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Axisymmetric Lattice Boltzmann Model of Droplet Impact on Solid Surfaces HUSSEIN DALGAMONI, XIN YONG, Binghamton Univ — Droplet impact is a ubiquitous fluid phenomena encountered in scientific and engineering applications such as ink-jet printing, coating, electronics manufacturing, and many others. It is of great technological importance to understand the detailed dynamics of drop impact on various surfaces. The lattice Boltzmann method (LBM) emerges as an efficient method for modeling complex fluid systems involving rapidly evolving fluid-fluid and fluid-solid interfaces with complex geometries. In this work, we model droplet impact on flat solid substrates with well-defined wetting behavior using a two-phase axisymmetric LBM with high density and viscosity contrasts. We extend the two-dimensional Lee and Liu model to capture axisymmetric effect in the normal impact. First we compare the 2D axisymmetric results with the 2D and 3D results reported by Lee and Liu to probe the effect of axisymmetric terms. Then, we explore the effects of Weber number, Ohnesorge number, and droplet-surface equilibrium contact angle on the impact. The dynamic contact angle and spreading factor of the droplet during impact are investigated to qualitatively characterize the impact dynamics.

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