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Spreading of thin droplets of perfect and leaky dielectric liquids on inclined surfaces ANDREW CORBETT, BO KYUNG RYU, SI HYUNG LEE, SATISH KUMAR, University of Minnesota — The spreading of droplets may be influenced by electric fields, a situation that is relevant to applications such as coating, printing, and microfluidics. In this work we study the effects of an electric field on the gravity-driven spreading of droplets down an inclined plane. We consider both perfect and leaky dielectric liquids, as well as perfectly and partially wetting systems. Lubrication theory is applied to generate a set of coupled partial differential equations for interfacial height and charge, which are then solved numerically with a finite- difference method. Electric fields tend to increase the height of the capillary ridge in both perfect and leaky dielectric droplets. In partially wetting liquids, the presence of large concentrations of surface charge can cause the main droplet to split into several smaller droplets. Although the model predicts that electric fields do not significantly change the long- time spreading rate, flow visualization experiments reveal that electric fields can significantly alter the dynamics of droplet spreading outside of the regime in which the model is valid.

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