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Evaporation of a drop on a flat solid substrate with pinned & perfect slip contact line AMIRHOSSEIN AMINI, G.M. HOMSY, Mechanical Engineering, University of Washington — We study the evolution of the profile of a 2D axisymmetric, incompressible, Newtonian droplet while evaporating on a flat solid substrate. The droplet has an initial circular cross section, the surface tension and the temperature of the solid-liquid interface are constant, and gravity and van der Waals effects are neglected. We deploy the one-sided model[1] which, together with the lubrication approximation, results in an evolution equation for the local height of the droplet. The evolution equation is a nonlinear partial differential equation that is 4^{th} order in space and 1^{st} in time and which is solved numerically using the method of lines. The problem is governed by several parameters, the key being the contact line condition and the wall superheat. For the case in which the contact line is pinned, we predict the drop thickness and contact angle as a function of time over a wide range of parameters. Interestingly, we observe a new self-similar regime near the end of the droplet evaporation and derive scaling laws from the numerical solutions. These results are contrasted with those for the case of perfect slip.

[1]Burelbach et al. Journal of Fluid Mechanics, **195** 463-494 (1988)

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