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Particle migration and stresslet from fully resolved simulations of particles in turbulent pipe flows FEDERICO TOSCHI, ABHINEET GUPTA, HERMAN J.H. CLERCX, Eindhoven Univ of Tech — Particle-laden turbulent flows occur in a variety of natural and industrial flows. The numerical simulation of such flows still remains challenging and relatively fewer studies were conducted to investigate the coupling between fully resolved particles and turbulent flows. Here we will present fully-resolved numerical simulations (based on the Lattice Boltzmann Method) to investigate turbulent pipe flows laden with large neutrally-buoyant particles at low Reynolds number and under dilute conditions. In our study the energy input was kept fixed resulting in Reynolds numbers, based on friction velocity, around 250. Two different particle radii were used with particle to pipe diameters ratios of 0.05 and 0.075, respectively. Both Eulerian and Lagrangian statistical properties were quantified along with the stresslet exerted by the fluid on the spherical particles. The high particle-to-fluid slip velocity close to the wall corresponds, locally, to events of high energy dissipation which are absent in the single-phase turbulent flow. The migration of particles from inner to outer region of the pipe, the dependence of the stresslet on the particle radial positions and the fragmentation rate of particles, estimated using the stresslet, have also been investigated.

Federico Toschi
Eindhoven Univ of Tech

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