



# Thermal and Fluid Sciences Affiliates and Sponsors Conference Program 2009

## Wednesday, February 4

3:45 pm – 4:05 pm                      **Break and Poster Session, Cypress**

4:05 pm – 5:50 pm                      **Tresidder Union, Oak East**

### Session IV – SHOCK TURBULENCE INTERACTION

- Direct Numerical Simulations Of Canonical Shock/Turbulence Interaction  
**J. Larsson, S. Lele, and P. Moin**
- Accurate Simulations Of Slowly Moving Shocks And Interfaces, With Applications To The Richtmyer-Meshkov Instability  
**E. Johnsen, J. Larsson, and S. Lele**
- Suitability Of Artificial Bulk Viscosity For Large-Eddy Simulation Of Turbulent Flows With Shock  
**A. Mani, J. Larsson, and P. Moin**
- A Bulk Viscosity Approach For Shock Capturing On Unstructured Grids  
**M. Shoeybi, J. Larsson, F. Ham, and P. Moin**
- LES Of Compressible Turbulent Flows Using Localized Artificial Diffusivity Method  
**S. Kawai and S. Lele**
- Numerical Simulation Of Re-Shocked Richtmyer-Meshkov Instability In Two And Three Dimensions  
**S. Shankar and S. Lele**
- Large-Eddy Simulation Of Turbulent Flow Over A High-Lift Configuration  
**P. Moin and D. You**

## Evening – Private Dinners

# Thermal and Fluid Sciences Affiliates and Sponsors Conference Program 2009

**Thursday, February 5**

**7:30 am – 8:30 am                      Light Breakfast - Tresidder Union, Cypress**

**8:30 am – 10:00 am                    Tresidder Union, Oak East**

## **Session V – COMBUSTION FUNDAMENTALS**

- Direct Numerical Simulations Studying Mixture And Temperature In Homogeneities In HCCI Engines  
**V. Mittal and H. Pitsch**
- Large Eddy Simulation Of A Sooting Jet Diffusion Flame  
**M. Mueller, G. Blanquart, and H. Pitsch**
- A Consistent Chemical Mechanism For Oxidation Of Substituted Aromatic Species  
**K. Narayanaswamy, S. Bahga, G. Blanquart, and H. Pitsch**
- An Analysis Of Error In Turbulent Premixed Flamelet Models  
**E. Knudsen, SH. Kim, and H. Pitsch**
- Large Eddy Simulation Study Of IC Engine Processes Using Immersed Boundary Technique  
**S. Shashank and H. Pitsch**
- Direct Numerical Simulation Of Soot Formation In Turbulent Non-Premixed Flames With Finite Rate Chemistry And Detailed Soot Dynamics  
**F. Bisetti, G. Blanquart, M. Mueller, and H. Pitsch**

**10:00 am – 10:20 am                    Break and Poster Session - Cypress**

**10:20 am – 12:05 pm                   Tresidder Union, Oak East**

## **Session VI – COMBUSTION DIAGNOSTICS AND APPLICATIONS**

- Supercritical Combustion Of Coal In Aquifer Water  
**J.R. Heberle and C. Edwards**
- Coal Gasification Under Supercritical Water Conditions  
**B. Kim and R. Mitchell**
- Optimal Architecture For Efficient Steady-Flow Engines  
**S. Ramakrishnan and C. Edwards**
- Application Of Chemical Looping Combustion To Solid Fuels  
**E. Goldstein and R. Mitchell**
- Increasing Engine Efficiency Through Extreme Compression  
**S. Miller and C. Edwards**
- Vapor-Phase Absorption Measurements In Multi-Phase Flows: A New Approach Using Tunable Mid-Infrared Lasers  
**J. Porter, J. Jeffries, and R. Hanson**
- Plasma Assisted Combustion In Supersonic Flows  
**H.Do, S. Im, G. Mungal, and M. Cappelli**

# Thermal and Fluid Sciences Affiliates and Sponsors Conference Program 2009

**Thursday, February 5**

**12:05 pm – 1:15 pm                      Luncheon, Oak West Lounge**

**1:15 pm – 3:00 pm                      Tresidder Union, Oak East**

## **Session VII – ADVANCED TURBULENCE MODELING AND SIMULATION TECHNIQUES**

- Domain Specific Language For Mechanics Codes  
**E. Elsen and E. Darve**
- Modeling Transition Of A Compressible Flow Over A Flat Plate Using Large Eddy Simulation  
**T. Sayadi and P. Moin**
- Large-Eddy Simulation Of Circulation Control Over An Airfoil  
**S. Hahn, K. Shariff, and P. Moin**
- Grid-Independent Large-Eddy Simulation  
**S.T. Bose, P. Moin, and D.You**
- Using Chimps For Rotorcraft Overset Grid Simulations  
**S. Hahn, G. Iaccarino, S. Anathan, and J. Baeder**
- Simulations Of Dispersion Downstream Of An Obstacle  
**D. Phillips, R. Rossi, and G. Iaccarino**
- Unsteady Simulations Of Non-Newtonian Fluids  
**D. Richter, G. Iaccarino, and E. Shaqfeh**

