

Abstract Submitted
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Crossover from collisional to frictional regime in a 3-dimensional granular flow EFFROSYNI SEITARIDOU, ELLEN KEENE, NALINI EASWAR, Smith College, Northampton, MA., NARAYANAN MENON, University of Massachusetts, Amherst, MA. — We have made measurements of the fluctuations in the pressure at several points on the boundary of a 3-dimensional, gravity-driven flow of slightly-polydisperse, smooth glass spheres. The flow is contained in a cylinder, with the flow rate being controlled over a factor of 30 by an aperture far downstream of the pressure measurement. As the flow velocity is decreased, we observe a crossover from a situation where momentum is transferred to the walls almost entirely by collisions to a situation where balls are almost always sliding against the walls. We parametrize this transition by measuring the fraction of time that a ball is in contact with the wall, a number that tends to unity in very slow flows prior to jamming. We present measures of the statistics and temporal fluctuations of the force delivered to the wall in both regimes. We find that in the collisional regime distributions of force are similar to those previously found in 2-dimensional flows(1), however, the distributions in the frictional regime are fundamentally new. Supported by NSF DMR 0305396 and NSF MRSEC DMR 0213695 (1). E. Longhi, N. Easwar and N. Menon, Phys.Rev.Lett, 89 (2002)

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