

Date: April 4

Time: 11:00 AM

Location: Maryland Hall 110

Speaker: Dr. Eckart Meiburg

University of California at Santa Barbara

Title: "*Computational investigations of gravity and turbidity currents*"

Abstract

We will present an overview of high-resolution, Navier-Stokes based simulations of gravity and turbidity currents, with the focus being on the standard lock-exchange configuration. The turbidity currents considered are driven by particles that have negligible inertia and are much smaller than the smallest length scales of the buoyancy-induced fluid motion. For the mathematical description of the particulate phase an Eulerian approach is employed with a transport equation for the local particle-number density. The governing equations are integrated numerically with high-order, mixed compact finite difference and spectral/spectral-element techniques.

We will discuss differences between two- and three-dimensional gravity current dynamics. Flow features due to large, non-Boussinesq density differences will be analyzed, and differences in the dynamics of the light and heavy fronts will be discussed. In the presence of a sloping bottom the early, constant front velocity phase is seen to give rise to a second phase characterized by the dynamics of horizontal layers accelerating past each other, similar to the classical analysis by Thorpe. Some effects due to stratification of the ambient will be discussed as well. Some first results will be shown regarding the unsteady interaction of a gravity current with a submarine structure, such as a pipeline.