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Dynamics in cohesive granular flow[1] JENNIFER RIESER, WENBIN LI, JU LI, University of Pennsylvania, JERRY GOLLUB, Haverford College, DOUGLAS DURIAN, University of Pennsylvania — Inter-particle interactions often have a dramatic effect on granular flow dynamics. Here, we explore the flow resulting from an applied compressive stress on a granular pillar composed of a single layer of particles. Grain-grain attractions within the pillar are governed by tunable capillary forces induced by an interstitial fluid. Both the applied stress and the grain positions are monitored as a function of time. We determine the probability distributions of particle translational and angular velocities, local packing fraction, and the number of nearest neighbors as a function of time. In addition, instantaneous velocities are used to characterize larger scale spatial structures that emerge in the flow from the collective motion of particles. We see a striking dependence on initial conditions, for instance in the development and in the behavior of slip planes, both of which are found to be qualitatively similar to molecular dynamics simulations.

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