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Low-order models of the motion of sessile droplets on highly hydrophobic surfaces[1] ALEX WRAY, LYES KAHOUADJI, OMAR MATAR, Imperial College London, STEPHEN DAVIS, Northwestern University — We consider the behaviour of a droplet deposited onto a hydroophobic substrate. This and associated problems have received attention due to their significance in a wide array of experimental and industrial contexts, such as the post-rupture wetting problem is of importance to coating flow applications. Such systems have typically defied low-order analysis due to the multi-valued nature of the interface, but we demonstrate how to resolve this issue in this instance. We begin by analysing the static case. We find that the system is governed by the Young-Laplace equation with the equilbrium shape depending on the Bond number, the contact angle and the volume of the droplet. We solve the system numerically, and use these results to validate a variety of low-order models. We then solve the dynamic problem using both direct numerical simulations and a low-order model based on conservation of energy.

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