Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Granular Flow in a Tumbler Under Variable g-Levels ANTJE BRUCKS, ZARM, University of Bremen, JULIO M. OTTINO, RICHARD M. LUEPTOW, Northwestern University — The Froude number $\omega^2 r/g$, where ω is the rotational speed, r the radius of the tumbler and g the gravitational acceleration, is frequently used to characterize a granular flow. Although g appears in the Froude number, little is understood about how its variation affects the nature of granular flow. Experiments were performed with $0.5mm$ glass beads in a half-full, quasi-two dimensional 45mm radius tumbler at high g-levels. The tumbler was mounted in a large centrifuge to provide high g-levels. At a particular tumbler rotational speed, the dynamic angle of repose decreases as the g-level increases from $1g$ to $25g$. However, the data at all g-levels collapses so that the angle of repose is independent of the g-level when plottet as a function of the Froude number. Furthermore, the shape of the surface of the flowing layer depends only on the Froude number, not directly on g. Thus, the Froude number appears to characterize the nature of the flowing layer in a tumbler when both ω and g are varied.

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Date submitted: 16 Aug 2005 Electronic form version 1.4