Center for Fluid Mechanics, Division of Applied Mathematics
Fluids, Thermal and Chemical Processes Group, School of Engineering
Joint Seminar Series

TUESDAY - FEBRUARY 14, 2012
4:00pm
Barus & Holley, Room 190

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MULTISCALE BIO-FLUID MEASUREMENTS AS A CLINICAL DIAGNOSTIC TOOL SET

Many medical conditions, from arterial stenosis, to cerebral-spinal disease, to voice disorders involve highly complex flows over a wide range of length scales. The integration of advanced medical imaging techniques, *e.g.* phase-contrast MRI, state-of-the-art fluid dynamics diagnostics, *e.g.* μPIV, and the application of fundamental fluid dynamics principles have created new opportunities for investigating, detecting, and ultimately treating many of these conditions. This talk will include brief highlights of bio-fluid measurement capabilities over a wide range of scales, from the sub-cellular scale measurements of flow over endothelial cells (ECs) to flow around Olympic swimmers. We will provide greater focus on two specific problems, i) mapping of shear, pressure and surface topography over endothelial cells, and ii) measuring differential pressure of cerebral spinal fluid in the brain. In the first study, we demonstrate that the pressure distribution over individual ECs is of the same magnitude as the local shear stress. In the second study, we present the potential of a new diagnostic tool for non-invasive pressure measure measurement in the brain. Thoughts on linking these seemingly disparate measurements and the potential for new collaborations will be discussed.

Biographical Sketch

Prof. Wei received a B.S. from Cornell in 1980 and an M.S. from Lehigh in 1982, both in Mechanical Engineering. In 1987, he was awarded a Ph.D. in Aerospace Engineering from Michigan. After a brief Post-doctoral appointment at Michigan, Prof. Wei joined the faculty of Mechanical & Aerospace Engineering at Rutgers in 1987. In 2006, Prof. Wei joined RPI as Head of Mechanical, Aerospace and Nuclear Engineering. He recently moved to the University of Nebraska – Lincoln as Dean of Engineering. Prof. Wei has held visiting faculty appointments at the Naval Surface Warfare Center (Carderock, MD), MIT and the Tampere University of Technology (Tampere, Finland). He is a Fellow of the ASME, IMechE and APS. Prof. Wei's research interests lie in coupling fundamental fluid dynamics experiments with critical technologies of socio-technological importance.