Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Jammed Clusters and Non-locality in Dense Granular Flows
PRASHIDHA KHAREL, PIERRE ROGNON[1], University of Sydney — We investigate the micro-mechanisms underpinning dense granular flow behaviour from a series of DEM simulations of pure shear flows of dry grains. We observe the development of transient clusters of jammed particles within the flow. Typical size of such clusters is found to scale with the inertial number with a power law that is similar to the scaling of shear-rate profile relaxation lengths observed previously[2]. Based on the simple argument that transient clusters of size ℓ exist in the dense flow regime, the formulation of steady state condition for non-homogeneous shear flow results in a general non-local relation, which is similar in form to the non-local relation conjectured for soft glassy flows[3]. These findings suggest the formation of jammed clusters to be the key micro-mechanism underpinning non-local behaviour in dense granular flows.

[1]Particles and Grains Laboratory, School of Civil Engineering, The University of Sydney, Sydney, NSW 2006, Australia
[2]K. Kamrin and G. Koval, Physical Review Letters 108, (2012); M. Bouzid, et al., Physical Review Letters 111, (2013); P. G. Rognon, et al., Journal of Fluid Mechanics 764, 171 (2015)
[3]Goyon, et al., Nature 454, 84 (2008)

Prashidha Kharel
University of Sydney

Date submitted: 05 Nov 2015 Electronic form version 1.4