

2010 Inverse Problems Symposium

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June 6-8, 2010 Michigan State University, Kellogg Hotel & Conference Center



Conference Chairperson: Kirk Dolan, Michigan State University
Conf. Co-Chairperson: Jongeun Choi, Michigan State University
Conf. Co-Chairperson: Cara Brooks, Rose-Hulman Institute of Technology
Honorary Chairperson: James V. Beck, Professor Emeritus, Michigan State University

Sponsors:

National Science Foundation (Thermal Transport Processes Program)

Department of Mechanical Engineering, MSU

Center for Systems Biology, MSU

U.S. Department of Agriculture

COMSOL

Preconference program

Sunday, June 6, 2010 Tutorial-Room 103AB.

Tutorial: Survey of Parameter Estimation

15:00-16:20 James Beck, Emeritus Professor, Michigan State University

16:20-16:30 Break

16:30-16:50 Bob McMasters, Mechanical Engineering, Virginia Military Institute

16:50-17:10 Seungik Baek, Mechanical Engineering, Michigan State University

17:10-17:30 Kevin Cole, Mechanical Engineering, University of Nebraska, Lincoln

Monday, June 7, 2010

- 8:00 **BREAKFAST-KELLOGG CENTER-Room 103AB**
- 8:30 **Greetings** Alejandro Diaz, *Chairperson, Mechanical Engineering, Michigan State University*
- 8:40 **Keynote Speaker:** Douglas E. Adams: "Inverse Problems in Alternative Energy: Discovering the Winds of Change"
- Session 1-Room 103AB Nondestructive Evaluation
Co-Chairs: Jung-Wuk Hong and Nizar Lajnef
- 9:25 **Estimation of Center of Gravity Using Forced Vibration Response Operational Data**
Joshua J. Cummins, Douglas E. Adams
- 9:45 **Measurement of the Electromagnetic Properties of Biaxial Anisotropic Materials using a Waveguide Technique** Benjamin R. Crowgey, Raoul O. Ouedraogo, Edward J. Rothwell, Leo C. Kempel, Shanker Balasubramaniam
- 10:05 **Parameter Estimation for Wavelet Transformed Ultrasonic Signals**
Andrew P. White, Jongeun Choi, Jung-Wuk Hong
- 10:25 **Damage Assessment Using Hyperchaotic Excitation and State Space Geometry Changes**
Shahab Torkamani, Eric A. Butcher
- 10:45 **BREAK**
- Session 2-Room 103AB Heat Transfer I
Co-Chairs: Robert McMasters and Ben Blackwell
- 11:00 **Filter IHCP Three-Dimensional Solution for Large Flat Plates and Small to Moderate Dimensionless Times** James V. Beck
- 11:20 **A Comparison of Extended Kalman Filter, Extended Information Filter, and Least Squares Approaches for Parameter Identification of a Transient Heat Transfer Problem**
Mike Myers, Ariosto Jorge, Greg Walker, Mark Mutton
- 11:40 **Estimation of Soil and Grout Thermal Properties through Geothermal Response Test**
Fabio Bozzoli, Linda Schiavi, Sara Rainieri, Giorgio Pagliarini
- 12:10 **LUNCH-KELLOGG CENTER- RED CEDAR A**
- Session 3-Room 103AB: Applied Inverse Problems
Co-Chairs: Nikolai Priezjev and Kevin Cole
- 13:20 **Real-time Identification of Human Finger Impedance for Haptic Rendering**
John W. Gregory, Ning Xi, Yantao Shen
- 13:40 **Soot Aggregate Sizing through Inverse Analysis of Light Scattering Data**
Kyle J. Daun, David W. Burr
- 14:00 **Application of Taguchi Method to Determine Exact Thicknesses of a Stacked Dielectric Bandstop Filter** Pavel Roy Paladhi, Jose Hejase, Chad Gardner, Collin Meierbachtol, Prem Chahal
- 14:20 **Design of Photonic Crystal Wave Guide for Light Confinement in Carbon Nanotube based Infrared Sensors** Jianyong Lou, Ning Xi, Carmen Kar Man Fung, Zhengfang Zhou, King Wai Chiu Lai
- 14:40 **BREAK**
- Session 4-Room 103AB Optimal Design of Experiments
Co-Chairs: Kyle Daun and Jinglu Tan
- 14:55 **An Application of Rician Cramer-Rao Lower Bound for Optimizing Gradient Schemes in Diffusion Tensor Imaging** Shantanu Majumdar, David C. Zhu, Satish S. Udpa, L. Guy Raguin
- 15:15 **Bayesian Design for Minimal Forecast Uncertainties**
Mohamed R. Khodja, Michael D. Prange, Hugues A. Djikpesse
- 15:35 **Identification of Switched Linear Systems and Recurrent-Pulse Excitation** Ya Guo, Jinglu Tan

15:55 **Optimal Thermocouple Location in Materials Processing Experiments through Fisher Information Analysis** Badri Ratnam, Kyle Daun, Mary Wells

