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Mechanical Properties of Hydrogel Beads KEELY CRIDDLE, THOMAS BENNS, DAN SHORTS, KLEBERT FEITOSA, James Madison University — Fragile solids made of dense disordered packing of bubbles, droplets and grains are able to withstand small stresses by virtue of system-wide force chains that lock the system into a jammed state. The nature of the jamming transition in such soft materials has been the subject of intense research, but despite much effort, a deep understanding remains elusive. In this experiment we study the mechanical properties of hydrogel beads to exploit them as force transducers in densely packed systems. The experiment consists of applying uniaxial planar compressions on the beads, and correlating the force to the bead's strain and contact area. The results show that while the strain scales linearly with the diameter of the contact area, the force and strain are found to obey a power law relation with two distinct exponents at small and large strains. This result leads to a power law dependence of the force on the contact area diameter of the compressed bead.

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