Abstract Submitted
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Jamming under shear[1] JIE ZHANG, JIE REN, SOMAYEH FARHADI, ROBERT BEHRINGER, Duke University — We describe experiments in which we consider the jamming of 2D granular materials under shear. We consider experiments involving both pure and simple shear. The particles making up the material are either disks or ellipses, and in both cases, they are fabricated from a photoelastic material. It is then possible to obtain quantitative data for contact forces, and all other relevant grain-scale information. A key observation from these experiments is that initial states with densities below isotropic jamming can be jammed under applied shear in a range of packing fractions between $\phi_{min} \leq \phi \leq \phi_J$, where ϕ_J corresponds to the isotropic (zero shear stress) jamming point. We explore the behaviour of the above systems for ϕ's in and near this regime. Specifically, we determine particle contacts and the mean contact number per particle, Z, the number of nearest neighbors, the shear and normal stresses, τ and P, and kinematic properties such as particle rotation and displacement. We find that the states of the system lie on a surface in a space consisting of ϕ, P, and τ. As time permits, we will explore the affine and non-affine motion of particles.

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