

**2018 SIAM Louisiana-Texas Section Conference**  
**Baton Rouge, Louisiana**  
**October 5–7, 2018**

**Schedule of talks on Saturday, October 6, 2018**

07:30–12:00 **Registration**

08:00–10:00 **Numerical geometric PDE, Session 1, Room: Lockett 239**

Organizers: Alan Demlow, Shawn Walker

08:00–08:25 Shawn Walker: A mixed finite element method for 4th order elliptic problems on surfaces

08:30–08:55 Alan Demlow: A posteriori error estimates for the Laplace-Beltrami operator on parametric surfaces

09:00–09:25 Justin Owen: FEM approximation of eigenvalue problems on surfaces

09:30–09:55 Vladimir Yushutin: A finite element method for surface Navier-Stokes flows

08:00–10:00 **Nonlinear modeling of disease dynamics, Room: Lockett 276**

Organizers: Kun Gou, Md Rafiul Islam, Tamer Oraby

08:00–08:25 Tamer Oraby: Modeling an outbreak of the Middle East respiratory syndrome in a hospital

08:30–08:55 Rafiul Islam: Mathematical modeling of an infectious disease and identification of its dominant transmission pathways

09:00–09:25 Mondal Hasan Zahid: Ebola: Impact of hospital's admission policy in an overwhelmed scenario

09:30–09:55 Kun Gou: Nonlinear tubular organ deformation analysis for airway swelling

08:00–10:00 **Image processing algorithms: progress and challenges, Session 1, Room: Lockett 277**

Organizer: Hyongsu Baek

08:00–08:25 Hyongsu Baek: Anisotropic angle smoothing algorithm for 3D dip estimation

08:30–08:55 Xinming Wu: Automatic fault interpretation with optimal surface voting

09:00–09:25 Houzhu Zhang: A robust optical flow algorithm for computing wave propagation direction

09:30–09:55 Sergey Fomel: Seismic data matching

08:00–10:00 **Mathematical and computational aspects of fracture, Session 1, Room: Lockett 284**

Organizers: Blaise Bourdin, Robert Lipton

08:00–08:25 Egor Dontsov: Hydraulic fracture regimes and their applications

08:30–08:55 Greg Rodin: Smooth and rough growing three-dimensional cracks

09:00–09:25 Yuri Antipov: Subsonic penetration of a thin rigid body into an elastic medium with crack-like cavities ahead and behind the body

09:30–09:55 Prashant Jha: Convergence results for finite element and finite difference approximation of nonlocal fracture models

08:00–10:00 **Imaging and inverse problems, Session 1, Room: Lockett 285**  
 Organizer: Tan Bui-Thanh

08:00–08:25 Iona Ambartsumyan: Bayesian inversion of fault properties in two-phase flow in fractured media

08:30–08:55 Hejun Zhu: Seismic modeling and imaging in elastic and viscoacoustic media

09:00–09:25 Siddhant Wahal: Efficiently evaluating rare event probabilities

09:30–09:55 Alexander V. Mamonov: Imaging and multiple removal via model order reduction

08:00–10:00 **Nonlinear conservation laws and applications, Session 1, Room: Lockett 243**  
 Organizers: Kun Zhao, Yanni Zeng

08:00–08:25 Charis Tsikkou: On similarity flows for the compressible Euler system

08:30–08:55 Tien Khai Nguyen: Recent results on Kolmogorov entropy compactness estimates for conservation laws

09:00–09:25 Changhui Tan: Global regularity for Burgers equation with density dependent fractional dissipation

09:30–09:55 Siran Li: Compensated compactness, (isometric) immersions and elasticity

10:00–10:30 **Coffee break, Room: Math Department Lounge in 3rd floor of Lockett Hall**

10:30–11:30 **Plenary lecture, Room: 100 Dodson Hall**  
 Suncica Canic: Mathematical Methods for Next Generation Stent Design

11:30–01:00 **Lunch, Room: Math Department Lounge in 3rd floor of Lockett Hall**

01:00–03:00 **Numerical geometric PDE, Session 2, Room: Lockett 239**  
 Organizers: Alan Demlow, Shawn Walker

01:00–01:25 Ari Stern: Hybrid methods for geometric PDEs

01:30–01:55 Martin Licht: Geometric transformations of finite element methods

02:00–02:25 Johnny Guzman: Exact smoothed piecewise polynomial sequences on Alfeld splits

02:30–02:55 Andrea Bonito: Numerical methods for bilayer plate models

01:00–03:00 **Mathematical modeling in ecology and epidemiology, Session 1, Room: Lockett 276**  
 Organizers: Hayriye Gulbudak, Mac Hyman

01:00–01:25 Scott A McKinley: Resource-driven encounters among consumers and the implications for the spread of disease

