MAR17-2016-001432

Abstract for an Invited Paper
for the MAR17 Meeting of
the American Physical Society

Characterizing Granular Networks Using Topological Metrics

JOSHUA DIJKSMAN, Wageningen University

We consider a granular system as it undergoes shear jamming. Using measures ranging from microscopic, through mesoscopic to system-wide characteristics, we observe that mesoscopic force networks properties provide a key link between micro and macro scales. To show the importance of mesoscopic length scales, we carry out both physical experiments and simulations that carefully reproduce the experimental conditions. The acquired data are directly compared across the different spatial scales. We find that the conventional measures, including stresses and contact numbers are similar between experiments and simulations. In particular, the various measures presented here depend in a universal manner on the fraction of non-rattler particles, f_{NR}. However, force networks exhibit high sensitivity to small differences between experiments and simulations. These differences are clearly captured by topological measures. We show that topological methods are needed for meaningful comparison between experiments and simulations.