Hydrodynamics of low-dimensional interacting systems: Advances, challenges, and future directions

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Steady velocity of entropic driven interface in shear flow

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When different two phases come into contact through a flat interface, the interface moves in a certain direction, and its steady-state velocity is determined by the driving force caused by the difference in free energy between the two phases and the mobility. When describing interface phenomena using the probabilistic order parameter field model, which is Model A of Hohenberg and Halperin(1977), a new interface driving force arises due to entropic contributions from noise and asymmetric shape of free energy density. We refer to such an interface as an "entropic driven interface". We investigate the steady-state velocity of planer entropic driven interfaces parallel to the flow by the Model A. We decompose the interface driving force into components in the bulk and at the interface, and derive the velocity formula. We also perform numerical calculations to verify the validity of the formula.

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