PROGRAM
for
The IMACS WORLD CONGRESS on
Computational and Applied Mathematics & Applications in Science and Engineering.

ATHENS, GA
August 03-05, 2009

SUNDAY, August 02, 2009
06:00 – 07:00 REGISTRATION
05:00 – 07:00 RECEPTION

MONDAY, AUGUST 03, 2009
07:00 – 09:00 REGISTRATION
08:00 – 08:30 WELCOME, Masters Hall
Thiab R. Taha/Program Chair and Conference Coordinator
Robert Beauwens / IMACS President
Event Manager/Georgia Center

8:30 - 9:30 KEYNOTE LECTURE: Zdzislaw Jackiewicz, Masters Hall
Title: General Linear Methods for Ordinary Differential Equations
Chair: Robert Beauwens

09:30 – 10:00 COFFEE BREAK

10:00 - 12:00 SESSION 1, Masters Hall
Chair: Robert Beauwens
Title: Iterative methods in scientific computations

10:00 – 10:20 Speaker: Lydia Novozhilova, Sergei Urazhdin, John Lee
Title: Simulation and qualitative study of a coupled Landau-Lifshitz-Gilbert system with spin-transfer torque

10:20 – 10:40 Speaker: Mardochée Magolu monga Made
Title: On some strategies for improving parallel preconditionings

10:40 – 11:00 Speaker: Christina Christara and Jingrui Zhang
Title: A high performance method for the biharmonic Dirichlet problem on rectangles

11:00 – 11:20 Speaker: Mahmud A. Mehemed Abughalia
Title: New Technique to Solve Nonlinear Problems

11:20 – 11:40 Speaker: Robert Beauwens
Title: On the parallelization of approximate factorization preconditioners

