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Investigation of the effect of wall friction on the flow rate in 2D and 3D Granular Flow[1] BRENDA CARBALLO-RAMIREZ, MOLLIE PLEAU, NALINI EASWAR, Smith College, SUMIT BIRWA, TCIS Hyderabad, NEIL SHAH, SHUBHA TEWARI, University of Massachusetts — We have measured the mass flow rate of spherical steel spheres under gravity in vertical, straight-walled 2 and 3-dimensional hoppers, where the flow velocity is controlled by the opening size. Our measurements focus on the role of friction and its placement along the walls of the hopper. In the 2D case, an increase in the coefficient of static friction from μ =0.2 to 0.6 is seen to decrease the flow rate significantly. We have changed the placement of frictional boundaries/regions from the front and back walls of the 2D hopper to the side walls and floor to investigate the relative importance of the different regions in determining the flow rate. Fits to the Beverloo equation show significant departure from the expected exponent of 1.5 in the case of 2D flow. In contrast, 3D flow rates do not show much dependence on wall friction and its placement. We compare the experimental data to numerical simulations of gravity driven hopper granular flow with varying frictional walls constructed using LAMMPS*. *http://lammps.sandia.gov

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