Abstract Submitted
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Experimental Measurements on a Three-Dimensional Vertical-Channel Granular Flow[1] KEVIN FACTO, CHAO HUAN, DONALD CANDELA, University of Massachusetts, Amherst, RONALD WALSWORTH, ROSS MAIR, Harvard-Smithsonian CFA — Experimental measurements using NMR techniques are presented for a dense, three-dimensional granular flow through a cylindrical vertical channel. The flow is measured far from the channel inlet and outlet, where it assumes an asymptotic form in which gravitational stress is completely supported by the side walls. Theoretical descriptions of this system have ranged from transitory force chains transmitting long-range stresses on the one hand, to viscous-fluid or other local constitutive equations on the other hand. Using NMR, we are able to measure both the mean flow profile and the spectrum of fluctuating deviations from the mean flow on millisecond time scales. The mean flow profile can reveal deviations from the parabolic profile of an ordinary liquid, while the fluctuations probe the diffusivity of grains. More complex NMR experiments probe time correlations in the grain motion, which may give information on caging effects similar to those proposed for glasses.

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