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Local analysis of the contact region of an evaporating sessile drop

S.J.S. MORRIS, Department of Mechanical Engineering, University of California, Berkeley — In experiments by Guéna et al. (2007), a drop of perfectly wetting pure liquid evaporates from a non–heated substrate at a rate controlled by vapour diffusion. The drop spreads until reaching a radius a determined by initial drop volume; the apparent contact line then reverses direction. The apparent contact angle measured at reversal was found experimentally to vary as $a^{-1/6}$ for $a < 1$ mm (about); for larger drops θ decreases more strongly. Local analysis (Morris *J. Fluid Mech.* 739: 308–337. 2014) predicts that $\theta \propto a^{-1/6}$; for the smaller drops obeying the 1/6th rule, predicted values agree with experiment to within 10–30%. Though the behaviour of drops smaller than the capillary length thus appears to be understood, that of larger drops is not.

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