Granular collapse in a fluid: Role of the initial volume fraction
LOÏC RONDON, OLIVIER POULQUEN, PASCALE AUSSILLOUS, Laboratoire IUSTI, UMR 6595 CNRS, Aix Marseille Université (UI, UII), 5 rue Enrico Fermi, 13465 Marseille cedex 13, France, GROUPE ECOULEMENT DE PARTICULES TEAM — The collapse of a granular column suddenly released on a plane has been intensively studied the last ten years in the case of a granular medium with no interaction with the interstitial fluid. However, in many geophysical events like submarine avalanches or landslides, the interaction between the grains and the surrounding fluid plays a crucial role. In this work, we experimentally studied the collapse of a granular mass in a viscous liquid. We found that contrary to the dry case, the aspect ratio of the initial mass is no longer the only relevant parameter controlling the deposit morphology. In the viscous regime, the dynamics is controlled by the initial volume fraction of the mass. Two different regimes are identified. For initially loose packing the deposits are thin and long, the dynamics is fast and a positive liquid pressure is measured below the column. For dense packing, the run out distance is twice less, the flow is slow and a negative pore pressure is measured during the flow. These results suggest that the dynamics of the granular collapse in a fluid is strongly affected by the dilatancy or contractancy behaviour of the granular media.

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Date submitted: 03 Aug 2010

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