Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Interfacial Granular Intrusions PAUL LINDEN, ZHONG ZHENG, HERBERT HUPPERT, NATHALIE VRIEND, JEROME NEUFELD, University of Cambridge — We study experimentally the intrusion of light granular material into an inviscid fluid of greater density. Despite a rich set of related geophysical and environmental phenomena, such as the spreading of calved ice and volcanic ash and debris flows, there are few previous studies on this topic. We conduct a series of lock-release experiments of light spherical beads into a rectangular tank initially filled with either fresh water or salt water, and record the time evolution of the interface shape and the front location of the current of beads. In particular, we find that the front location obeys a power-law behaviour during an intermediate time period following the release of the lock before the nose of beads reaches a maximum runout distance within a finite time. We investigate the dependence of the scaling exponent and runout distance on the total amount of beads, the initial lock length, and the properties of the liquid that fills the tank in the experiments. Appropriate scaling arguments are provided to collapse the raw experimental data into universal curves, which can be used to describe the front dynamics of light granular intrusions with different size and buoyancy effects and initial aspect ratios.

Paul Linden
University of Cambridge

Date submitted: 01 Aug 2017 Electronic form version 1.4