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Cross-stream migration of compliant particles in microfluidic channels[1] ALEX KILIMNIK, Georgia Institute of Technology, SOOJUNG CLAIRE NUR, DINO DI CARLO, UCLA, ALEXANDER ALEXEEV, Georgia Institute of Technology — Using a 3D hybrid lattice Boltzmann and lattice spring computational method, the motion of rigid and soft particles in a pressure-driven microfluidic flow was examined. The particles were modeled as neutrally buoyant fluid-filled elastic shells. The equilibrium positions of these particles were obtained in a low-Reynolds-number flow while accounting for non-linear inertial effects. Microchannels of different width were examined and it was found that the equilibrium position of the rigid particles moves away from the channel walls as the ratio between particle diameter and channel width increases. Furthermore, it was found that capsule deformability enhances the particle migration toward the channel centerline. The simulation results were compared with experimental data obtained with varying size and viscosity oil droplets suspended in water indicating favorable agreement. These findings could aid in the design of devices to sort particles based on their mechanical stiffness.

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