01:30–01:55 Cameron Browne: Network model for ecology of virus and immune response during HIV infection

02:00–02:25 Xiang-Sheng Wang: Viral dynamics revisited: partial degeneracy and spatial heterogeneity

02:30–02:55 Aadrita Nandi: Effects of host infectivity and susceptibility on disease emergence in stochastic multigroup models with applications to emerging and re-emerging infectious diseases

01:00–03:00 **Spectral theory of differential operators, Session 1, Room: Lockett 284**  
 Organizer: Stephen Shipman  
 01:00–01:25 Gregory Berkolaiko: Nodal count distribution of graph eigenfunctions  
 01:30–01:55 Minh Kha: On Liouville-Riemann-Roch theorems  
 02:00–02:25 Wen Liu: Quotient of a quantum graph by a representation of its symmetry group  
 02:30–02:55 Stephen Fulling: Spectral analysis in renormalization

01:00–03:00 **Imaging and inverse problems, Session 2, Room: Lockett 285**  
 Organizer: Tan Bui-Thanh  
 01:00–01:25 Brad Marvin: A scalable approach to the consistent bayesian method  
 01:30–01:55 Wei Li: A hybrid inverse problem in the fluorescence ultrasound modulated optical tomography in the diffusive regime  
 02:00–02:25 Tan Bui-Thanh: A data-scalable randomized misfit approach for solving large-scale PDE-constrained inverse problems  
 02:30–02:55 No talk

01:00–03:00 **Models and methods in biology and physics: from the stochastic to the continuum, Session 1, Room: Lockett 241**  
 Organizer: William Ott  
 01:00–01:25 William Ott: Impact of delay on the dynamics of biophysical systems  
 01:30–01:55 James Winkle: Continuum modeling of bacterial growth in confined environments: Stochastic interactions and nematic ordering  
 02:00–02:25 Ilya Timofeyev: Application of large deviations to genetic evolution of bacterial populations  
 02:30–02:55 Duc Truong: Cell assembly detection and low dimensional dynamics extraction for hippocampal calcium imaging data

01:00–03:00 **Nonlinear partial differential equations and applications, Session 1, Room: Lockett 243**  
 Organizers: Karthik Adimurthi, Phuc Cong Nguyen  
 01:00–01:25 Jinping Zhuge: Periodic homogenization of quasilinear elliptic equations  
 01:30–01:55 Ralph Saxton: Delta Shock Formation in the  $N \times N$  Keyfitz and Kranzer System  
 02:00–02:25 Ariel Barton: Boundary value problems for higher order elliptic differential equations  
 02:30–02:55 John Villavert: Qualitative analysis of equations associated to sharp Hardy-Sobolev and Caffarelli-Kohn-Nirenberg inequalities

03:00–3:30 **Coffee break, Room: Math Department Lounge in 3rd floor of Lockett Hall**

03:30–05:30	<b>Computational methods for waves in complex media, Session 1,</b> <b>Room: Lockett 239</b> Organizers: Wei Cai, Tom Hagstrom
03:30–03:55	Wei Cai: Fast kernel matrix compression techniques for wave scattering in inhomogeneous media
04:00–04:25	Adrianna Gillman: A fast direct solver for scattering problems in quasi-periodic layered medium Helmholtz problems
04:30–04:55	Jingmei Qiu: High order semi-implicit IMEX WENO scheme for the Euler system with all-Mach number
05:00–05:25	Bo Wang: Efficient numerical simulation of spherical cloaking in time domain

03:30–05:30	<b>Modeling, analysis, and computation in mathematical biology,</b> <b>Room: Lockett 276</b> Organizer: Xiang-Sheng Wang
03:30–03:55	Jun Liu: Optimal control of a continuously size-structured model for the growth and treatment of metastatic cancer
04:00–04:25	Masud Rana: Spatially heterogeneous producer-grazer model subject to stoichiometric constraints
04:30–04:55	Jaeyoun Oh: An adaptive MFS for the Laplace equation in 2D and 3D
05:00–05:25	Zhifu Xie: A diffusive prey-predator model with Alee effect in predator

03:30–05:30	<b>Image processing algorithms: progress and challenges, Session 2,</b> <b>Room: Lockett 277</b> Organizer: Hyoungsu Baek
03:30–03:55	Hyoungsu Baek: Computational challenges for generating balanced images
04:00–04:25	Xinming Wu: Seismic volumetric unfaulting and flattening
04:30–04:55	No talk
05:00–05:25	No talk

