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Finite size analysis of zero-temperature jamming transition under applied shear stress[1] HAO LIU, USTC, No.96, JinZhai Road, Hefei, Anhui, 230026, P.R.China, XIAOYI XIE, Department of Physics, New York University, New York, NY 10012, NING XU, USTC, No.96, JinZhai Road, Hefei, Anhui, 230026, P.R.China — We generate jammed packings of frictionless spheres under constant shear stress by minimizing an enthalpy-like energy. At fixed volume fraction and shear stress, we enumerate jammed states out of a large number of independent minimizations. The yield stress is defined as the shear stress at which the probability of finding jammed states is 50%. We find that the yield stress for three-dimensional systems with harmonic repulsion satisfies the finite size scaling, which implies a diverging length scale approaching the unjamming transition at zero temperature and shear stress. Interestingly, the same length scale is exhibited as well in finite size scaling of typical quantities concerned in the study of jamming at zero shear stress, including the potential energy, pressure, coordination number, and shear modulus. This consistency indicates that the length scale found here is robust and universal for three-dimensional systems with harmonic repulsion.

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