

JAMMING OF PROLATE GRANULAR MATERIALS IN THREE-DIMENSIONAL HOPPER FLOWS. *S. Barker and S. Franklin, Department of Physics, sgb1362@rit.edu, svfsps@rit.edu*

One interesting feature of very prolate (long and thin) granular materials is their ability to form jammed states which are resistant to perturbations. We are studying this behavior in the context of a three-dimensional wedge-shaped hopper, a scenario that occurs frequently in industrial settings, and which has been studied in some detail for approximately spherical granular materials. Particle size, aspect ratio (length/diameter) and hopper aperture width can be varied independently. The number of particles that falls through the hopper at a given aperture width varies greatly among individual trials. The distributions are exponential, similar to those observed in previous experiments with regular granular materials. This is surprising, given the obvious differences between the two types of matter. This common behavior can be described by a model that assumes that, for a given hopper opening, each particle has the same probability of passing through the aperture. A further point of interest is that the flow size distributions can be fully characterized by the mean avalanche size. While the divergence of mean throughput with exit aperture shows scaling similar to that in ordinary materials, the large aspect ratio materials jam in much larger openings than do rounder particles.