03:30–05:30	<b>High-order accurate numerical methods for multi-physics problems,</b> <b>Room: Lockett 284</b> Organizer: Longfei Li
03:30–03:55	Yue Yu: Error estimates for immersogeometric methods with application to bioprosthetic heart valves
04:00–04:25	Dan Serino: A stable added-mass partitioned (AMP) algorithm for elastic solids and incompressible flows
04:30–04:55	Andre Ganesini Odu: High-Order accurate conservative finite difference methods for Vlasov equations in 2D+2V
05:00–05:25	Annalisa Quaini: A Higher-order DG/ALE partitioned approach to solving fluid-structure interaction problems

03:30–06:00 **Numerical approximation of fractional differential equations, Session 1, Room: Lockett 285**

Organizers: Andrea Bonito, Robert Lipton

- 03:30–03:55 Joe Pasciak: Rational approximations to functions involving fractional powers of elliptic operators
- 04:00–04:25 Abner Salgado: Finite element approximation of an obstacle problem for a class of integro-differential operators
- 04:30–04:55 Xiaochuan Tian: Consistent traction boundary conditions for nonlocal models
- 05:00–05:25 Zhiping Mao: Fractional phase field crystal modelling
- 05:30–05:55 Wenbo Li: Computation of fractional minimal graphs

03:30–05:30 **Numerical PDE/ODE and HPC applications, Session 1, Room: Lockett 241**

Organizer: Don Liu

- 03:30–03:55 Don Liu: Numerical studies of complex two phase flow and convective heat transfer
- 04:00–04:25 Sheng Xu: Some recent development of the immersed interface method for flow simulation
- 04:30–04:55 Xiaoliang Wan: Dynamic-solver-consistent minimum action method for Navier-Stokes equations
- 05:00–05:25 No talk

03:30–05:30 **Nonlinear partial differential equations and applications, Session 2, Room: Lockett 243**

Organizers: Karthik Adimurthi, Phuc Cong Nguyen

- 03:30–03:55 Tadele Mengesha: A Potential space estimate for solutions of system of coupled nonlocal equations
- 04:00–04:25 Dat Cao: Quasilinear elliptic equations with weights
- 04:30–04:55 Jiuyi Zhu: Quantitative uniqueness of partial differential equations
- 05:00–05:25 Karthik Adimurthi: A unified approach to parabolic quasilinear equations

05:40–07:00 **Poster session and snacks, Location: 2nd floor of Lockett Hall**

## Schedule of talks on Sunday, October 7, 2018

07:30–12:00 **Registration**

08:00–10:00 **Computational methods for waves in complex media, Session 2,  
Room: Lockett 239**

Organizers: Wei Cai, Tom Hagstrom

08:00–08:25 Jesse Chan: Bernstein-Bezier weight-adjusted discontinuous Galerkin methods for wave propagation in heterogeneous media

08:30–08:55 Minh Binh Tran: Iterative solvers for discontinuous Galerkin methods

09:00–09:25 Alex Mamonov: Multi-scale S-fraction reduced-order models for massive wavefield simulations

09:30–09:55 John Lagrone: Microdynamics in regularized Brinkman flow

08:00–10:00 **Mathematical modeling in ecology and epidemiology, Session 2,  
Room: Lockett 276**

Organizers: Hayriye Gulbudak, Mac Hyman

08:00–08:25 Hayriye Gulbudak: Two-strain multi-scale dengue model structured by dynamic host antibody level

08:30–08:55 Mac Hyman: An Agent Based Model for the Transmission of Chlamydia through a Heterosexual Network Embedded in Social Network

09:00–09:25 Li Guan: Effects of Distribution for the Time-Since-Infection and Risk Change on a Vector-Borne Model

09:30–09:55 Melanie Jensen: Antibody-mediated immobilization of virions in mucus

08:00–10:00 **Mathematics in oil and gas exploration and production, Session 1,  
Room: Lockett 277**

Organizers: Ipsita Gupta, Monika Valjak

08:00–08:25 Monika Valjak and Francisco Correa Mora: Geostatistic modeling applications in deepwater Gulf of Mexico reservoirs

08:30–08:55 Yanfen Zhang and Hemant Phale: Ensemble-based methods for history matching and production optimization

09:00–09:25 Hope Asala: Gas flow in non-Newtonian drilling fluids - A CFD approach

09:30–09:55 Andreas Michael: Orientation of hydraulic fracture initiation from horizontal wellbores: An analytical and numerical Study

08:00–10:00 **Mathematical and computational aspects of fracture, Session 2,  
Room: Lockett 284**

Organizers: Blaise Bourdin, Robert Lipton

08:00–08:25 Xiaochuan Tian: Coupling methods of nonlocal and local models

08:30–08:55 Masoud Behzadinasab, John T. Foster: A peridynamics study of predicting ductile fracture in additively manufactured metal

09:00–09:25 Blaise Bourdin: Crack nucleation in variational phase-field models of fracture

09:30–09:55 James Scott: The Dirichlet problem for a nonlocal system of equations related to peridynamics

