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Two approaches for numerical modelling of waves generated by landslides : macroscopic and grain scales.

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The present works aims to show two approaches for the numerical modelling of waves generated by landslides.

The first approach is based on a macroscopic view of the landslide. Two cases are introduced : the pyroclastic flow and the generation by a granular flow.

Regarding the pyroclastic flow, if we consider that the high interstitial pressure persists during the propagation as showed in some experiments (Roche et al.), the slide has a fluid-like behaviour and therefore can be modelled as a Newtonian fluid. Some experiments are in process to assess this hypothesis.

In the case of granular flow, we deal with the experiment of glass beads falling on a slope into water (Viroulet) for two diameters of beads. First, the landslide is modelled as a Newtonian fluid. The aim is to determine the viscosity value for each case and be able to reproduce the first wave. To be closer to the granular media, the mu(I)-rheology is also introduced (GDR MiDi). This rheology has been proposed to model dense granular flow and parameters are defined by the media.

The second approach is to model the grain itself in the granular media. It can be done by coupling a DEM code with a Navier-Stokes code for example (Shan and Zhao). However, here, the idea is to compute the slide and the fluids with only a Navier-Stokes (NS) code. To realise that, the solid are modelled using penalised fluid (Ducassou et al.). Yet, the interactions between solid have to be manage by an additional routine in the NS code. A first model has been developed for interaction between discs. Experimental results are expected for the validation of this routine like the fall of several cylinders on a slope into water.

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