

A Hybrid Immersed Boundary and Immersed Interface Method for Interfacial Flow with Insoluble Surfactant in DC Electric Field

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In this talk, we develop a simple hybrid immersed boundary and immersed interface method to simulate the dynamics of surfactant-covered drop under the influence of an electric field in Navier-Stokes flows. The leaky-dielectric model is used to take into account the effect of electric model. Specifically, we consider the external electric force as an interfacial force rather than a global force. This step can avoid losing numerical accuracy on external electric force. An artificial tangential velocity has been added to the Lagrangian markers to ensure that the markers are uniformly distributed at all times. The corresponding modified surfactant equation is solved in a way such that the total surfactant mass is conserved. A series of numerical tests on the present scheme have been conducted to illustrate the applicability and reliability of the method. We first perform the convergence check for interfacial electric force. Then we valid the present method by comparing to theoretical results. Finally, the dynamics of surfactant-covered drop are investigated in detail.

References:

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