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Numerical modelling of propagation of landslides using SPH

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Landslides cause severe economic damage and a large number of casualties every year around the world. Engineers and geologists need to understand and predict their properties, such as velocity, depth and run out distance. In addition to experience gained on similar cases, predictions require the application of mathematical, constitutive/rheological and numerical models.

Different models are currently used to simulate long run-out landslides in order to elaborate hazard maps.

Among the available alternatives, depth integrated models present a reasonable compromise between computational cost and accuracy.

The purpose of this paper is to apply the SPH depth integrated model, together with suitable rheological laws, to analize fast landslides.

We will present the results obtained with the code Geoflow_SPH to three selected cases:

(i) The Frank avalanche,
(ii) the Cougar Hill flowslide and
(iii) the Sham Tseng debris flow.

The results of the simulations include estimations of fundamental aspects of the problem, such as the path followed by the sliding mass, the shape of the run-out area, the maximum run-out, the depth of the final deposit, the pore pressure evolution and the speed evolution of the landslide.