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Non-affine elasticity in jammed systems

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Symmetry dictates that perfect crystals should deform homogeneously, or *affinely*, under external load, and computing the elastic moduli from the underlying interaction potential is then straightforward. For disordered materials no such simple procedure exists, and recent numerical works have demonstrated that non-affine corrections can dramatically reduce the naive expectation for the shear modulus in a broad class of disordered systems and may control rigidity loss in the zero pressure limit in purely repulsive systems, i.e. the unjamming transition (c.f. [O'Hern et. al. PRE 68, 011306 (2003)]). We present numerical results and an analytical framework for the study of these non-affine corrections to the elastic response of disordered packings.