

# **Program**

## ***Second International Conference on Porous Media and its Applications in Science, Engineering and Industry***

**June 17-21, 2007**

### **Sheraton Kauai Resort Hotel**

**2440 Hoonani Road, Poipu Beach, Koloa, Kauai, Hawaii 96756  
Tel: 1-808-742-4037 Fax: 1-808-742-4041**

#### ***Chair***

**Prof. Kambiz Vafai**  
University of California, Riverside, USA

#### ***Co-Chairs***

**Prof. Adrian Bejan**  
Duke University, USA

**Prof. Abdul-Khader Mojtabi**  
Universite Paul Sabatier, France

**Prof. Akira Nakayama**  
Shizuoka University, Japan

# **ECI**

**Engineering Conferences International  
6 MetroTech Center  
Brooklyn, NY 11201  
T: 1-718-260-3743 - F: 1-718-260-3754  
info@eci.poly.edu - www.engconfintl.org**

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**Sunday, June 17, 2007**

16:30 - 18:30	Registration
18:30 – 19:30	Reception
19:30 – 21:00	Dinner Buffet

**IMPORTANT ANNOUNCEMENTS**

- Audiotaping, videotaping and photography of presentations are strictly prohibited.
- Speakers – Please leave at least 5 minutes for questions and discussion.
- Please do not smoke at any conference functions.
- Turn your cellular telephones to vibrate or off during technical sessions.
- Be sure to make any corrections to your name/contact information on the Master Participant List or confirm that the listing is correct. A corrected copy will be sent to all participants after the conference.

**Monday, June 18, 2007**

- 07:30 – 08:30 Breakfast
- 08:30 – 08:40 Welcome – Chair and ECI Liaison
- 08:40 – 09:30 **Special Session: Flow Transport in Industrial Applications**
- Recent Advances in Modeling Unsaturated Flow in LCM Processes used for Manufacturing Polymer Composites*  
**Krishna M. Pillai**, University of Wisconsin-Milwaukee, USA
- The Role of Porous Media in Modeling Fluid Flow within Hollow Fiber Membranes of the Total Artificial Lungs*  
**Joseph L. Bull**, University of Michigan, USA
- 09:30 – 10:00 Coffee Break
- 10:00 – 10:30 *Various volume fractions of smooth muscle cells affect molecular diffusion through the arterial wall*  
**Mahsa Dabagh**, Lappeenranta University of Technology, Finland
- 10:30 – 11:30 **Keynote: Porous Media in Biology: Research & Industrial Applications**  
**Jacques Huyghe**, Eindhoven University of Technology, The Netherlands
- 12:00 – 13:00 Lunch
- 13:00 – 17:00 Free time / *ad hoc* sessions
- 17:00 – 18:00 Mai Tai hour with entertainment
- 18:00 – 18:50 **Session 1: Advances in Numerical Techniques**
- Practical Finite-Analytic Method- An Overview*  
**Faruk Civan**, University of Oklahoma, USA
- Simulation of Flow and Transport at the Micro(Pore) Scale*  
**David Trebotich**, Lawrence Livermore National Laboratory, USA
- 18:50 – 20:05 **Session 2: Experimental and Measuring Techniques**
- Experimental Investigation of Pebble Beds Structure and Porosity Influence on Heat Transfer Characteristics*  
**S. Rimkevicius**, Lithuanian Energy Institute, Lithuania
- Rendering the Transient Hot Wire Experimental Method to Porous Media Applications*  
**Peter Vadasz**, Northern Arizona University, USA
- Design and Simulation of a Spout fluid bed coating system*  
**Joel Plawsky**, Rensselaer Polytechnic Institute, USA
- 20:30 – 21:30 Dinner
- 21:30 – 23:00 **Poster Session / Social Hour**

