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Particle migration in two-phase, viscoelastic flows[1] NICK JAENSSON, MARTIEN HULSEN, PATRICK ANDERSON, Eindhoven Univ of Tech — Particles suspended in creeping, viscoelastic flows can migrate across stream lines due to gradients in normal stresses. This phenomenon has been investigated both numerically and experimentally. However, particle migration in the presence of fluid-fluid interfaces is hardly studied. We present results of simulations in 2D and 3D of rigid spherical particles in two-phase flows, where either one or both of the fluids are viscoelastic. The fluid-fluid interface is assumed to be diffuse and is described using Cahn-Hilliard theory. The particle boundary is assumed to be sharp and is described by a boundary-fitted, moving mesh. The governing equations are solved using the finite element method. We show that differences in normal stresses between the two fluids can induce a migration of the particle towards the interface in a shear flow. Depending on the magnitude of the surface tension and the properties of the fluids, particle migration can be halted due to the induced Laplace pressure, the particle can be adsorbed at the interface, or the particle can cross the interface into the other fluid.

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