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Local Rearrangements in a Dense Granular Medium During Steady and Oscillatory Shear STEVEN SLOTTERBACK, University of Maryland: College Park, KRISZTIAN RONASZEGI, Budapest University of Technology and Economics, WIM VAN SAARLOOS, Leiden University, WOLFGANG LOSERT, University of Maryland College Park — Cooperative motion is a hallmark of dense granular media. Using the laser sheet scanning method described in [1], we are able to track the motions of all particles in a dense packing of spheres in three dimensions. We analyze the motions of all particles within a split bottom shear cell. We study both steady and oscillatory shearing processes. We compare relative motions of neighboring particles using a measure, P(cos(α)), based on a measure originally used by Ellenbroek et al [1]. The angle, α, is the angle between the relative displacements of neighboring particles and their bond vectors. A pair of neighboring particles where cos(α)=0 is called a rolling contact. We find that particles in contact tend to roll past one another, which is consistent with the findings made by Ellenbroek et al for systems close to jamming. We also find that the number of rolling contacts drops at the onset of a shear reversal. [1] Slotterback et al, to appear in Phys Rev Lett [2] Ellenboek et al., Phys Rev Lett, 97 258001 (2006)

Steven Slotterback
University of Maryland: College Park

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