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Shear jamming in highly strained granular system without shear banding[1] YIQIU ZHAO, Duke University, JONATHAN BARS, Universit de Montpellier, HU ZHENG, ROBERT BEHRINGER, Duke University — Bi et al. (Nature 2011) have shown that, if sheared, a granular material can jam even if its packing fraction (ϕ) is lower than the critical isotropic jamming point ϕJ. They have introduced a new critical packing fraction value ϕS such that for ϕS$<\phi<\phi$J the system jams if sheared. Nevertheless, the value of ϕS as a function of the shear profile or the strain necessary to observe jamming remain poorly understood because of the experimental complexity to access high strain without shear band. We present a novel 2D periodic shear apparatus made of 21 independent, aligned and mirrored glass rings. Each ring can be moved independently which permits us to impose any desired shear profile. The circular geometry allows access to any strain value. The forces between grains are measured using reflective photoelasticity. By performing different shear profiles for different packing fractions we explored the details of jamming diagram including the location of the yield surface.

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