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Pinning of a perfectly wetting volatile liquid at a sharp edge - experiment and theory[1] YANNIS TSOUMPAS, SAM DEHAECK, ALEXEY REDNIKOV, Universite Libre de Bruxelles - TIPs, CP 165/67, MARIANO GALVAGNO, UWE THIELE, Loughborough University - Department of Mathematical Sciences, PIERRE COLINET, Universite Libre de Bruxelles - TIPs, CP 165/67 — It is well known that contact lines of drops, even those of wetting liquids, stay pinned at sharp edges of the substrate until the apparent contact angle exceeds a critical value. In the present study, we show that evaporation influences this effect. The edge of a circular groove is used as an example. Experiments with wetting liquids of different evaporation rate show indeed that not only the spreading of the liquid is adequately halted, but also that the pinning is enhanced for the more volatile cases. The experimental results are qualitatively compared with predictions of a thin film model in two dimensions. The approach employs an evolution equation for the height profile of an evaporating thin film (small contact angle droplet) on a substrate with a rounded edge, and enables one to predict the dependence of the apparent contact angle on the position of the contact line. The calculations confirm our experimental observations, namely that there exists a dynamically produced critical angle for depinning that increases with the evaporation rate. This suggests that one may introduce a simple modification of the Gibbs criterion for pinning that accounts for the non-equilibrium effect of evaporation.

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