Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Nonlinear stability of granular shear flow: shear banding PRIYANKA SHUKLA, PhD Student, MEHEBOOB ALAM, Prof. — We show that a Landau-type 'order-parameter' equation describes the onset of shear-band formation in granular plane Couette flow wherein the flow undergoes an ordering transition into alternate layers of dense and dilute regions of low and high shear rates, respectively, parallel to the flow-direction. Even though the linear theory predicts the stability of the homogeneous shear solution in dilute flows, our analytical bifurcation theory suggests that there is a sub-critical finite-amplitude instability that is likely to lead to shearband formation in dilute flows which is in agreement with previous numerical simulations.

Priyanka Shukla
PhD Student

Date submitted: 23 Jul 2010 Electronic form version 1.4