaks - Upper Level

Chair: Ani P. Velo, University of San Diego, USA

2:30-2:45 Approximation of Solutions to Stochastic Fractional Integro-Differential Equation with Deviated Argument
Renu Chaudhary, Dwijendra N Pandey, and Alka Chadda, Indian Institute of Technology Roorkee, India

2:50-3:05 The Dynamic Multi-Newsvendor Problem
Zhaohu Fan, Pennsylvania State University, USA

3:10-3:25 Approximate Controllability of Semi Linear Control System with Delay Using Tikhonov Regularization
Ravinder Katta and Sukavanam Nagarajan, Indian Institute of Technology Roorkee, India

3:30-3:45 Optimal Multi-Level Monte-Carlo Method for a System of Stochastic PDEs
Leila Taghizadeh, Amirreza Khodadadian, and Caroline Geiersbach, Vienna University of Technology, Austria; Clemens F. Heitzinger, Arizona State University, USA and Vienna University of Technology, Austria

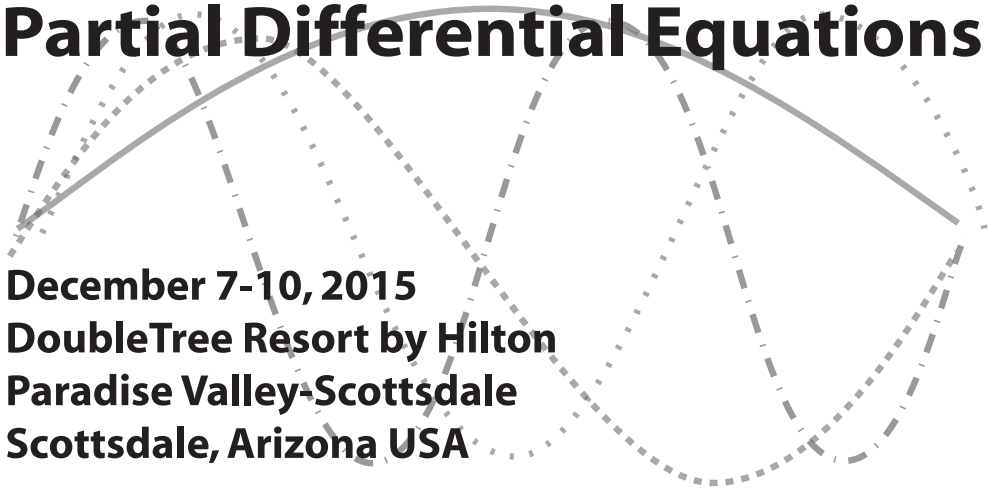
3:50-4:05 Analytical Results for Stress and Particle Velocity on Impact Problems in Elastic Layered Media
Ani P. Velo, University of San Diego, USA; George Gazonas, Army Research Office, USA

4:10-4:25 Liouville SLE Boundaries on CFT Torus Defined with Scholastic Schrödinger Equation.
Scott M. Little, Northcentral University, USA; Dan Cervo, Yavapai College, USA

PD15 Abstracts

SIAM Conference on

Analysis of Partial Differential Equations



December 7-10, 2015
DoubleTree Resort by Hilton
Paradise Valley-Scottsdale
Scottsdale, Arizona USA

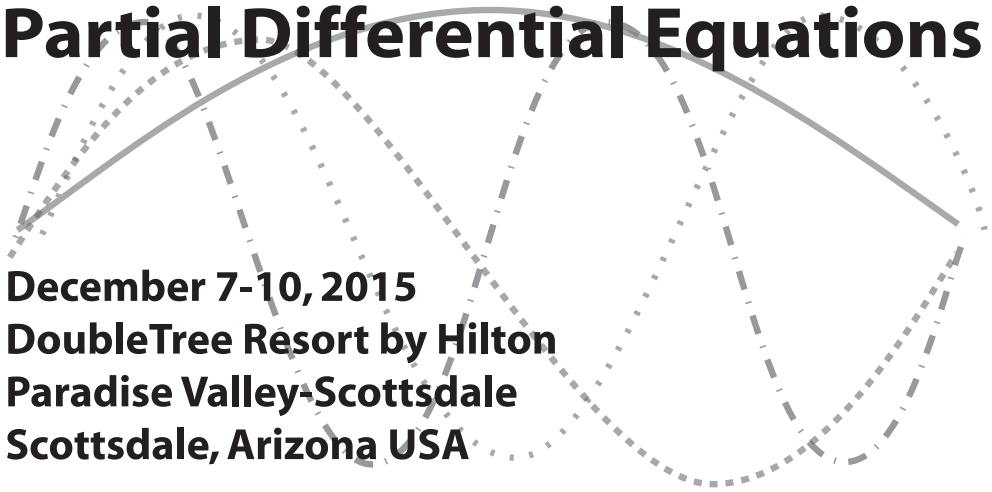
Abstracts are printed as submitted by the authors.

