Geophysical Research Abstracts
Vol. 18, EGU2016-7894, 2016
EGU General Assembly 2016

The respective roles of bulk friction and slip velocity during a granular mass flow

Lydie Staron
(staron@lmm.jussieu.fr)

Catastrophic granular mass flows form an important natural hazard. Mitigation has motivated numerous studies on the properties of natural granular flows, and in particular, their ability to travel long distances away from the release point. The mobility of granular flows is commonly characterised through the definition of rheological properties and effective friction. Yet, it is widely accepted that the description in term of effective friction may include various lubrication effects, softening at the base of the flow and large slip velocities being a most likely one. In this case, flow bulk properties may obliterate the flow boundary conditions.
In this contribution, we investigate how disentangling bulk properties from boundary conditions may improve our understanding of the flow. Using discrete simulations, we induce increasing slip velocities in different flow configurations. We show that increased mobility may be achieved without changing bulk properties. The results are interpreted in terms of a Robin-Navier slip condition and implemented in a continuum Navier-Stokes solver. We quantify the respective role of rheological bulk properties and boundary conditions in the general behaviour of a transient mass flow. We show that omitting the description of boundary conditions leads to misinterpretation of the flow properties. The outcome is discussed in terms of models reliability.

References

P.-Y. Lagrée et al, The granular column collapse as a continuum: validity of a two-dimensional Navier-Stokes model with the mu(I) rheology, J. Fluid Mech. **686**, 378-408 (2011)

L. Staron and E. Lajeunesse, Understanding how the volume affects the mobility of dry debris flows, Geophys. Res. Lett. **36**, L12402 (2009)

L. Staron, Mobility of long-runout rock flows: a discrete numerical investigation, Geophys. J. Int. **172**, 455-463 (2008)