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Numerical simulation of elasto-inertial particle migration in square channel flow of viscoelastic fluids[1] ZHAOSHENG YU, Zhejiang University — In this paper, the inertia-elasticity-induced migration of a neutrally buoyant spherical particle in a pressure-driven square-shaped channel flow of an Oldroyd-B fluid is numerically investigated with a fictitious domain method. The particle lateral motion trajectories are shown for the bulk Reynolds number ranging from 1 to 100 and the Weissenberg number being up to 1.5.When the inertial effect is negligible, the particle migrates towards the channel centerline or the closest corner. As fluid elasticity is increased, the corner-attractive region is first extended and then shrinks, and the migration rate becomes larger. When the fluid inertial effect is not negligible, the particle migration equilibrium position depends strongly on the elasticity number and weakly on the Reynolds number. Our results reveal a new elasto-inertial equilibrium position located in the channel diagonal plane for the elasticity number in the range of 0.001 to 0.02. When the elasticity number exceeds around 0.02, the particle migrates towards the channel centerline or the closest corner.

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