Notes

PD15 Organizer and Speaker Index

SIAM Conference on

Analysis of Partial Differential Equations



December 7-10, 2015
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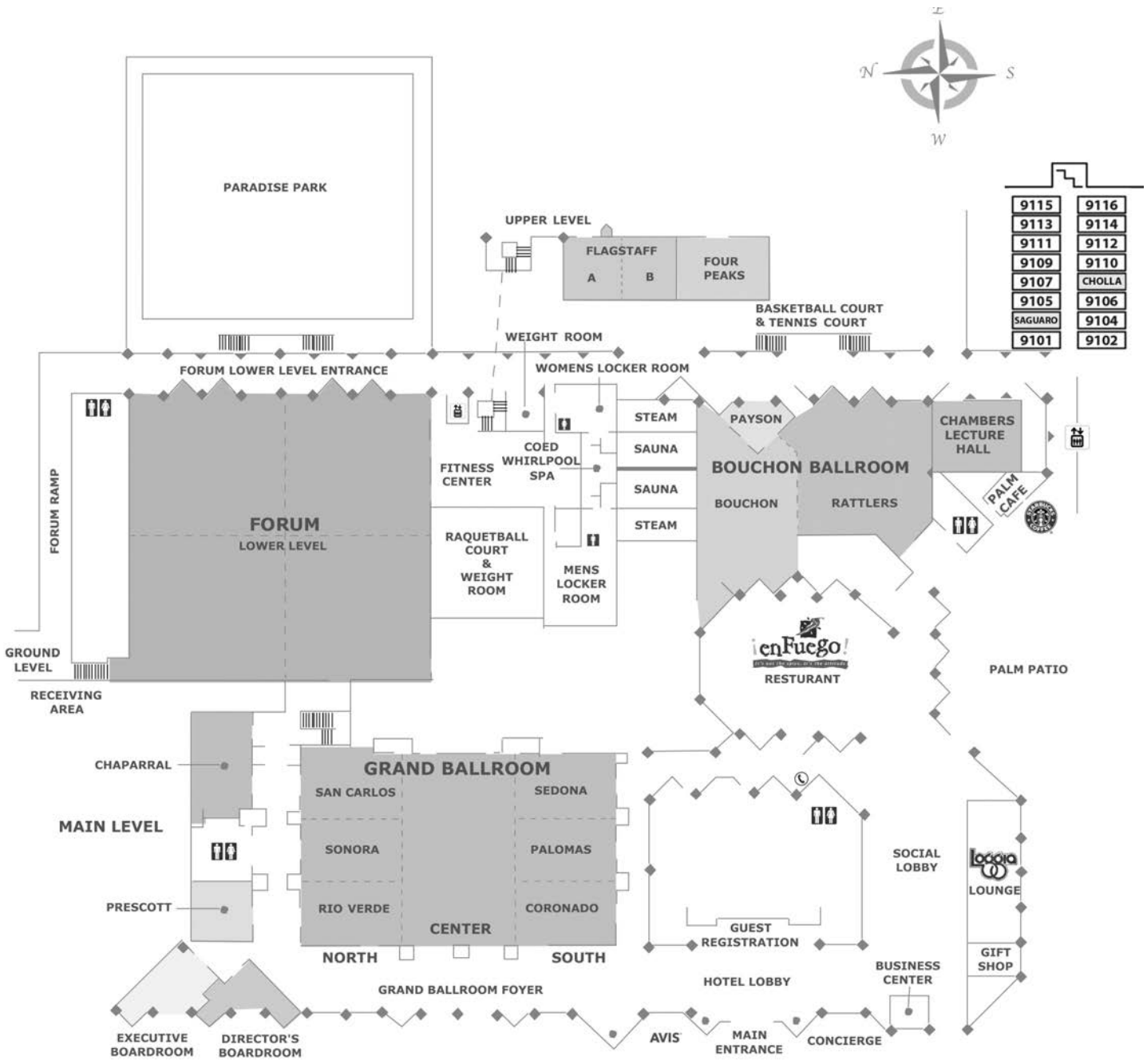
PD15 Conference Budget

Conference Budget
SIAM Conference on Analysis of Partial Differential Equations
December 7-10, 2015
Scottsdale, Arizona

Expected Paid Attendance		370	
Revenue			
Registration Income			$126,880
	Total		$126,880
Expenses			
Printing			$3,300
Organizing Committee			$3,800
Invited Speakers			$11,250
Food and Beverage			$25,036
AV Equipment and Telecommunication			$27,200
Advertising			$5,000
Conference Labor (including benefits)			$51,793
Other (supplies, staff travel, freight, misc.)			$9,600
Administrative			$14,540
Accounting/Distribution & Shipping			$7,753
Information Systems			$13,979
Customer Service			$5,280
Marketing			$8,293
Office Space (Building)			$5,245
Other SIAM Services			$5,540
	Total		$197,609
Net Conference Expense			($70,729)
Support Provided by SIAM			$70,729
			$0
Estimated Support for Travel Awards not included above:			
Early Career and Students		34	$24,300

DoubleTree Resort, Scottsdale Floor Plan



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