



Planar collapse of a granular column : experiments and discrete element simulations

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The collapse of a granular column is an intriguingly simple table-top experiment which exhibits a host of interesting phenomena. Here, we introduce a planar version in which the collapsing column is only one particle deep perpendicular to the plane of motion to make observations of the internal motion possible. This configuration also particularly lends itself to comparison with discrete element simulations which are performed in tandem. Our experiments confirm that this planar system displays all the same features as a collapsing cylinders and rectangular blocks. In particular, the dominant dependence on the initial parameters of the column runout is through a power law of the initial height-to-width aspect ratio. Discrete element simulations, which are found to reproduce the experimental behaviour very well, are then used to analyse the velocity field of the collapse process. A predominantly-linear velocity profile is found in a moving layer over an evolving static pile. The time-dependent strain rate in the moving layer is in reasonable correspondance with a strain rate prediction for flow down a fixed slope by Rajchenbach (*Phys. Rev. Lett.* **90** 144302, 2003).