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A computational study of two-phase viscoelastic systems in a capillary tube with a sudden contraction/expansion[1] METIN MURADOGLU, DAULET IZBASSAROV, Koc University — Two-phase viscoelastic systems are computationally studied in a pressure-driven tube with a sudden contraction and expansion using a finite-difference/front-tracking method. The effects of viscoelasticity in drop and bulk fluids are investigated including high Weissenberg and Reynolds number cases up to $Wi = 100$ and $Re = 100$. The FENE-CR model is used to account for the fluid viscoelasticity. Extensive computations are performed to examine drop dynamics for a wide range of parameters. It is found that viscoelasticity interacts with drop interface in a non-monotonic and complicated way, and the two-phase viscoelastic systems exhibit very rich dynamics especially in the expansion region. At high Re, the drop undergoes large deformation in the contraction region followed by shape oscillations in the downstream of the expansion. For a highly viscous drop, a re-entrant cavity develops in the contraction region at the trailing edge which, in certain cases, grows and eventually causes encapsulation of ambient fluid. The re-entrant cavity formation is initiated at the entrance of the contraction and is highly influenced by the viscoelasticity. The effects of viscoelasticity are reversed in the constricted channel: Viscoelasticity in drop/continuous phase hinders/enhances format

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