Saint Venant simulations for miniature landslides experiments

Ludovic Brivady*[1], Rory Cerbus , Faug Thierry , and Hamid Kellay[1]

[1]Laboratoire Ondes et Matière d'Aquitaine – CNRS, Université de Bordeaux (Bordeaux, France) – France

Résumé

A main objective in landslide research is to predict how far they will travel. Recent experiments at the laboratory scale have investigated the runout distance and have reproduced the positive correlation between landslide volume and landslide runout observed for natural systems.
We investigated numerically using the minimalistic model of the Saint-Venant equation these laboratory landslides where a granular pile initially at rest on an inclined slope is suddenly released, slides and spreads on the incline and finally comes to rest on a horizontal plane. This geometry is, in our sense, more realistic to mimic natural landslides, avalanches or debris flows that are running on a mountain slope or detaching from a cliff. The runout distance and front velocity are quantitatively compared to those from experiments. We study the spread of the deposit in the transverse and longitudinal directions. Finally, we propose arguments to derive an expression of the runout distance that describes fully the experiments and numerical simulations. The connection with previous experiments for the collapse of granular columns is also discussed.

*Intervenant