Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Effect of friction on shear jamming[1] DONG WANG, JONATHAN BARES, Duke University, JOSHUA DIJKSMAN, Wageningen University and Research Centre, JIE REN, Merck & Co., HU ZHENG, Hohai University; Duke University, ROBERT BEHRINGER, Duke University — Shear jamming of granular materials was first found for systems of frictional disks, with a static friction coefficient $\mu \approx 0.6$ (Bi et al. Nature (2011)). Jamming by shear is obtained by starting from a zero-stress state with a packing fraction ϕ between ϕ_J (isotropic jamming) and a lowest ϕ_S for shear jamming. This phenomenon is associated with strong anisotropy in stress and the contact network in the form of force chains, which are stabilized and/or enhanced by the presence of friction. Whether shear jamming occurs for frictionless particles is under debate. The issue we address experimentally is how changing friction affects shear jamming. By applying a homogeneous simple shear, we study the effect of friction by using photoelastic disks either wrapped with Teflon to reduce friction or with fine teeth on the edge to increase friction. Shear jamming is still observed; however, the difference $\phi_J - \phi_S$ is smaller with lower friction. We also observe larger fluctuations due to initial configurations both at the lowest and the highest friction systems studied. Ongoing work is to characterize response from different friction systems under shear with information at local scale.

[1]We acknowledge support from NSF-DMR1206351, NASA NNX15AD38G and W.M. Keck Foundation.

Dong Wang
Duke University

Date submitted: 27 Jul 2015 Electronic form version 1.4