

Diffuse-Interface Simulations of Interfacial Dynamics in Complex Fluids

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Complex fluids have microstructures that evolve during flow, and their dynamics tend to be coupled to interfacial deformation. Thus, interfaces of complex fluids exhibit unusual behavior, and this is exemplified by the dynamics of bubbles and drops in viscoelastic and nematic liquids. In this talk, I will introduce a diffuse-interface model for simulating interfacial dynamics in complex fluids. Its application is illustrated by using two intriguing phenomena: (i) partial coalescence between a drop and an interface for Newtonian and polymeric liquids; (ii) evolution of orientational defects around bubbles and drops rising in a nematic liquid crystal. Experimental observations will be analyzed and explained by detailed numerical computations.