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Simulating and Shaking a Rotating Drum of Beads MICHAEL NEWEY, University of Maryland, IREAP deparment, ANDREW PORTER, University of Maryland, NICOLAS TABERLET, Rennes University, France, WOLFGANG LOSERT, University of Maryland — It is well known that different sized particles will segregate when rotated in a horizontal cylinder, but the mechanism–for axial segregation in particular–is not well understood. We use a combination of high-speed imaging and perturbation experiments to elucidate flow properties during axial segregation in bi- and tri- disperse mixtures in a rotating drum. In addition, we use molecular dynamics (MD) simulations to investigate the motion of particles in the bulk and to measure internal stresses and dissipation. Experimental results indicate slow convective flow on timescales comparable to the band formation time. We use MD simulation to thoroughly investigate this possibility in three dimensions. The MD simulations also highlight the crucial role of sidewalls in the segregation phenomena. To further investigate the stability properties of the flowing layer, we shake the rotating drum horizontally–perpendicular to the surface flow direction. This allows us to estimate a 'viscosity' of the flowing layer based on amplitude and phase lag of the oscillation at the surface of the flow.

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