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Particle-to-Particle Dynamics in a Granular Pile Subject to Cyclic Shear STEVEN SLOTTERBACK, WILLIAM UPDEGRAFF, University of Maryland, MARTIN VAN HECKE, Universiteit Leiden, WOLFGANG LOSERT, University of Maryland — We report a study of the particulate motions of a granular pile under cyclic shear and how they relate to the bulk rheological properties of the pile. Using a laser sheet scanning technique, we track the trajectories of all of the particles within a section of a split-bottom shear cell. We shear the pile quasistatically to ensure rate independence of shear stress. Immediately after reversal of the shear direction, we observe a transient drop in shear stress of the pile over a characteristic strain. We construct a network of nearest neighbors that roll or slide past one another between frames. We find that, for strain amplitudes less than the aforementioned characteristic strain, rolling/sliding links are extinguished with higher frequency than for larger amplitudes. We also report other particle level measures, such as mean squared displacements, for various amplitudes of oscillatory shear.

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