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The Role of Inertia in Particle Laden Flows HAMED HADDADI, JEFFREY MORRIS, Levich Institute, City College of New York — The microstructure and rheological properties of suspensions of neutrally buoyant hard spherical particles under finite inertia are studied using lattice-Boltzmann method (LBM). The suspensions are subjected to simple shear flow and the properties are studied as a function of inertia and volume fraction, ?. The inertia is characterized by shear flow Reynolds number, Re. The influence of inertia and the volume fraction is studied for 0.005 ¡ Re ¡ 2 and 0.1 ¡ ? ¡ 0.3. The topology of the streamlines and pair trajectories, specially off-plane configurations, are observed in more detail. The flow induced microstructure is investigated using the pair distribution function g(r). Different stress types generated by surface tractions, acceleration and velocity fluctuations are computed and their influence on the first and second normal stress differences, the particle pressure and the viscosity of the suspensions are detailed. In addition, the dynamics of the particle interactions are examined from a pair kinematics perspective. One specific example of inertia flow in a microfluidic set up is briefly discussed.

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