

Department of Mathematics

University of Houston

## Scientific Computing Seminar

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### Some Computational Issues in Hydraulic Engineering : Dams breaks, landslides, weir flows and impulse waves

Thursday, Oct. 15, 2015

1:30 PM- 2:30 PM

Room 646 PGH

#### **Abstract:**

We address the numerical simulation of free surface flows in computational fluid dynamics. We focus on problems related to hydraulic engineering, such as the simulation of dam breaks, impact of landslides, weir flows and creation of impulse waves.

We present a numerical framework for the simulation of three-dimensional two-phases flow with free surfaces, involving an incompressible liquid and free surfaces. The mathematical model relies on the incompressible Navier-Stokes equations and a Eulerian method for tracking the free surfaces between a liquid and the air. We use an implicit time splitting scheme and a two-grid method to decouple the physical phenomena. An extension allows to handle several immiscible liquids for multiphase flows, by tracking multiple liquid phases.

To illustrate the robustness of the methods, we present numerical simulations in various situations: the flooding consequences of potential dam breaks, the creation of impulse waves following a landslide, stationary weir flows for dam lake discharge (so-called Creager weirs), and the sedimentation of sand in dam retention lakes.

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This seminar is easily accessible to persons with disabilities. For more information or for assistance, please contact the Mathematics Department at 743-3500.