Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

Slow granular flows in a Split-Bottom Couette device PETER DSOUZA, PRABHU NOTT, Indian Institute of Science — We present DEM simulations and experiments of slow shear of granular materials in a split-bottom Couette device. This device is a cylindrical cup with a split base, wherein a central disc that is flush with the bottom rotates, while all other walls of the device are stationary[1]. Shear originates at the split between this disc and the rest of the base. This device has been widely used to validate rheological models for granular flows since it exhibits wide shear bands. We show that by changing the fill height of the device, we change the location of shear in the material. We then show the presence of system spanning vortices in addition to the primary azimuthal flow. These vortices are like those seen in the cylindrical Couette device[2]. We show that the form of the vortices can be explained by accounting for shear-induced dilation in the system, validating the arguments made for the vortices seen in the Cylindrical Couette device[2]. No current rheological models for slow granular flow allow for shear-induced dilation and thus can't capture these vortices. We thus make the case that dilation needs to be included in any rheological model for slow granular flows. 1.Dijksman, & van Hecke, 2010, Soft Matter 2.Krishnaraj, & Nott, 2016, Nature Comm

Peter Dsouza
Indian Institute of Science

Date submitted: 26 Jul 2019 Electronic form version 1.4