08:00–10:00 **Numerical approximation of fractional differential equations, Session 2, Room: Lockett 285**  
 Organizers: Andrea Bonito, Robert Lipton

08:00–08:25 Jie Shen: Log orthogonal functions and their applications to fractional PDEs

08:30–08:55 Peng Wei: Numerical approximation of time dependent advection fractional diffusion systems

09:00–09:25 Juan Pablo Borthagaray: Weighted Sobolev regularity and rate of approximation of the fractional obstacle problem

09:30–09:55 Harbir Antil: Sobolev spaces with non-Muckenhoupt weights, fractional elliptic operators, and applications

08:00–10:00 **Models and methods in biology and physics: from the stochastic to the continuum, Session 2, Room: Lockett 241**  
 Organizer: William Ott

08:00–08:25 Swati Patel: Feedbacks between ecology and evolution affect coexistence of different species

08:30–08:55 Bhargav Karamched: Moran models of spatial alignment in microbial colonies

09:00–09:25 Mehdi Sadeghpour: Bayesian parameter inference for models of microbial consortia

09:30–09:55 Xi Chen: Consistency of non-parameteric estimation of drift and diffusion coefficients in SDEs from stationary time-series

08:00–10:00 **Nonlinear conservation laws and applications, Session 2, Room: Lockett 243**  
 Organizers: Kun Zhao, Yanni Zeng

08:00–08:25 Yanni Zeng: Recent results for the logarithmic Keller-Segel-Fisher/KPP system

08:30–08:55 Geng Chen: BV existence or blowup for p-system?

09:00–09:25 Xukai Yan: (-1)-homogeneous solutions of stationary incompressible Navier-Stokes equations with singular rays

09:30–09:55 Tong Wu: A new approach for designing moving-water equilibria preserving schemes for the shallow water equations

10:00–10:30 **Coffee break, Room: Math Department Lounge in 3rd floor of Lockett Hall**

10:30–11:30 **Plenary lecture, Room: 100 Dodson Hall**  
 Todd Arbogast: Mixed Methods for Two-Phase Darcy-Stokes Mixtures of Partially Melted Materials with Regions of Zero Porosity

11:30–01:00 **Lunch, Room: Math Department Lounge in 3rd floor of Lockett Hall**

- 01:00–03:00 **Numerical geometric PDE, Session 3, Room: Lockett 239**  
Organizers: Alan Demlow, Shawn Walker
- 01:00–01:25 Juan Pablo Borthagaray: Q-tensor model for nematic liquid crystals with variable degree of orientation
- 01:30–01:55 Alexander Zhiliakov: Generalized Approximate Static Condensation Method for a Heterogeneous Multi-Material Diffusion Problem
- 02:00–02:25 Harbir Antil: Optimal control of grain boundary motions
- 02:30–02:55 Wenbo Li: Pointwise error estimates for a two-scale method for the Monge-Ampère equation

- 01:00–03:00 **Mathematics in oil and gas exploration and production, Session 2, Room: Lockett 277**  
Organizers: Ipsita Gupta, Monika Valjak
- 01:00–01:25 Mayank Tyagi and Sultan Anbar: Statistical estimation and machine learning of proppant and gravel packs petrophysical properties from pore scale simulations
- 01:30–01:55 Wenbo Zhu: Cognitive machine monitoring: industrial monitoring systems using machine learning and deep learning approaches
- 02:00–02:25 Xuan Liao and Mayank Tyagi: Data driven modeling and predictive analytics for waterflooding operations using reservoir simulations
- 02:30–02:55 Jorge Chebeir: Artificial neural networks for unconventional reservoirs production and supply chain optimization

- 01:00–03:00 **Spectral theory of differential operators, Session 2, Room: Lockett 284**  
Organizer: Stephen Shipman
- 01:00–01:25 Vu Hoang: Quantitative bounds versus weakly coupled states for generalized Schrödinger operators
- 01:30–01:55 Isaac Michael: Birman-Hardy-Rellich-type inequalities and refinements
- 02:00–02:25 Giles Auchmuty: Construction of orthogonal eigenfunction bases of Hilbert-Sobolev spaces
- 02:30–02:55 Robert Lipton: Analytic continuation of bilinear forms and spectra of divergence form operators for composite media.

- 01:00–03:00 **Numerical PDE/ODE and HPC applications, Session 2, Room: Lockett 241**  
Organizer: Don Liu
- 01:00–01:25 Lisa M. Kuhn: Modified spline basis functions for simulating PDE systems using the finite element method
- 01:30–01:55 Ning (Michael) Zhang: Immersed boundary method in coastal hydraulic modeling
- 02:00–02:25 Steele Russell: Exploiting parallelisms in grid world navigation task to reduce training latency via high performance computing techniques
- 02:30–02:55 No talk