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**Imaging Forces in a Three-Dimensional Granular Material**

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Duke University — We experimentally study the quasi-static deformation of three-dimensional sphere packings subjected to macroscopic deformation. We perform these experiments on slightly polydisperse, nearly frictionless soft hydrogel spheres in a modified tri-axial shear apparatus. We resolve the microscopic force network in a this three dimensional packing of spheres through imaging the entire packing. By resolving particle deformations via custom written image analysis software, we extract all particle contacts and contact forces. In addition, we measure boundary stresses during compression and shear. We address the non-linear force response of a disordered packing under compression, force network dynamics and explore the plastic rearrangements inside cyclically sheared and compressed packings.

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