Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Computationally and experimentally assessed gravity-driven, mono- and bidisperse, particle-laden flows SHREYAS KUMAR, Harvey Mudd College, KAIWEN HUANG, UCLA, MATT HIN, Cornell University, GILBERTO URDANETA, ALIKI MAVROMOUSTAKI, JEFFREY WONG, UCLA, SUNGYON LEE, Texas A&M, ANDREA BERTOZZI, UCLA — We present an experimental study which investigates the motion of granular materials in mono- and bi-disperse suspensions consisting of silicone oil, glass and ceramic beads. The beads are of distinct densities both denser than the oil but of approximately the same size. A finite volume of slurry is allowed to flow down an inclined plane and the subsequent flow development is recorded. The system parameters are the angle of inclination, the total particle concentration and the relative amount of heavy (ceramic) to light (glass) beads. Similarly to the results observed in previous studies of mono-disperse slurry flows, in bidisperse suspensions, there exist two stable flow regimes: the first one involves settling of particles to the substrate while, in the second one, the particles aggregate at the front of the flow. We carry out a series of experiments to investigate the effect of system parameters on the resulting flow regime patterns and compare our results with a theoretical model which incorporates the effects of shear-induced migration and sedimentation in bidisperse suspensions of negatively buoyant particles. Further, we use fluorescent particle beads to compare the particle spatio-temporal evolution observed in experiments against numerical simulations.

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Date submitted: 01 Aug 2013 Electronic form version 1.4