

Abstract Submitted
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Effects of viscoelasticity on the migration of a viscous drop in a shear flow near a wall¹ SWARNAJAY MUKHERJEE, KAUSIK SARKAR, University of Delaware — Dynamics of a drop migrating in a shear flow of a viscoelastic liquid (FENE-CR) near a wall is numerically investigated. Viscoelasticity hinders migration, and it is explained by investigating the viscoelastic forces around the drop. The orientation angle and the lateral migration velocities both decrease linearly with increasing viscoelasticity (Deborah number and amount of polymer viscosity). The enhanced curvature of the streamlines above the drop adds to this effect, it being more prominent for smaller deformation at lower capillary numbers. The slip velocity of the drop decreases with increasing Deborah number. For viscosity matched systems, the initial position does not influence the migration for the low values of Deborah number considered. However, at higher viscosity ratios, initial position plays a role. Increasing the viscosity ratio lowers the migration velocity and addition of viscoelasticity decreases it further. For very high viscosity ratio, viscoelasticity can induce drop migration towards the wall.

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