**3:00 pm - 3:20pm                      Break and Poster Session, Cypress**

**3:20 pm – 4:20 pm                      Tresidder Union, Oak East**

## **Session VIII – UNCERTAINTY QUANTIFICATION**

- Assessing Geometrical Uncertainty Using RANS Turbulence Modeling  
**J. Axerio-Cilies and G. Iaccarino**
- To Intrude Or Not To Intrude: Algorithmic Challenges In Uncertainty Propagation  
**P. Constantine, D. Gleich, and G. Iaccarino**
- Low Rank Approximation Of Uncertain Systems  
**A. Doostan and G. Iaccarino**
- Risk Quantification In Unsteady Flow Simulation Using Adjoint Based Approaches  
**Q. Wang, G. Iaccarino, and P. Moin**

**4:30 pm – 6:00 pm                      Lab Tours, Oak East, Meeting Point**

**6:00 pm – 7:00 pm                      Cocktail Hour, Faculty Club**

**7:00 pm – 9:30 pm                      Dinner Banquet, Faculty Club**

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**Friday, February 6**

**7:30 am – 8:30 am                      Light Breakfast – Tresidder Union, Cypress**

**8:30 am – 9:30 am                      Tresidder Union, Oak East**

**Session IX – MICROSCALE AND FUEL CELL**

- Characteristic Analysis Of Electrokinetic Transport In Hybrid Microchannel-Nanochannel Systems  
**A. Mani, T. Zangle, and J. Santiago**
- Visualization Of On-Chip Isotachopheresis With A Fluorescent Tracer  
**R. Chambers and J. Santiago**
- First-Principles Simulations Of Cathode Kinetics Of PEM Fuel Cells  
**V. Viswanathan and H. Pitsch**
- Pore-Scale Simulations Of Transport-Chemistry Interactions In Catalyst Layers Of PEM Fuel Cells  
**S. Kim and H. Pitsch**

**9:30 am – 10:30 am                      Tresidder Union, Oak East**

**Session X – FLUID MECHANICS APPLICATIONS**

- Characterization Of Flow And Heat Transfer In Metal Foams  
**A. Onstad, C. Elkins, R. Moffat, and J. Eaton**
- The Effect Of Inlet Flow Perturbations On 3D Diffuser Flows  
**A. Padilla, E. Cherry, K. P. Lo, G. Garcia, C. Elkins, and J. Eaton**
- Characterizing The Wake Developed By A Formula 1 Racing Car Front Tire  
**E. Issakhanian, K. P. Lo, C. Elkins, and J. Eaton**
- Measurements Of Scalar Mixing Using A New MRI Diagnostic  
**M. Benson, C. Elkins, and J. Eaton**
- LES Of HP Cascade Flow With Free-Stream Turbulence  
**R. Bhaskaran and S. Lele**

**10:30 am – 10:50 am                      Break and Poster Session, Cypress**

**10:50 am – 11:50 am                      Tresidder Union, Oak East**

**Session XI – MULTIPHASE FLOWS**

- Theoretical And Numerical Study Of Air Layer Drag Reduction In Two-Phase Couette Flow  
**D. Kim and P. Moin**
- Numerical Studies Of Primary Atomization Of Liquid Jets In Crossflow  
**M. Pai and H. Pitsch**
- DNS Of Spray Evaporation And Combustion In A Swirling Combustor  
**K. Luo, O Desjardins, and H. Pitsch**

**11:50 am                                      Closing Remarks**

## POSTERS

- The Finite-Element Method On Graphics Processors  
**C.Cecka, A. Lew, and E. Darve**
- Fourier Based Fast Multipole Method For The Helmholtz Equation  
**C.Cecka and Eric Darve**
- Scale Effects On Impingement Cooling Arrays With Local Extraction  
**T. Hoberg, A. Onstad, and J. Eaton**
- MRV Experiments On A Complete Gas Turbine Combustor Model  
**L. Hom, A. Onstad, C.Elkins, and J. Eaton**
- Chemical Mechanism For The High Temperature Combustion Of Engine Relevant Fuels With Emphasis On Soot Precursors  
**G. Blanquart , P. Pepiot-Desjardins, and H. Pitsch**
- A Generalized Combustion Model For Multiple Injection Diesel And HCCI Engines  
**E. Doran and H. Pitsch**
- Plasma Actuated High Speed Flow  
**S. Im, H. Do, W. Kim, M. Mungal, and M. Cappelli**
- Upstream Boundary Condition Sensitivity Of The Shock-Boundary Layer Interaction  
**D. Helmer, T. Chantrasm, C. Elkins. J. Eaton, and G. Iaccarino**
- Experimental And Computational Investigations Of A Formula 1 Tire  
**J.Axerio-Cilies. E. Issakhanian, and G. Iaccarino**
- LES Of Shockwave-Turbulent Boundary Layer Interactions  
**D. Dawson, B. Morgan, and S. Lele**
- Effect Of Thermophysical Properties On Boundary Layer Instability  
**K. Franko and S. Lele**
- Multi-Scale Modelling Of PEM Fuel Cells  
**V. Rai, M. Aryanpour, V. Viswanathan, S.H. Kim, A. Dhanda, and H. Pitsch**