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**Force network in a three-dimensional sheared material** NICOLAS BRODU, INRIA Bordeau, JONATHAN BARES, Duke University, JOSHUA DIJKSMAN, Wageningen University, BOB BEHRINGER, Duke University — Force chains in 2D granular material have been widely studied over the past decade. However the force network evolution when a 3D granular medium is sheared remains poorly understood due to the complexity of carrying out experimental observations. We present experiments using a novel apparatus to measure particle motion and inter-particle forces in the case of the quasi-static deformation of a 3D sphere packing subject to shear and compression. We perform these experiments on slightly polydisperse and very low-friction soft hydrogel spheres. We resolve the microscopic force network in a three dimensional packing by imaging the entire packing at each loading steps using a laser scanning technique. By resolving particle deformations via custom image analysis software, we extract all particle contacts and contact forces with a very good accuracy. We observe an increase of pressure, P, the Reynolds pressure during shear. This rise in pressure is associated with the evolution of the microscopic force network. The flow of particles is also investigated and correlated to the evolution of the network.

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