Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

Boundary stresses due to sheared granular mixtures BEREKET YOHANNES, KIMBERLY HILL, Department of Civil Engineering, University of Minnesota, Minneapolis, Minnesota, LESLIE HSU, WILLIAM DIETRICH, Department of Earth and Planetary Science, University of California, Berkeley, California
— Models for stress produced by a sheared granular layer indicate stress should scale with particle size (such as the classic model suggested by Bagnold in 1954 where stress scales as particle size squared [1]). However, it is not clear how this particle-size scaling should be modified for a mixture of different-sized particles, important for applications such as debris flows. We investigate external stresses generated by a dense sheared granular mixture flowing in a thin layer over a solid boundary. To do so, we use Distinct Element Method (DEM) simulations based on a soft sphere model and compare the results with large-scale experimental measurements. Based on results from a variety of mixtures of different-sized particles, we have found that the scaling of the stress at the boundary does not depend on a simple metric such as average particle size. Instead, the scaling of the stress appears to have a more complicated dependence on both the relative sizes of the particles in the mixture and the relative concentration of the different species. [1]R.A. Bagnold (1954) Proc. R. Soc. Lond., A 225 pp. 49-63.

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Date submitted: 06 Aug 2008 Electronic form version 1.4