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Drag Force in a Gas Fluidized Granular Bed T.A. BRZINSKI, D.J. DURIAN, University of Pennsylvania, Dept. of Physics — We use a rheometer to measure the torque acting on a rotating bar in a bed of gas-fluidized glass beads. We vary rotation rate from .001-10rps, vary depth from 1-10 cm, and increase the fluidizing gas flow from no flow well into the fluidized regime. We observe that at high rotation rates the drag is roughly proportional to velocity squared. At low rates we can rescale the measured torque by depth, and observe a collapse of the data. These results agree with the predictions of a granular drag force model which has proven effective in predicting granular impact dynamics. The model consists of an inertial drag term, which is depth-independent and scales as velocity squared, and a frictional drag term, which is independent of rate and varies linearly with depth. We find, as expected, that while the frictional term is airflow-dependent the inertial term is uncoupled from the fluidization.

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