

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

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

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