16:15-17:15

Poster Session-Room 101
Session Chair: Jongeun Choi

1. **Inverse Algorithm Optimization For Determining Optical Properties of Biological Materials from Spatially-Resolved Diffuse Reflectance** Haiyan Cen, Renfu Lu, Kirk Dolan
2. **Inverse Prediction of Phase Change Banks in High Temperature Furnaces** Marc LeBreux, Martin Désilets, Marcel Lacroix
3. **Complex Modal Estimation of Wave Parameters in One-Dimensional Media** Brian Feeny
4. **Parameter Estimation in Heat Transfer and Elasticity using Trained POD-RBF Network Inverse Methods** Craig A. Rogers, Alain Kassab, Eduardo Divo, Z. Ostrowski, R.A. Bialecki
5. **Design of Antenna Structures for Carbon Nanotube based Infrared Sensors with the Consideration of Quantum Behaviors in Field Enhancement** Carmen Kar Man Fung, Ning Xi, Zhengfang Zhou, Balasubramaniam Shanker, Jianyong Lou, King Wai Chiu Lai
6. **Modal Decomposition Applied to Heat Conduction** Brian Feeny, Filippo de Monte, James V. Beck, Neil T. Wright
7. **Stress Crack Formation During Drying of Corn Kernels** Pawan Takhar, Srivikorn Dit-u-dompo
8. **Modeling Pasting Curves of Cornstarches Using Parameter Estimation Techniques** Rabiha Sulaiman, Kirk Dolan, James Steffe
9. **A Computational Fluid Dynamics (CFD) Model Intended for Fluid Flow Prediction Inside a Modified Atmosphere Packaging Container** Brajesh Tripathi, Rubino Maria, Rafeal Auras
10. **Error Analysis in Estimating Temperature-Dependent Thermal Diffusivity and Kinetic Parameters using Heat Penetration Data** Andrew Sommerlot, Dharmendra Mishra, Kirk Dolan
11. **Discriminating between Models of Thermal Change in Biological Materials** Neil T. Wright
12. **Sequential Estimation of Microbial Inactivation Kinetic Parameters for Nonisothermal Heating Processes** Dharmendra Mishra, Kirk Dolan
13. **Application of Time Reversal Techniques for Solution of Inverse Problems** S. Reyes-Rodriguez, N. Lei, L. Udpa, S.S. Udpa

18:30 Social Time **RED CEDAR B**

19:00 **SYMPOSIUM BANQUET-KELLOGG CENTER RED CEDAR B**

"Inverse Problems in Physics and Image Reconstruction in Positron Emission Tomography/Computed Tomography,"

20:00 **Banquet Speaker:** Kevin Berger, Assistant Professor of Radiology, Assistant Chair of Radiology, Dept. of Radiology, Michigan State University

Tuesday, June 8, 2010

- 8:00 **BREAKFAST-KELLOGG CENTER-ROOM 103AB**
- 8:30 **Keynote Speaker: Narendra Beliganur Using Comsol for Inverse Problems**
- Session 5-Room 103AB Heat Transfer II
 Co-Chairs: Keith Woodbury and Kevin Dowding
- 9:15 **Mixed Boundary Conditions in Heat Conduction**
 Filippo de Monte, James V. Beck
- 9:35 **Multi-Dimensional Inverse Heat Conduction Solutions Using a "Black Box" Direct Solver**
 Jonathan W. Woolley, Ben Blackwell, James V. Beck
- 9:55 *BREAK*
 Session 6-Room 103AB Mathematical Aspects of Inverse Problems
 Co-Chairs: Cara Brooks and Zhewei Dai
- 10:20 **Identifiability and Identification of Linear Time-Invariant Systems**
 Ya Guo, Jinglu Tan
- 10:40 **Inverse Identification of the Time-Varying Shape of a Phase Change Bank in a High Temperature Melting Furnace** Marc-André Marois, Martin Désilets, Marcel Lacroix
- 11:00 **A posteriori Parameter Selection for Local Regularization of Nonlinear Volterra Equations of Hammerstein Type** Cara Brooks
- 11:20 **On the Local Regularization Method for the Nonlinear Autoconvolution Problem**
 Zhewei Dai, Patricia Lamm
- 11:40 **LUNCH-KELLOGG CENTER-CENTENNIAL C**
 Session 7-Room 103AB Mechanics
 Co-Chairs: Brian Feeny and Seungik Baek
- 13:00 **An Energy Balance Approach for Oscillator Parameter Identification** Brian Mann
- 13:20 **Estimation of In Vivo Arterial Wall Thickness and Anisotropy: An Inverse Optimization Problem** Shahrokh Zeinali-Davarani, L. Guy Raguin, Seungik Baek
- 13:40 **Inverse problem for slip boundary conditions in nanoscale polymer films: A molecular dynamics simulation approach** Nikolai Priezjev
- 14:00 **Reduced Mass-Weighted Proper Decomposition of an Experimental Non-Uniform Beam**
 Rickey A. Caldwell, Brian F. Feeny
- 14:20 *BREAK*
 Session 8- Room 103AB Heat Transfer III
 Co-Chairs: Neil Wright and Filippo de Monte
- 14:40 **Selection of an inverse heat conduction solver for studying direct chill casting**
 Sebastien Bolduc, Laszlo Kiss
- 15:00 **Testing Multi-Layer Samples Using the Flash Diffusivity Method**
 Robert L. McMasters, Ralph B. Dinwiddie
- 15:20 **Temperature and Heat Flux Errors Associated with Thin Film Thermometry**
 Keith A. Woodbury, Jonathan W. Woolley, Kenneth H. Mahan
- 15:40 Critique Session Room 103AB
- 16:10 Closing Comments and Announcement of IPS 2012