Abstract Submitted
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A lattice-Boltzmann model of Electrocapillarity[1] ELFEGO RUIZ GUTIERREZ, RODRIGO LEDESMA AGUILAR, GARY G. WELLS, GLEN MCHALE, Smart Materials and Surfaces Laboratory, Northumbria University, ANDREW M. J. EDWARDS, CARL V. BROWN, MICHAEL I. NEWTON, School of Science and Tech- nology, Nottingham Trent University — Dielectrophoresis and electrowetting have become widely used techniques for controlling and manipulating small amounts of liquids. Applications of these include the transport, and separation of liquids and other particles of different electric permittivity, electronic paper displays, adjustable lenses, and lab-on-a-chip devices. The underlying phenomena can be encompassed under electrocapillarity, the interaction of electric fields with multiphase systems where the effects of surface tension are comparable with electrostatic forces. Fundamental aspects in electrocapillarity are still open for investigation, for example, the motion of contact lines and the shape that the liquid interface acquire in the presence of electric stresses. Here, we propose a simple lattice-Boltzmann method that is capable of simulating electrocapillarity. We use a binary fluid model that includes capillary phenomena and extend the algorithm to include the forces produced by electric fields. We first validate our method by comparison against the experimental observations. Then, we examine the morphology of droplets under dielectrophoretic stresses.

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