11:40 – 12:00 Speaker: Enguo Gu
Title: Analysis on dynamical model in multi-agent fishery with partial agent cooperation
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<tr>
<th>Time</th>
<th>Session</th>
<th>Chair</th>
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<tbody>
<tr>
<td>10:00 - 12:00</td>
<td>SESSION 2, Room Q</td>
<td>Chair: Basem Atili</td>
<td>Title: Numerical methods for Differential and Differential Algebraic Systems</td>
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<tr>
<td>10:00 – 10:20</td>
<td>Speaker: Basem Atili</td>
<td>Title: Numerical Treatment of Differential Algebraic Systems of Index 2 Using the Hilber-Hughes-Taylor- (HHT-) Method</td>
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<tr>
<td>10:20 – 10:40</td>
<td>Speaker: Andriy Pototsky and Natalia Janson</td>
<td>Title: Synchronization of a large number of continuous one-dimensional stochastic elements with time delayed mean field coupling</td>
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<tr>
<td>10:40 – 11:00</td>
<td>Speaker: Luca Gerardo-Giorda</td>
<td>Title: Optimized Schwarz Methods for Maxwell's System</td>
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<td>11:00 – 11:20</td>
<td>Speaker: Dan Rusu</td>
<td>Title: Pattern Formation in Two-Dimensional Electrohydrodynamics</td>
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<tr>
<td>11:20 – 11:40</td>
<td>Speaker: Mohamed Gaith, Imad Al Hayek</td>
<td>Title: Correlation Between Overall Elastic Stiffness, Bulk Modulus and Interatomic Distance in Anisotropic Materials: Semiconductors</td>
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<tr>
<td>11:40 – 12:00</td>
<td>Speaker: Mukesh Kumar</td>
<td>Title: Parameter-Uniform Numerical Methods for Time Dependent Singularly Perturbed Reaction-Diffusion System</td>
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<td>10:00 - 12:00</td>
<td>SESSION 5, Room R</td>
<td>Chair: C. Kazanci, A. Sornborger and M. Adams.</td>
<td>Title: Mathematical and Computational Biology</td>
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<td>10:00 – 10:20</td>
<td>Speaker: Vassily Lyubetsky, Elena Zhizhina, Lev Rubanov</td>
<td>Title: Gibbs Field Approach for Evolutionary Analysis of Regulatory Signal of Gene Expression under Constraints on Secondary Structure</td>
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<td>10:20 – 10:40</td>
<td>Speaker: Enrique Arribas, Ramon Varon, Francisco Garcia-Sevilla</td>
<td>Title: wREFERASS: Rate Equations for Enzyme Reactions at Steady State under MS-Windows</td>
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<td>10:40 – 11:00</td>
<td>Speaker: Andrew Sornborger, Louis Tao</td>
<td>Title: Dimensional reduction of a visual cortical network model</td>
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<td>11:00 – 11:20</td>
<td>Speaker: Hassan Fathallah-Shaykh, Jerry Bona</td>
<td>Title: Mathematical Model of the Drosophila Circadian Clock: Loop Regulation and Transcriptional Integration</td>
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<td>11:20 – 11:40</td>
<td>Speaker: David Luper, John Schramski, Caner Kazanci, Hamid Arabnia</td>
<td>Title: Repetition and Homogeneity Buried in Complex Ecosystems: Using Pattern Recognition in Ecological Network Analysis</td>
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<td><strong>12:20 - 1:20</strong></td>
<td>LUNCH</td>
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| 1:30 – 2:30 | **KEYNOTE LECTURE:** Jack Dongarra, Masters Hall  
Title: An Overview of High Performance Computing and Challenges for the future  
Chair: Thiab Taha |
| 2:40 - 3:20 | **CONTRIBUTED PAPERS,** Masters Hall  
Chair: Andy Nonaka  
2:40 – 3:00  
Speaker: George Shu Heng Pau, Andy Nonaka  
Title: Reduced Basis Method for Nanodevices Simulation  
3:00 – 3:20  
Speaker: Abdallah Badr  
Title: Numerical solution of linear differential equations with fractional order |
| 2:40 - 3:20 | **CONTRIBUTED PAPERS,** Room Q  
Chair: S.M. Lee  
2:40 – 3:00  
Speaker: S.M. Lee, J.H. Park, H.Y. Jung  
Title: An improved robust stability criterion for uncertain cellular neural networks with time-varying delay  
3:00 – 3:20  
Speaker: Murat Adivar  
Title: Function Bounds for Solutions of Volterra Integro Dynamic Equations on Time Scales |
| 2:40 - 3:20 | **CONTRIBUTED PAPERS,** Room R  
Chair: Gennady Sintotskiy  
2:40 – 3:00  
Speaker: Roland Kasper and Gennady Sintotskiy  
Title: Component-oriented simulation of electrical circuits in the field of mechatronic systems  
3:00 – 3:20  
Speaker: Xiaoping Lu and Peter Rhodes  
Title: A Semi-analytic Solution of American Style Down-and-Out Call Options |
| 3:30 – 4:00 | **COFFEE BREAK**                                                                                     |
| 4:00 – 5:20 | **CONTRIBUTED PAPERS,** Masters Hall  
Chairs: Radu Cascaval  
4:00 – 4:20  
Speaker: Paul Christodolides and Frederic Dias  
Title: Rising Streams Hitting a Horizontal Plate  
4:20 – 4:40  
Speaker: Ankit Jain, Wei Yu, Harini Medikonduru, Ryan Foster, Thiab Taha  
Title: Web Based Interface for Numerical Simulations of Nonlinear Evolution Equations  
4:40 – 5:00  
Speaker: Travis Hunter and Radu Cascaval  
Title: Numerical Studies of Interface Problems on Networks  
5:00 – 5:20  
Speaker: Xiaolin Li, Wurigen Bo, James Glimm, Yanhong Zhao, Fan Zhang  
Title: Front tracking and application in computation of fluid instabilities, phase transition and financial derivative |
4:00 – 5:20 SESSION 5, Room Q
Chairs: C. Kazanci, A. Sornborger and M. Adams.
Title: Mathematical and Computational Biology

4:00 – 4:20 Speaker: Anna Zagrebneva, Yuri Tyutyunov, Vasiliy Govorukhin
Title: Complex dynamics in predator-prey trophotaxis model

