Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Collapsing granular beds: The role of interstitial air DEVARAJ VAN DER MEER, CHRISTA GJALTEMA, TESS HOMAN, Physics of Fluids group, University of Twente, the Netherlands — A pre-fluidized sand bed consisting of fine particles compactifies when it is subjected to a shock. We find that the response depends on both the shock strength and the ambient pressure where, counterintuitively, the bed height decreases less at lower ambient pressures. We investigate what happens to the interstitial air during compaction by measuring the pressure variations above and below the bed: The top pressure is observed to decrease abruptly –on the time scale of the compaction– whereas that below the bed very slowly rises to a maximum. Subsequently both pressures slowly relax to ambient values. We introduce a one-dimensional diffusion model that uses only the change in bed height and the ambient pressure as an input, and find that it accurately accounts for the measured pressure variations.

Devaraj van der Meer
Physics of Fluids group, University of Twente, the Netherlands

Date submitted: 24 Jul 2013 Electronic form version 1.4