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**Thin film rupture on flat and structured surfaces with surface charge densities** CHRISTIAAN KETELAAR, VLADIMIR AJAEV, Southern Methodist University — We perform a linear and nonlinear stability analysis to determine the conditions at which a thin film of viscous liquid containing a small concentration of ions will rupture for different surface charge densities at the solid-liquid and gas-liquid interfaces. The rupture is driven by the combined action of the electrostatic component of the disjoining pressure and van der Waals forces. The evolution of the interface shape is described using the system of lubrication-type equations. By considering a small perturbation to the constant steady-state solution, we obtain the growth rate of the instability and find a wave number range where the perturbation decays. The nonlinear stability analysis is performed by solving the interface shape equation numerically for a range of parameters corresponding to different values of the initial film thickness, Debye length, and surface charge densities. We then discuss applications of the same mathematical framework to analyze film rupture on charged structured surfaces.

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