Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Underlying Asymmetry with Particle-Size Segregation PARMESH GAJJAR, The University of Manchester, KASPER VAN DER VAART, GAEL EPELY-CHAUVIN, NICOLAS ANDREINI, cole Polytechnique Fdrale de Lausanne, NICO GRAY, The University of Manchester, CHRISTOPHE ANCEY, cole Polytechnique Fdrale de Lausanne — Granular media have a natural tendency to self-organise when sheared, with different sized constituents counter-intuitively separating from each other. Not only does the segregation produce a rich diversity of beautiful patterns, but it can also have serious implications in both industrial and geophysical environments. Despite the universal importance, the individual particle dynamics during segregation are still poorly understand, with such an analysis proving to be difficult with conventional techniques such as binning and sidewall observation. This talk will present results of recent experiments that studied particle scale segregation dynamics during oscillatory shear. Refractive index matched scanning allowed examination of the interior of the flow, where it was observed that large and small particles have an underlying asymmetry that is dependant on the local particle concentration. Small particles were seen to segregate faster through regions of many large particles, whilst large particles rise slower through regions of many small particles. The asymmetry is quantified on both bulk and particle length scales, and is shown to have good agreement with a continuum model that uses a cubic segregation flux.

Parmesh Gajjar
The University of Manchester

Date submitted: 27 Jul 2015 Electronic form version 1.4