Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Lateral migration and orientation of ellipsoidal particles in Poiseuille flow WENBIN MAO, ALEXANDER ALEXEEV, George W. Woodruff School of Mechanical Engineering, Georgia Institute of Technology — Inertial migration is widely used for separating microparticles in microfluidics. We use a hybrid numerical method that combine the lattice Boltzmann model and lattice spring model to investigate the dynamics of neutrally buoyant ellipsoidal particles in a Poiseuille flow with a finite Reynolds number. We find distinctive behaviors of particles depending on the particle shape, initial orientations and ratio of the particle size to channel width. Due to nonlinear flow effects, the particles equilibrate at off-center trajectories depending on particle geometry. Two possible equilibrium modes of motion are found. Particles either tumble with the main ellipsoid axis in the plane parallel to the flow direction or rotate along the main axis oriented perpendicular to the flow direction. We present a phase diagram showing the transitions between these two modes. The results indicate the possibility of particle separation by shape using microchannel flows.

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Date submitted: 04 Aug 2011 Electronic form version 1.4