2010-2011

Graduate Seminar Series

The Department of Mechanical Engineering – Engineering Mechanics

Proudly Presents

Assistant Professor Seung - Hyun Kim

Michigan Technological University

Seung Hyun Kim is an Assistant Professor in the Department of Mechanical Engineering-Engineering Mechanics at Michigan Technological University. He obtained his BS, MS, and PhD from Pohang University of Science and Technology. He then joined Center for Turbulence Research at Stanford University as a postdoctoral fellow. Before joining Michigan Tech, he was a research associate at Stanford University. His research interests focus on the modeling of multiscale and multiphysics problems in relation to energy science and technology. Current areas of interest include the modeling of turbulent combustion, pollutant formation, and combustion instabilities; multiscale fuel cell modeling; multiphase flows in porous media; and carbon capture and sequestration.

Thursday, Nov. 18, 2010 | 4:00 – 5:00 p.m. | Room 112, ME-EM Bldg.

Computational Reacting Flows in Energy Applications

Chemically reacting flows are central to energy applications such as combustors, catalytic reactors, and fuel cells. Such flows typically involve several physical and chemical processes interacting with each other over a wide range of scales. Computation of those multiscale and multiphysics phenomena poses a great scientific challenge and is crucial to enhancing the development of advanced energy systems that meet future standards. In this talk, I will discuss the computational modeling of reacting flows observed in two important energy conversion devices, combustors and fuel cells. The modeling of turbulence-chemistry interactions in turbulent nonpremixed flames will be presented in the context of the conditional moment closure method and the large eddy simulation. The emphasis will be given to the effects of multiscale turbulent mixing on pollutant formation. The multiscale modeling of proton exchange membrane (PEM) fuel cells will then be presented with emphasis on interactions of surface reactions, nanoscale reactant transport, and liquid water dynamics in porous electrodes.

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