

## **Weekly Seminar: Spring 2009**

**Date: Friday February 20**

Time: 11:00 AM

Location: Maryland Hall 110

Speaker: Tian-Jian Hsu (Tom), University of Delaware

Title: *"On Several Critical Processes in Understanding the Fate of Terrestrial Sediment in the Coastal Ocean"*

### **Abstract**

Studying the fate of terrestrial sediment in the coastal ocean (source to sink) is critical to improving our current understanding on global change and sustainable management of our ecosystems and natural resources. While the importance of small mountainous river contribution to the total sediment discharge into the global oceans has been recognized since the early 90s', our physical understanding on the dynamics of the near-field sediment-laden river plume and corresponding sediment deposition remain to be limited. A mathematical modeling framework for fine sediment transport in stratified environment is developed based on multiphase flow principles. The modeling framework is employed in a turbulence-averaged wave-resolving numerical model to study several critical processes in the nearshore (water depth < 10m), including sediment-laden plume dynamics and initial deposition, wave-supported gravity-driven mudflow and wave dissipation over muddy seabed. To further resolve detailed turbulence-sediment interactions and to improve the closures in the Reynolds-averaged approach, Direct Numerical Simulation (DNS) for carrier fluid flow during fine sediment transport under oscillatory flow is carried out based on extending an existing DNS code. It is our long-term goal that our small-scale modeling effort can provide useful intra-wave parameterizations to enhance existing 3D wave-averaged coastal modeling system.