

Abstract Submitted
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Electrohydrodynamic deformation of thin liquid films near surfaces with topography SATISH KUMAR, ARUNA RAMKRISHNAN, University of Minnesota — Motivated by the use of electrostatic assist to improve liquid transfer in gravure printing, we use theory and experiment to understand how electric fields deform thin liquid films near surfaces with cavity-like topographical features. Lubrication theory is used to describe the film dynamics, and both perfect and leaky dielectric materials are considered. For sinusoidal cavities, we apply asymptotic methods to obtain analytical results that relate the film deformation to the other problem parameters. For trapezoidal-like cavities, we numerically solve evolution equations to study the influence of steep topographical features and the spacing between cavities. Results from flow visualization experiments are in qualitative agreement with the theoretical predictions. In addition to being relevant to printing processes, the model problems we consider are also of fundamental interest in and represent novel contributions to the areas of electrohydrodynamics and thin-liquid-film flows.

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