CASTS TALKS

2012 Special Program in Applied

Mathematics and Applied Mechanics

On the formulation of the catastrophic flows over complex terrain surface

2012 - 04 - 18 (Wed.)
15:00 - 17:00
308, Mathematics Research Center Building (ori. New Math. Bldg.)

   In this talk, an alternative formulation for flows over non-trivial topographic surface will be presented. A quasi-curvilinear coordinate system is introduced, in which the coordinate surface coincides with the basal surface even when the deposition or entrainment process at the base is significant. The model equations are derived by means of depth-integration together with the assumptions of small curvature of the topography and shallowness of the flow body. While deriving the model equations, the influence of the topography is taken into account as much as possible. The resultant model equations form a conservation system of the Cartesian components of the conservative physical variables. The best benefit of this formulation is that it greatly simplifies the computation of the varying coordinate orientations. The features and advantages of this formulation are presented by numerical examples and comparison with the experimental measurements. Two models will be demonstrated, one is single-phase model for dry granular flows and the other one is for Coulomb mixture theory.