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Lattice Boltzmann simulation of particle inertial focusing in micro channels YU CHEN, MORAN WANG, Department of Engineering Mechanics, School of Aerospace, Tsinghua University — We perform three dimensional lattice Boltzmann simulations to study particle inertial focusing in micro channels. Interpolation based curved boundary condition is employed to accurately treat the non-slip boundary condition of the particle surface. Force evaluation is via the corrected momentum exchange method recently proposed by our group, which ensures Galilean invariance and smooth force transition as the particle move across lattice nodes. Our results show good agreement with experiments, four equilibrium positions were found in square channel and two were found in rectangle channel. The two stage focusing is observed in our simulations which is also reported by others. For curving channels, additional force from dean flow further reduces equilibrium positions. A large portion of the curving channel needs to be simulated, as periodic boundary condition may not be valid here. By utilizing the parallel computing advantage of LBM, we perform large scale simulations of inertial focusing in curving channels. Detailed flow information and precisely monitored particle motion may provide valuable insight to understanding the mechanism of inertial focusing in micro channels and inspire developing of new designs.

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