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Viscoelastic droplet deformation in complex flow: application of the extended finite element ARASH SARHANGI FARD, MARTIEN HULSEN, PATRICK ANDERSON, Eindhoven University of Technology — Deformation of a viscoelastic drop in a Newtonian matrix under Stokes flow is simulated using a eXtended finite element method (XFEM). We consider the matrix inside a continuous mixer (like twin screw extruder), where shear and elongational flows are presents. Surface tension is included in the traction vector across the interface between the droplet and the matrix. The governing balance equations are solved once over entire domain (droplet and matrix). The surface of droplet is described by a discretized mesh and its position is updated by tracking the nodal positions in time. For XFEM integration, the position of the surface is determined explicitly by a numerical level set. To couple the velocity between droplet and matrix, a constrain is applied on balance equations. Constraints are enforced using a Lagrangian multiplier and also using weak interface conditions. Results are discussed for different viscosity ratio's and different Weissenberg numbers.

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