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Jamming of deformable foams

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The jamming transition of soft athermal particles has long been explored by numerical models of undeformable spheres/circles and the researchers have extensively studied the critical behavior of the particles near jamming. It is now well known that the shear modulus of undeformable particles scales as the square root of the proximity to the jamming transition density. However, the square-root scaling of the shear modulus has never been validated experimentally and one questions whether "deformability" of the particles alters the critical scaling. In this study, we numerically investigate the jamming transition of deformable foams to examine the influence of deformability. We show that the critical scaling of pressure, elastic energy, and excess coordination number is well established and the vibrational density of states (VDOS) exhibits a plateau above a characteristic frequency. We also examine the finite size scaling of shear modulus to clarify the effect of deformability.

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