

2018 Inverse Problems Symposium

<https://inverseproblems2018.org/>

June 3–5, 2018

Kellogg Hotel & Conference Center
Michigan State University



Sponsors:



Department of
Statistics &
Probability

**MECHANICAL
ENGINEERING**
AT MICHIGAN STATE UNIVERSITY

MICHIGAN STATE UNIVERSITY
DEPARTMENT OF
MATHEMATICS



Symposium Program

SUNDAY, June 3 – TUTORIALS (Room 105 AB)

- 15:30 **Part 1: A theoretical upper limit for sensitivity coefficients in parameter estimation and complementary transient experiments** (Filippo de Monte)
- 16:30 Break
- 16:45 **Part 2: Estimating Two Heat-Conduction Parameters from Two Complementary Transient Experiments** (Robert L. McMasters)
- 18:00 Informal Dinner (pay on your own) at Brody Square, across from Kellogg Center

MONDAY, June 4 – Oral Presentations and Posters (Room 105 AB)

- 7:30 Registration and Continental Breakfast, Room 105AB
- 8:00 Welcome: Darrell Donahue, Chair, Biosystems & Agricultural Engineering, Room 105AB
- 8:10 Kick-off: Kirk Dolan, Room 105AB
- 8:15 **KEYNOTE: Database of Exact Solutions and Applications in Diffusion** (Kevin Cole)

Session 1: Theory and Methods

Session Co-Chairs: Bob McMasters, Kevin Dowding

- 9:00 **On the Parameter Identification Problem** (Nilson Costa Roberty)
- 9:20 **Optimization Methods for the Elastography Inverse Problem** (Baasansuren Jadamba)
- 9:40 **Optimal Combinations of Tikhonov Regularization Orders for IHCPs** (Forooza Samadi and Keith A. Woodbury)
- 10:00 **Next Generation Approaches to Exponential Analysis** (Thomas Chuna, Zhiyi Su, Lalita Udpa, and Antonello Tamburrino)
- 10:20 Break

Session 2: Heat Transfer, Applied Mechanics, Controls

Session Co-Chairs: Keith Woodbury, Fabio Bozzoli

- 10:40 **Multi-dimensional Parameter Estimation Utilizing Generalized Heat Conduction Solutions** (James V. Beck)
- 11:00 **Retrieving Thermal Diffusivity of an Anisotropic Material** (Arkadiusz Ryfa, Wojciech Adamczyk, Ziemowit Ostrowski, and Zbigniew Buliński)
- 11:20 **Development of Correlation for the Heat Transfer Coefficient for an Array of Water Jets** (Arkadiusz Ryfa, Marek Rojczyk, and Wojciech Adamczyk)
- 11:40 **Estimation of the Local Space and Time Varying Heat Flux Inside a Pulsating Heat Pipe by the Tikhonov Regularisation Method** (Luca Cattani, Fabio Bozzoli, and Sara Rainieri)
- 12:00 Lunch (Room: Centennial ABC)
- 13:00 **Parametric Identification of a Mathieu Equation with a Constant Load** (Ayse Sapmaz, Brian Feeny)

Session 3: Nondestructive Evaluation

Session Chair: Renfu Lu

- 13:20 **Solving Inverse Eddy Current Testing Problems using Subregion Finite Element Method** (Mohammad R. Rawashdeh, Zhiyi Su, Anton Efremov, Swathi Ramesh, Anders Rosell, Lalita Udpa, S. Ratnajeevan H. Hoole, and Yiming Deng)
- 13:40 **A Stepwise Method for Estimating Optical Properties of Two-Layer Turbid Media from Spatial-Frequency Domain Reflectance** (Dong Hu, Renfu Lu, and Yibin Ying)

Session 4: Tomography and Inverse Scattering

Session Co-Chairs: Yang Yang, Rongrong Wang

- 14:00 **Low Frequency Extrapolation with Deep Learning** (Hongyu Sun and Laurent Demanet)
- 14:20 **Full Waveform Inversion with Optimal Transport** (Lingyun Qiu)
- 14:40 **Linear Sampling Method for a Terminating Waveguide** (Liliana Borcea, Fioralba Cakoni, and Shixu Meng)
- 15:00 **Truncated Spectral Regularization for an Ill-Posed Non-linear Parabolic Problem: A Revisit** (Ajoy Jana and M. Thamban Nair)
- 15:20 Announcements for IPS 2019 (Purdue--Mishra) and ICIPE 2020 (Italy--deMonte)
- 15:30 Break