4:20 – 4:40 Speaker: Caner Kazanci , Julia Reese, Linda Mummy
Title: Quantifying indirect interactions in ecosystems

4:40 – 5:00 Speaker: Claudio Tebaldi
Title: Synchronization in Logistic Networks with Adaptative Competition

5:30 – 6:30 IMACS Board Meeting, Room Q

5:00 – 5:20 Speaker: Shuting Xu, Sang-Bae Kim, Jun Zhang
Title: Predicting the Solvability Space of the Preconditioned Krylov Subspace Methods

5:00 – 5:20 Speaker: Sang-Bae Kim, Shuting Xu, Jun Zhang
Title: Data mining and prediction of SAI type matrix preconditioner
TUESDAY, AUGUST 04, 2009

8:00 - 9:00 KEYNOTE LECTURE: Martin Berzins, Masters Hall
Title: Multiscale Adaptive Simulations of Fires and Explosions using the Uintah Fluid-Structure Interaction Solver
Chair: Tony Jakeman

9:20 – 10:00 CONTRIBUTED PAPERS, Masters Hall
Chairs: Ernest Tollner
9:20 – 9:40 Speaker: Ernest Tollner, John Schramski, Caner Kazanci, Bernie Patten
Title: Control System Approaches to Ecological Systems Analysis
9:40 – 10:00 Speaker: Amir El-Haffaf
Title: Existence theorem for a fourth order boundary value problem

9:20 – 10:00 CONTRIBUTED PAPERS, Room Q
Chairs: David Prager
9:20 – 9:40 Speaker: John Jakeman
Title: Investigating the performance of high-order stochastic collocation methods
9:40 – 10:00 Speaker: David Prager
Title: Stock Loan Valuation under a Regime-Switching Model with Mean Reverting States and Finite Maturity

9:20 – 10:00 CONTRIBUTED PAPERS, Room R
Chairs: Jennifer Erway
9:20 – 9:40 Speaker: Rao Li
Title: The Spectral Moments and Energy of Graphs
9:40 – 10:00 Speaker: Jennifer Erway and Roummel Marcia
Title: Backward stable diagonal pivoting methods without interchanges for solving unsymmetric tridiagonal systems

