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Dissipative Particle Dynamics Simulations of Two-Phase Flows ANUPAM TIWARI, JOHN ABRAHAM, School of Mechanical Engineering, Purdue University — Dissipative particle dynamics (DPD) is a coarse-grained particle method that includes thermal fluctuations. A mean-field theory based model is developed for two-phase flows. Surface tension arises in the model due to terms that account for long-range attractive forces. The model is validated through static simulations carried out to reproduce the Laplace law relationship, and dynamic simulations of liquid cylinder and drop oscillations. It is shown that in both cases analytical and computed results agree within 8%. We will also present results from simulations of capillary waves and Rayleigh-Taylor instability. In the case of capillary waves, comparisons will be shown with analytical results, and in the case of Rayleigh-Taylor instability, comparisons will be shown with analytical and other computed results. As an application of the model, results from simulations of thermally induced jet breakup will also be presented.

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