**Tuesday, June 19, 2007**

- 07:30 – 08:30 Breakfast
- 08:30 – 09:15 **Session 3: Bio Transport in Porous Medium**
- Keynote:**  
*Vascularized Smart Materials: Designed Porous Media for Self-Healing and Self-Cooling*  
**Adrian Bejan**, Duke University, USA
- 09:15 – 10:30 *Protein crystal mediated biotemplating*  
**Amihay Freeman**, Tel Aviv University, Israel
- Bacterial Chemotaxis Tranverse to Axial Flow in Microfluidic Channels*  
**Roseanne M. Ford**, University of Virginia, USA
- Macroscopic governing equations for bioheat transfer phenomena*  
**A. Nakayama**, Shizuoka University, Japan
- 10:30 – 11:00 Coffee Break
- 11:00 – 12:15 **Session 4: Advanced Mathematical Approaches to the Modeling of Porous Medium**
- A General Purpose Physical Velocity Formulation for Numerical Simulation of Flows through Porous Media*  
**Huiying Li**, Fluent Inc., USA
- Derivation and Implementation of a Volume-Averaged Entropy Generation Functional for Non-Equilibrium Heat Transfer in High-Conductivity Metal Foams*  
**Lee J. Betchen**, University of Western Ontario, Canada
- A Novel Methodology to Describe Solute Transport in Porous Media*  
**Branko Bijeljic**, Imperial College, United Kingdom
- 12:30 – 13:30 Lunch
- 13:30 – 18:15 Free time / *ad hoc* sessions
- 18:15 – 19:05 **Session 5: Particle Migration and Deposition in Porous Media**
- A numerical modeling of composting process with aeration*  
**F. Kuwahara**, Shizuoka University, Japan
- Permeability Impairment and Flow Reduction in Porous Media under Non-Equilibrium Particle Deposition Conditions*  
**Faruk Civan**, University of Oklahoma, USA

**Tuesday, June 19, 2007**

19:05 – 20:20

**Session 6: Industrial and Environmental Heat Transfer and Flow in Porous Media**

*Mass transfer in a solvent vapor extraction (vapex) heavy oil recovery process*

**Yongan Gu**, University of Regina, Canada

*Sieve analysis for the purpose of selecting sand production control devices*

**Shapour Vossoughi**, University of Kansas, USA

*Transition from Trickling to Pulsing Regime in a Trickle Bed Reactor- A Parametric Study*

**Ajay Bansal**, National Institute of Technology, India

20:30 – 21:30

Dinner

21:30 – 23:00

**Poster Session** / Social Hour

**Wednesday, June 20, 2007**

- 07:30 – 08:30 Breakfast
- 08:30 – 09:15 **Special Session: Porous Media Applied to Marine and Environmental Problems**
- Keynote:** *Marine biogeochemical studies using non-invasive experimental methods, numerical simulation and hydrodynamic instability*  
**Arzhang Khalili**, Max Planck Institute for Marine Microbiology, Germany
- 09:15 – 10:15 *Monotonic Growth of Motile Microorganisms*  
**Peter Vadasz**, Northern Arizona University, USA
- Stability of Gravity Driven Convection in a Cylindrical Porous Layer Subjected to Vibration  
**S Govender**, University of Kwa Zulu Natal, South Africa
- 10:15 – 10:45 Coffee Break
- Filtering Shelf Sediments*  
*Markus Huettel, Florida State University*  
Modeling of Coupled Heat Transfer and Reactive Transport Processes in Porous Media: Application to Seepage Studies at Yucca Mountain, Nevada  
**Sumit Mukhopadhyay**, Lawrence Berkeley National Laboratory, USA
- 12:00 – 13:00 Lunch
- 13:30 – 15:35 **Session 7: Natural and Forced Convection in Porous Medium**
- Extension of the Porous Media Model of Heat Transfer to Nanofluid Suspensions*  
**Peter Vadasz**, Northern Arizona University, USA
- Fluid Flow and Convection Heat Transfer in Mini/Microporous Media*  
**Pei-Xue Jiang**, Tsinghua University, China
- Natural Convection around a Horizontal Cylinder in the Presence of Nanofluids*  
**Eiyad Abu-Nada**, Hashemite University, Jordan
- Exploration of Thermal Dispersion by Direct Numerical Simulation of an Idealized Spherical-Void-Phase Porous Metal*  
**S. A. Mohsen Karimian**, University of Western Ontario, Canada
- The role of microstructural characteristics in conductive and convective heat transfer within porous media*  
**Mahsa Dabagh**, Lappeenranta University of Technology, Finland
- Global stability for penetrative double-diffusive convection in a porous medium  
**Antony A. Hill**, University of Durham, United Kingdom
- 15:55 – 16:05 Coffee Break

