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Packing structure of cyclically sheared dense granular spheres ANDREEA PANAITESCU, ARSHAD KUDROLLI, Clark University — We characterize the structure of densely packed frictional granular spheres cyclically sheared between parallel walls under constant pressure boundary conditions with a fluorescent refractive index matched liquid imaging technique. This technique allows us to measure the three dimensional particles position and obtain the Voronoi tessellation corresponding to the particles in the bulk. We calculate the radial distribution function, g(r) from the measured position and show that its significant features can be captured by the Percus-Yevick formula derived for frictionless random packed spheres for initial volume fraction $\Phi = 0.59$\$. However, small but systematic deviations are observed because of the splitting of the second peak as Φ is increased by 3%. The angular correlation of the particles as measured by the bond order metric, Q_6 shows disorder compared to a close packed structure, but similar to those shown by frictionless spheres. The distribution of the Voronoi free volume is described by a three-parameter gamma distribution postulated for random packing of spheres. Overall, these measure show significant similarity of the observed granular packing compared with random packing of frictionless spheres, but some systematic differences as well.

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