10:00 – 10:30 COFFEE BREAK

10:40 – 11:40 SESSION 4, Masters Hall
Chair: Andy Nonaka, Ann Almgren, and John Bell, Mike Zingale and Chris Malone
Title: Adaptive mesh refinement strategies for simulating large multiphysics multiscale problems
10:40 – 11:00 Speaker: Andy Nonaka and George Shu Heng Pau
Title: MAESTRO: An Adaptive Low Mach Number Hydrodynamics Algorithm for Astrophysical Flows
11:00 – 11:20 Speaker: James Lambers and Margot Gerritsen
Title: Multi-Phase Flow Simulation with Integrated Upscaling, MPFA Discretization, and Adaptivity
11:20 – 11:40 Speaker: Jeffrey Banks and J. A. F. Hittinger
Title: Adaptive and High-Order Methods for Laser-Plasma Interaction Problems
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| 10:40 – 11:40 | CONTRIBUTED PAPERS, Room Q       | Muhammad Asif Gondal                                                                | Speaker: Koffi B. Fadimba  
Title: On Uniqueness for Immiscible Two-Phase Flow through Porous Media |
|               |                                  |                                                                                     | Speaker: Muhammad Asif Gondal and Alexander Ostermann  
Title: Exponential Runge--Kutta methods for option pricing |
|               |                                  |                                                                                     | Speaker: Valery Cherepennikov and Elena Talimonchuk Cancel  
Title: Polynomial quasisolutions of some linear functional difference equations |
| 10:40 – 11:40 | SESSION 7, Room R                | Luca Gerardo-Giorda and Alessandro Veneziani  
Title: Numerical Methods in Cardiovascular Problems                                      | Speaker: Giovanna Guidoboni, Suncica Canic, Roland Glowinski, Nicola Cavallini,  
Annalisa Quaini  
Title: Mathematical and Computational Modeling of blood flow: arteries, valves and transport |
|               |                                  |                                                                                     | Speaker: Elio Agostoni, Mauro Perego, Sandro Salsa, Alessandro Veneziani  
Title: Modeling Focal Cerebral Ischemia: Microcirculation, Tissue Metabolism and Ion Diffusion |
|               |                                  |                                                                                     | Speaker: Minisini Sara, Luca Formaggia, Paolo Zunino  
Title: Modelling Controlled Drug Release from Polymeric Matrices into the Arterial Wall with Application to Drug Eluting Stent |
| 11:50 – 1:00  | LUNCH                            |                                                                                     |                                                                                         |
| 1:00 – 3:00   | CONTRIBUTED PAPERS, Masters Hall | Mohammad Ismail                                                                     | Speaker: Yair Zarmi  
Title: Dynamical systems that are approximated by solitons - A new approach to soliton interactions |
|               |                                  |                                                                                     | Speaker: Scott David Kelly and Parthesh Pujari  
Title: Energetics and Motion Planning for a Free Deformable Hydrofoil in an Ideal Fluid with Localized Discrete Vortex Shedding |
|               |                                  |                                                                                     | Speaker: Mohammad Ismail  
Title: A New Linearly Implicit Scheme for the Coupled Nonlinear Schrödinger Equation |
|               |                                  |                                                                                     | Speaker: Rolf Ryham  
Title: Global Existence and Long Term Behavior for Dissipative Systems in Electro-Hydrodynamics |
|               |                                  |                                                                                     | Speaker: Khosrow Maleknejad and Saeed Sohrabi  
Title: An Approximation Method for Solution of Nonlinear Volterra-Fredholm Integral Equations |
|               |                                  |                                                                                     | Speaker: Petre Birtea and Dan Comanescu (Cancelled)  
Title: Dissipation in Hamilton-Poisson systems |

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1:00 – 3:00 SESSION 8, Room Q  
Chair: Ming Jun Lai  
Title: Mathematical Methods for Image Analysis

1:00 – 1:20 Speaker: Weihong Guo and Feng Huang  
Title: An Unsupervised Adaptive Non-local Means Filter to Remove Inhomogeneous Noise and Artifact

1:20 – 1:40 Speaker: Sung Ha Kang  
Title: Colorization via variational models and vector-valued RKHS function extension

1:40 – 2:00 Speaker: Ming-Jun Lai and Jingyue Wang  
Title: The convergence of a central difference discrete ROF model for image denoising

2:00 – 2:20 Speaker: Yang Wang and Hao-Min Zhou  
Title: Multiscale Total Variation Algorithms and Cross Channel Denoising for Color Images

2:20 – 2:40 Speaker: Weihong Guo and Wotao Yin  
Title: Bredge: Enhanced Compressive Imaging using Edge Detection

1:00 – 3:00 SESSION 7, Room R  
Chair: Luca Gerardo-Giorda and Alessandro Veneziani  
Title: Numerical Methods in Cardiovascular Problems

1:00 – 1:20 Speaker: Marina Piccinelli, Alessandro Veneziani, Luca Antiga  
Title: Influence of internal carotid artery geometry on aneurysms location and orientation

1:20 – 1:40 Speaker: Tiziano Passerini, Alessandro Veneziani  
Title: A geometrical multiscale model of cerebral circulation

1:40 – 2:00 Speaker: Lucia Mirabella, Marina Piccinelli, Tiziano Passerini, Eldad Haber, Alessandro Veneziani  
Title: Image-based tissue structural dynamics estimation in cardiovascular problems

2:00 – 2:20 Speaker: Radu Cascaval  
Title: Nonlinear Dispersive Effects and Dynamic Changes in the Human Cardiovascular System

3:00 – 3:30 COFFEE BREAK

3:30 – 4:50 SESSION 4, Master Hall  
Chair: Andy Nonaka, George Pau  
Title: Adaptive mesh refinement strategies for simulating large multiphysics multiscale problems

