Geophysical Research Abstracts,
Vol. 10, EGU2008-A-01202, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-01202
EGU General Assembly 2008

Slope relaxation for dry or water immersed granular avalanches

P. Gondret (1), D. Doppler (1), R. Fischer (1), T. Loiseleux (1,2), B. Perrin (3) and M. Rabaud (1)

(1) Laboratoire FAST, Université Paris-Sud 11, Université Paris 6, CNRS, Campus universitaire, Bat. 502, F-91405 Orsay, France (gondret@fast.u-psud.fr/Fax: +33 169158060)

(2) Unité de Mécanique, Ecole Nationale Supérieure de Techniques Avancées, 32 boulevard Victor, F-75015 Paris, France

(3) Laboratoire Pierre Aigrain, Université Paris 7, CNRS, Ecole Normale Supérieure, 24 rue Lhomond, F-75231 Paris, France

We are studying the slope relaxation of either dry or water immersed granular avalanches in small scale laboratory experiments (glass beads in a rotating drum or in a long thin inclinable cell). For the water immersed case, the pile slope relaxes in a quasi-static way, and the corresponding slow process may last few minutes to few hours [1]. By contrast, inertia is important for the dry case: the quick relaxation of the pile slope last only few seconds and the stopping angle is found to be correlated to the starting angle beyond the intrinsic fluctuations of these characteristic pile angles [2]. This observed correlation defines an another characteristic intermediate “neutral” angle that is crucial for a good understanding of the avalanche dynamics [2]. Contrary to water immersed avalanches for which the time duration is found to be all the more large for large avalanche amplitude [1], dry avalanches are found quicker at larger amplitudes [2]. For both the water immersed case and dry case, the velocity profile in the thin flowing layer has been measured by PIV means and thus the time evolution of the grain flux during an avalanche from start to stop [1,3]. We have also investigated the influence of a water flow parallel to the pile slope on its stability. We have found a stabilizing (resp. destabilizing) effect for an upward (resp. downward) direction of the water flow [4].

[1] D. Doppler, P. Gondret, T. Loiseleux, S. Meyer, and M. Rabaud, “Relaxation dynamics of water-immersed granular avalanches,” J. Fluid Mech. **577**, 161-181 (2007).

[2] R. Fischer, P. Gondret, B. Perrin, and M. Rabaud, “Dynamics of dry granular avalanches,” submitted to Phys. Rev. Lett. (2008).

[3] S. Courrech du Pont, R. Fischer, P. Gondret, B. Perrin, and M. Rabaud, “Instantaneous velocity profile during granular avalanches,” Phys. Rev. Lett. **90**, 048003 (2005)

[4] T. Loiseleux, P. Gondret, M. Rabaud, and D. Doppler, “Onset of erosion and avalanche for an inclined granular bed sheared by a continuous laminar flow,” Phys. Fluids **17**, 103304 (2005).