Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Assessing a Continuum Description of Wide Shear Zones in Slow Granular Flow by Discrete Element Simulations JEREMY B. LECHMAN, GARY S. GREST, Sandia National Laboratories*, MARTIN DEPKEN, Instituut-Lorentz for Theoretical Physics, MARTIN VAN HECKE, Kamerlingh Onnes Lab — While the rheology of rapid granular flows is becoming well established, slow, dense flows are not well characterized in part because the strain localization (i.e., shear bands) they often exhibit is not easily amenable to continuum descriptions. Recently, a novel experimental system (split-bottom Couette Cell) was developed with promising potential to give new insight into these flows due to its wide, smooth shear zones (Fenistein et al. PRL **92**, 94301). Subsequent experimental and numerical studies have lead to a good understanding of the nature of the flow in this device, which has lead Depken et al. (cond-mat/0510524) to propose a set of testable constitutive relations between the internal stresses and flow field. In particular, they suggest that the bulk, effective friction coefficient between sliding layers of particles is not constant, but has a subtle dependence on the orientation of the layers with respect to the bulk force. Here we present large-scale Discrete Element Simulations to analyze the bulk flow in both circular, above and below the critical height, and linear, where no critical height for slip at the base is found, split-bottom geometries. We check the proposed form of the stress tensor and assess the validity of the claim that the effective friction coefficient depends on the shape of the shear zone with respect to gravity.

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Date submitted: 30 Nov 2005

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