Session 5: Poster Session (15:45 –17:00)

Session Chair: Brian Feeny

1. **Spectral Unmixing of the Native Endogenous Fluorophores of Unstained Tissues Using Multimodal Nonlinear Optical Imaging and Comparison of Inverse Problem Solving Methods** (Gabrielle A. Murashova, Dirk Colbry, and Marcos Dantus)
2. **Application of Gompertz Growth Model to Study the Effect of Silver Nanocomposite Films on Shelf Life Chicken Breast** (Garima Khardwal, Vinni Thekkudan Novi, Kirk Dolan)
3. **Hydrolytic Degradation of Poly(lactic acid) in Water Solutions Below and Above Glass transition temperature** (Limsukon Wanwarang, Woranit Muangmala, Rafael Auras, Kirk Dolan, and Susan Selke)
4. **Modeling of Biodegradation Kinetics of Poly(lactic acid) Nanocomposites During Simulated Composting** (Pooja Mayekar, Rafael Auras, Kirk Dolan, and Susan Selke)
5. **Parameter Estimations for Enthalpy Relaxation of Polylactide** (Uruchaya Sonchaeng, Rafael Auras, Susan Selke, and Kirk Dolan)
6. **Inverse Method to Estimate Parameters of Adsorption Equilibrium for Removal of a Heavy Metal from Aqueous Solution** (Zhao Li, Zi-Wei Wang, Kirk Dolan, and Muhammad Rabnawaz)
7. **Estimating *Salmonella* Inactivation Kinetics for High Temperature, Short-Time Experiments That Do Not Reach Isothermal Temperatures** (Kaitlyn Casulli and Kirk Dolan)
8. **Complex Modal Analysis of Swimming Motion of Carangiform Fish** (M. Tanha, B.F. Feeny)

- 17:00 Break
- 18:00 Social Time (Room: Centennial ABC)
- 19:00 **Symposium Banquet** ((Room: Centennial ABC)
- 19:45 **Banquet Speaker: Dirk Colbry**
Do More, Faster: Utilizing Advanced Computing Hardware

TUESDAY, June 5 – Oral Presentations (Room 105 AB)

- 8:00 Continental Breakfast
- 8:35 **KEYNOTE: Inverse Problems are More Than Mathematics** (Dan Segalman)

Session 6: Analysis of Actual Experimental Data

Session Co-Chairs: Neil Wright, James Beck

- 9:20 **Parameter Estimation Involving Droplets on Flat and Cylindrical Non-Wettable Surfaces**
(Mehran Abolghasemibizaki, Connor J. Robertson, Christian P. Fergusson, Robert L. McMasters, and Reza Mohammadi)
- 9:40 **Parameter Estimation to Model Virus Persistence** (Kara Dean)
- 10:00 **High-Solids Batch Anaerobic Digestion of Zoological Organic Waste: Estimation of Performance Parameters to Improve Digester Design and Operating Efficiency** (Gina Masell Haylett and Dana Kirk)
- 10:20 **Optimizing Shear Wave Parameters in Viscoelastic Ultrasound Shear Wave Phantoms**
(Luke M. Wiseman, Matthew W. Urban, Yiqun Yang, and Robert J. McGough)
- 10:40 Break

Session 7: Bioengineering

Session Co-Chairs: Dharmendra Mishra, Pawan Takhar

- 11:00 **Hybrid Mixture Theory Based Modeling of Unsaturated Transport in Food Biopolymers**
(Ying Zhao and Pawan Takhar)
- 11:20 **Estimation of Thermal Diffusivity of Heaters for Food Processing Applications using Inverse Method** (Halak Mehta, Michael Varney, James V. Beck, and Dharmendra K. Mishra)
- 11:40 **Inverse Estimation of Fluid to Particle Heat Transfer Coefficient in Aseptic Processing** (James Chapa, Halak Mehta, and Dharmendra Mishra)
- 12:00 Lunch (Room: Centennial ABC)
- 13:20 **Modeling the Thermal Resistance of *Salmonella* in Almond Meal** (Philip J. Steinbrunner, Nurul H. Ahmad, Sanghyup Jeong, and Bradley P. Marks)
- 13:40 **Modeling Tissue Temperature During Cryolipolysis – CoolSculpting Fat Reduction** (Neil T. Wright)
- 14:00 Closing Remarks