Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Rheology of U-Shaped Granular Particles MATTHEW HILL, SCOTT FRANKLIN, Rochester Institute of Technology — We study the response of cylindrical samples of U-shaped granular particles (staples) to extensional loads. Samples elongate in discrete bursts (events) corresponding to particles rearranging and re-entangling. Previous research on samples of constant cross-sectional area found a Weibullian weakest-link theory could explain the distribution of yield points. We now vary the cross-sectional area, and find that the maximum yield pressure (force/area) is a function of particle number density and independent of area. The probability distribution function of important event characteristics the stress increase before an event and stress released during an event both fall of inversely with magnitude, reminiscent of avalanche dynamics. Fourier transforms of the fluctuating force (or stress) scales inversely with frequency, suggesting dry friction plays a role in the rearrangements. Finally, there is some evidence that dynamics are sensitive to the stiffness of the tensile testing machine, although an explanation for this behavior is unknown.

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Date submitted: 05 Nov 2015 Electronic form version 1.4