

Abstract Submitted
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Two-dimensional dense granular material subject to uniform simple shear¹ JIE REN, R. BEHRINGER, Duke University — We have performed 2D shear experiments using photoelastic particles and a novel apparatus to investigate the role of shear strain on the jamming of a dense granular material. The goal of this work is to explore the shear stress axis in the jamming phase diagram proposed by Liu and Nagel. The experiments are carried out using a 2D simple shearing apparatus, whose base is specifically designed to perform nearly uniform shear at the particle scale across the shearing area. By using photoelastic particles, we can measure stresses, strains, contact forces, and particle displacements while shearing. We note two important observations from this work: 1) for densities that are below the value for isotropic jamming, the system jams when subject to shear strain; 2) starting from jammed isotropic states at higher densities, the application of quasi-static shear at constant density does not lead to failure, but rather a strengthening of the system.

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Robert Behringer
Duke University

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