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Inertial migration of elastic particles in a pressure-driven power-law fluid[1] SAMUEL BOWIE, ALEXANDER ALEXEEV, Georgia Institute of Technology — Using three-dimensional computer simulations, we study the cross-stream migration of deformable particles in a channel filled with a non-Newtonian fluid driven by a pressure gradient. Our numerical approach integrates lattice Boltzmann method and lattice spring method in order to model fluid structural interactions of the elastic particle and the surrounding power fluid in the channel. The particles are modeled as elastic shells filled with a viscous fluid that are initially spherical. We focus on the regimes where the inertial effects cannot be neglected and cause cross-stream drift of particles. We probe the flow with different power law indexes including both the shear thickening and thinning fluids. We also examine migration of particles of with different elasticity and relative size. To isolate the non-Newtonian effects on particle migration, we compare the results with the inertial migration results found in the case where the channel is filled with a simple Newtonian fluid. The results can be useful for applications requiring high throughput separation, sorting, and focusing of both synthetic particles and biological cells in microfluidic devices.

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