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Response of Two-Dimensional Statically Jammed Frictionless Disks at Constant Pressure to Increasing Pure Shear Stress[1] BENJAMIN COHEN-STEAD, Whitman College, YEGANG WU, STEPHEN TEITEL, University of Rochester — We perform numerical simulations of a model two-dimensional granular system composed of a bidisperse distribution of soft-core, circular, frictionless disks. Starting from randomly quenched, mechanically stable, configurations at fixed isotropic pressure above the jamming transition, we gradually increase the applied pure shear stress, under conditions of fixed pressure, until we reach the yield stress at which stability is lost and the system begins to flow. Averaging over many different initial configurations, we compute the average packing fraction and average shear and compressional strains, as the shear stress is increased to yielding. We find that the response of the system is non-monotonic in the applied shear stress. As the shear stress initially increases from zero, the system compresses (packing fraction increases at fixed pressure); but at a shear stress equal to roughly 70% of the yield stress, the system starts to dilate (packing fraction decreases at fixed pressure).

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