Seminar
Department of Civil and Environmental Engineering

Thursday, April 9, 10:00AM
Holmes Hall 244

Modeling of Propagation of Fast Landslides

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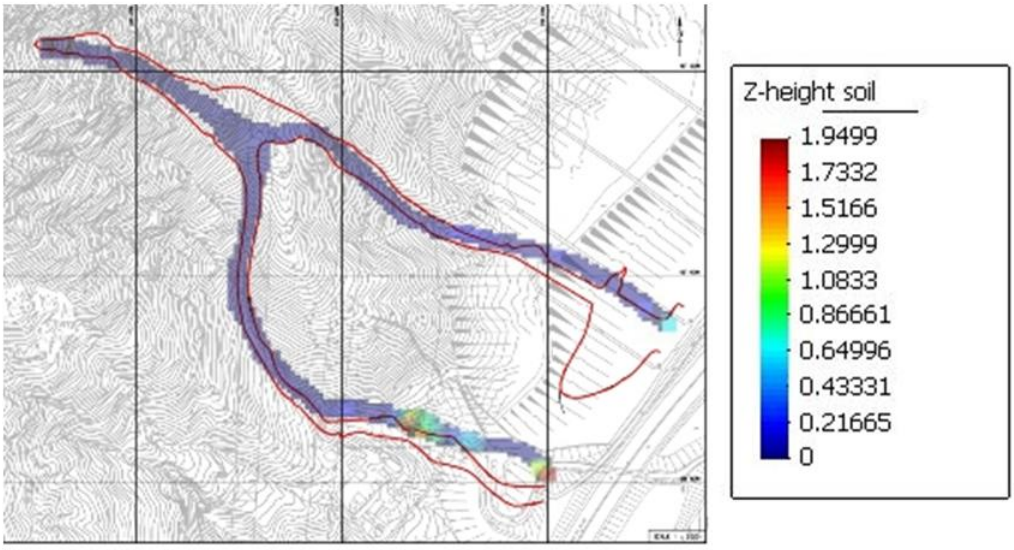
The talk deals with modelling of fast landslides with large velocities of propagation, which can be triggered in loose soils presenting very loose or metastable structures with a strong tendency to compact under shearing, like poorly compacted deposits which experiment a sudden collapse with important build up of pore pressures and liquefaction in some cases.

I will present an overview of depth averaged models for fast catastrophic landslides where coupling of solid skeleton and pore fluid (air and water) is important. The first goal is to show how Biot-Zienkiewicz models can be applied to develop depth integrated, coupled models. Next, I will describe rheological models used for fluidized geomaterials, and show how a link between rheological and constitutive models exists, based on Perzyna's viscoplasticity.

Among the several alternative numerical models, I will focus here on SPH which has not been widely applied by engineers to model landslide propagation. I will propose an improvement, based on combining Finite Difference meshes associated to SPH nodes to describe pore pressure evolution inside the landslide mass. Finally, I will present an assessment of the performance of the models, considering three sets of tests and examples which allows to assess the model performance and limitations: (i) Problems having an analytical solution, (ii) Small scale laboratory tests, and (iii) Real cases for which Ie have had access to reliable information, like the Tsing Shan debris flow (Hong Kong 2000)



Tsing Shan debris flow: Model predictions versus field observations