3:30 – 3:50 Speaker: Ralf Deiterding  
Title: A level-set-based adaptive mesh refinement method for fully coupled shock-driven fluid-structure interaction simulation
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| 3:30 – 3:50 | SESSION 6, Room Q  
Title: Computational and Numerical Methods in Imaging  
Speaker: Ying Guo  
Title: Independent Component Analysis of Multi-subject Functional Magnetic Resonance Imaging Data  
Speaker: Qun Zhao, Jason Langley, and Sunbok Lee  
Title: Computational Analysis of Phase Gradient Mapping in MRI  
Speaker: Andrew Sornborger, Louis Tao, James Lauderdale  
Title: Imaging seizures at the brain-scale in larval zebrafish  
Speaker: Ying Zhu  
Title: An integrated graphical environment to study adaptive behavior | Tianming Liu |
| 3:30 – 4:50 | SESSION 9, Room R  
Title: Evolutionary Computation  
Speaker: Liang Wang and Don Potter  
Title: SIB Code Search Based On Temporal Difference Learning  
Speaker: Ananta Palani, W. D. Potter  
Title: Hypercube Snake-in-the-Box Exploration Using Level Representation  
Speaker: Sal LaMarca  
Title: GAMSA: Genetic Algorithm for Multiple Stem Alignment  
Speaker: Diptee Mehta and Khaled. Rasheed  
Title: Genetic-Algorithm-Based feature Selection for Biomaterial Modeling | Khaled. Rasheed |
| 7:00 – 9:00 | BANQUET |
### SESSION 6, Room Q

**8:00 – 10:00**

**Chairs:** Tianming Liu  
**Title:** Computational and Numerical Methods in Imaging

- **08:00 – 08:20**
  **Speaker:** Nicole Lazar  
  **Title:** Creating and Comparing Group Maps from fMRI Data

- **08:20 – 08:40**
  **Speaker:** Nathan Yanasak, Chris Wright, Jerry Allison  
  **Title:** On the Benefits of Non-Uniform Gradient Prescription in DTI

- **08:40 – 09:00**
  **Speaker:** Suchi Bhandarkar  
  **Title:** Computational Methods in Virtual Reconstructive Craniofacial Surgery

- **09:00 – 09:20**
  **Speaker:** Oskar Skrinjar  
  **Title:** Cardiac Motion Recovery from Magnetic Resonance Images

- **09:20 – 09:40**
  **Speaker:** Roummel Marcia, Zachary Harmany, Rebecca Willett  
  **Title:** Sparse Poisson Intensity Reconstruction Algorithms

### CONTRIBUTED PAPERS, Room R

**Chairs:** Faiz Ahmad and Vladimir Kazakov

- **08:00 – 08:20**
  **Speaker:** Vladimir Kazakov, Ruben Hernandezv  
  **Title:** Applications of no Markovian Process Kinetic Equation for New Statistical Analysis Problems

- **08:20 – 08:40**
  **Speaker:** Faiz Ahmad and Muneer Rashid  
  **Title:** Counting Invariants of a Tensor

- **08:40 – 09:00**
  **Speaker:** Adrian Sescu, Abdollah A. Afjeh, Carmen Sescu  
  **Title:** Runge-Kutta Discontinuous Galerkin Method Applied to Nonlinear Tricomi Equation

- **09:00 – 09:20**
  **Speaker:** Sofiane Khelladi, Hakim El Hadjen, Xesus Nogueira, Farid Bakir, Mohamed Ouaddaout  
  **Title:** Toward a High Order Unsteady Finite Volume Solver Based on Moving Least Squares Approximation Method: Application to Aeroacoustic Problems

- **09:00 – 09:20**
  **Speaker:** Natalia Janson, Andrey Pototsky, Sandhya Patidar, Cancel  
  **Title:** Stochastic neural networks and their control

### LUNCH, Georgia Center

11:30 – 12:30

**THE END OF THE PROGRAM**