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Self-diffusion in bulk sheared granular materials ANDREEA PANAITESCU, ASHISH ORPE, ARSHAD KUDROLLI, Department of Physics, Clark University — We will discuss the diffusion and structural properties of granular particles in the bulk of a cyclically sheared three dimensional rectangular cell. The particles are visualized away from the side walls using a fluorescent refractive index matched interstitial fluid. Previous studies have shown that the diffusion is anisotropic with respect to the vorticity plane, but these results have been confined to either two dimensional systems or small three dimensional systems where the boundary effects could not be decoupled. In a cyclic shear cell, the packing fraction the particles and their orientational order vary smoothly over time. The particle positions are identified and tracked over long durations to obtain particle diffusivity, mean-squared displacements and probability distributions of particle displacements. An analysis of the effect of structural order on the motion of the particles will be presented.

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