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Capillary instabilities of liquid films inside a wedge LI YANG, G.M. HOMSY, Department of Mechanical Engineering, University of California Santa Barbara — We consider a liquid meniscus inside a wedge of included angle 2β that wets the solid walls with a contact angle θ. The meniscus has a convex interface which satisfies $\pi/2 < \theta + \beta < \pi$. The capillary pressure gradient due to a small disturbance in the location of the contact line moves fluid from a neck region to a bulge region, causing instabilities. A dynamic contact-line condition is considered in which the contact angle varies linearly with the slipping speed of the contact line with a slope of G: $G = 0$ represents perfect slip and fixed contact angle. A nonlinear thin film equation is derived and numerically solved for the shape of the contact line as a function of parameters. The result for $G = 0$ shows that the evolution process consists of a successive formation of bulges and necks in decreasing length and time scales, eventually resulting a cascade structure of primary, secondary and tertiary droplets. When $G > 0$, there is a similar but slower nonlinear evolution process. The numerical results agree qualitatively with very recent experimental results.

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