

Multiphase microfluidics: the diffuse interface model

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Abstrak

Multiphase flows are typically described assuming that the different phases are separated by a sharp interface, with appropriate boundary conditions. This approach breaks down whenever the lengthscale of the phenomenon that is being studied is comparable with the real interface thickness, as it happens, for example, in the coalescence and breakup of bubbles and drops, the wetting and dewetting of solid surfaces and, in general, in micro-devices. The diffuse interface model resolves these problems by assuming that all quantities can vary continuously, so that interfaces have a non-zero thickness. This book reviews the theory and describes some relevant applications of the diffuse interface model for one-component, two-phase fluids and for liquid binary mixtures, to model multiphase flows in confined geometries.