Abstract Submitted
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Inertial particle accelerations in near-wall turbulence: comparison of experiments and simulations[1] VALENTINA LAVEZZO, ALFREDO SOLDATI, University of Udine, SERGIY GERASHCHENKO, California Institute of Technology, ZELLMAN WARHAFT, LANCE COLLINS, Cornell University, INTERNATIONAL COLLABORATION FOR TURBULENCE RESEARCH (ICTR) COLLABORATION — Recent experiments in a turbulent boundary layer (Gerashchenko et al. 2008) revealed surprising trends for inertial particle accelerations in the near-wall region. In particular, acceleration variance was seen to increase with increasing inertia, contrary to what is found in isotropic turbulence. They conjecture an explanation for this reversal in the trend based on the interaction of the inertial particle with the mean flow and gravity. To gain further insight into these findings, we perform direct numerical simulations (DNS) of channel flow with suspended inertial particles that are tracked in the Lagrangian frame of reference. The DNS parameters have been chosen to match those of the experiment, based on boundary layer scaling. Three swarms of particles with different Stokes numbers (0.88, 1.77 and 11.9) have been simulated. Results for the mean and RMS profiles of particle acceleration are in qualitative agreement with the earlier experiments.

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