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Continuous Geometric Families of Mechanically Stable Particle Packings GUOJIE GAO, Dept. of Mechanical Engineering, Yale University, JERZY BLAWZDZIEWICZ, COREY O'HERN, Dept. of Mechanical Engineering & Dept. of Physics, Yale University — We have performed numerical simulations of quasistatic shear flow of soft disks at zero pressure to generate mechanically stable (MS) packings as a function of applied shear stress/strain in small 2D systems ranging from 4 to 20 disks. In systems composed of frictionless disks, we find that at any given shear strain, there are a finite number of dicrete MS packings characterized by the positions of all particles. In contrast, there are an infinite number of MS packings during continuous shear flow that form a finite geometric families (characterized by the network of interparticle contacts) as a function of shear strain. We count the number of geometric families and measure their length in strain as a function of system size. In particular, we will determine whether the MS packings at finite shear have different structural and mechanical properties from those at zero shear. We also study the effects of friction on MS particle packings. In contrast to frictionless MS packings, frictional packings form continuous geometric families even at a zero shear strain.

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