**Wednesday, June 20, 2007**

16:05 – 17:20

*Two-Phase Flow Through a Porous Bed of Packings: A Parametric Study on Dynamic Liquid Saturation*

**Ajay Bansal**, National Institute of Technology, India

*The Effect of Local Thermal Non-equilibrium on the Infiltration of Hot Fluid into a Porous Domain*

**D.A.S. Rees**, University of Bath, UK

*Non-Darcy natural convection in a cavity filled with a heat-generating porous medium: thermal non-equilibrium model*

**Q.W. Wang**, Xi'an Jiaotong University, China

17:20 – 18:10

**Session 8: Conduction in Porous Medium**

*Diffusion and permeation of non reactive gas through cement-based materials*

**Fabien Frizon**, French Atomic Energy Commission, France

*The paradox of heat conduction in porous media subject to lack of local thermal equilibrium*

**Peter Vadasz**, Northern Arizona University, USA

18:10 – 20:00

Break

20:00 – 22:00

Conference Banquet



**Thursday, June 21, 2007**

- 07:30 – 08:30 Breakfast
- 08:30 – 10:30 **Special Session: Thermo-Hydro-Chemo-Mechanical Coupling in Geomaterials**
- Coupled Thermal-Hydrologic-Mechanical Impacts of Geological CO<sub>2</sub> Sequestration*  
**Brian J. McPherson**, University of Utah, USA
- A Chemo-Thermo-Mechanically Coupled Analysis of Subsurface Ground Deformation induced by Methane Hydrate Dissociation*  
**Fusao Oka**, Kyoto University, Japan
- Temperature Effects on Hydraulic Properties of Geosynthetic Clay Liners*  
**Hossam Abuel-Naga**, Monash University, Australia
- A Coupled Geomechanical-Transport Modelling of Sand Production in Petroleum Reservoirs*  
**Guillaume Servant**, IFP, France
- 10:30 – 11:00 Coffee Break
- 11:00 – 11:50 *Linear stability analysis of miscible thermo-viscous flow in porous media*  
**M. N. Islam**, University of Calgary, Canada
- Electro-Diffusive transport in charged porous media: From the particle level scale to the macroscopic scale using volume averaging*  
**David W. Smith**, University of Melbourne, Australia
- 11:50 – 13:05 **Session 9: Evaporation, Condensation, Capillary Effect, and Reactive Flow in Porous Media**
- Moisture transport and pressure build up at high temperature in concrete: a model of fire spalling*  
**L. Pel**, Eindhoven University of Technology, the Netherlands
- A New Approach to the Modelling of Immiscible Displacement in Porous Media - Interacting Capillary Bundle Models*  
**Mingzhe Dong**, University of Regina, Canada
- 13:05 – 13:20 **Closing Remarks**
- 13:30 Lunch and adjournment

# Poster Presentations

## Special Session: Flow Transport in Industrial Applications

1. An Experimental Study of Mobilization and Creeping Flow of Oil Slugs in a Water-Filled Capillary  
**Mingzhe Dong**, University of Regina, Canada  
*Mixed convection around buried offshore installations in a porous seabed*  
**Arzhang Khalili**, Max Planck Institute for Marine Microbiology, Germany

## Multiphase Transport in Porous Media

2. Smoothed Particle Hydrodynamics Model for Reactive Transport and Biomass Growth  
**Alexandre M. Tartakovsky**, Pacific Northwest National Laboratory, USA
3. Application of MRI to the measurement of two-phase flow of supercritical CO<sub>2</sub> and water in porous rocks  
**Tetsuya Suekane**, Tokyo Institute of Technology, Japan
4. Heat Removal performance of Particle-Sintered Porous media Counter to heat Flux Input and its Phase Change Characteristics  
**Kazuhisa Yuki**, Tohoku University, Japan
5. Voda Multiphase Flow Code for Investigation of Napl Behavior at heterogeneous Sand Layers  
**Jiri Mikyska**, Czech Technical University in Prague, Czech Republic
6. Analytical and Numerical Solution for One-Dimensional Two-Phase Flow in Homogeneous Porous Medium  
**Michal Benes**, Czech Technical University in Prague, Czech Republic
7. Hydrocarbon Recovery from Porous Media and Reduction of Asphaltene Deposition during CO<sub>2</sub> Extraction Process  
**Ali H. Al-Marzouqi**, UAE University, United Arab Emirates

## Experimental and Measuring Techniques

8. Adaptable deterministic geometric pore-scale modelling for different porous media  
**JP du Plessis**, University of Stellenbosch, South Africa
9. Development of Groundwater Flowmeter  
**Shigeo Kimura**, Kanazawa University, Japan
10. Experimental study of tree networks for minimal pumping power  
**Mohammad Sayeed**, C. Abdul Hakeem College of Engineering and Technology, India

## Evaporation, Condensation, Capillary Effect, and Reactive Flow in Porous Media

11. Viscous Fingering Instability of Reactive and Anisotropically Dispersive Flows in Porous Media  
**Karim Ghesmat**, University of Calgary, Canada
12. Evaluation of the Viscous Finger Width  
**Marina N. Ivashneva**, Moscow MV Lomonosov State University, Russia
13. Frost Behavior of a Fin Surface with a Non-Uniform Temperature Distribution  
**Kwan-Soo Lee**, Hanyang University, Korea

#### **Particle Migration and Deposition in Porous Media**

14. Convective venting of porous media fractures  
**Maria Ines Dragila**, Oregon State University, USA

#### **Advanced Mathematical Approaches to the Modeling of Porous Medium**

15. Equivalent Particle Diameter for Pressure Drop Porous Metals  
**Nihad Dukhan**, University of Detroit Mercy, USA

#### **Industrial and Environmental Heat Transfer and Flow in Porous Media**

16. Wicking of Perfectly Wetting Liquids into a Metallic Mesh  
**Nicolas Fries**, Zarm, Center of Applied Space Technology & Microgravity, Germany
17. Seepage and critical hydraulic gradients in tailings dams and natural formations  
**Isabel Jantzer**, Lulea University of Technology, Sweden
18. Mechanical and Electric properties of Porous High Strength AC9A Aluminum Alloy  
**Chi Y. A. Tsao**, National Cheng Kung University, Taiwan

#### **Combined Heat and Mass Transfer in Porous Medium**

20. Fluid Flow, Solute Mixing and Precipitation in Porous Media  
**George D. Redden**, Idaho National Laboratory, USA

#### **Natural and Forced Convection in Porous Medium**

21. Carbon Dioxide Impinging Jet Heat Transfer of a Porous Surface by a Circular Nozzle with a Flange  
**Kouichi Kamiuto**, Oita University, Japan
22. Flow through a Hexagonal Array of Perturbed Spheres at low to high Reynolds number  
**J. Gunnar I. Hellstrom**, Lulea University of Technology, Sweden
23. Numerical Simulation of Forced Pulsating Channel Flow over two Heat Blocks Mounted with Porous Covers  
**Po-Chuan Huang**, National Taipei University of Technology, Taiwan

24. Heatline visualization of natural convection in a porous cavity occupied by a fluid with temperature dependent viscosity  
**Kamel Hooman**, The University of Queensland, Australia
25. Three-dimensional numerical study of time-periodic natural convective heat transfer in an inclined cubic enclosure with porous medium  
**Q W Wang** Xi'an Jiaotong University, China
26. Drag Coefficient of a Porous Obstacle  
**Yasushi Kakimoto**, Shizuoka University, Japan

**Porous Media Applied to Marine and Environmental Problems**

27. Mean Flow and Linear Stability of an Oscillatory Particulate Suspension  
**Arzhang Khalili**, Max Planck Institute for Marine Microbiology, Germany
28. Stability of buoyancy-opposed mixed convection in a sediment layer with relevance to hydrothermal vents  
**Arzhang Khalili**, Max Planck Institute for Marine Microbiology, Germany