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Wetting, dewetting and multiplicity of solutions for nematic liquid crystal ridges JOSEPH R. L. COUSINS, LINDSEY T. CORSON, BRIAN R. DUFFY, STEPHEN K. WILSON, University of Strathclyde, NIGEL J. MOTTRAM, University of Glasgow — Situations involving droplets of nematic liquid crystal (nematic) on a solid substrate are of great interest, both scientifically and technologically. In such situations there is a solid–nematic interface between the solid substrate and the nematic, a nematic–isotropic interface (i.e. a free surface) between the nematic and the surrounding atmosphere, and a three-phase contact line. The static continuum description of these interfaces was first obtained by Jenkins and Barratt (1974), who derived equations for the balance of couple and balance of stress on the free surface and the force at the contact line in terms of the average nematic molecular orientation and the free surface height. Using a complementary approach we minimise the energy functional of a static two-dimensional ridge of nematic to derive the full governing equations. We then specialise these equations to a thin ridge of nematic and construct parameter planes in terms of the nematic material parameters, which describe the wetting and dewetting behaviour as well as the possibility of multiple solutions for the free surface height. Our findings allow us to speculate on similar important transitions for droplets of nematic and provide a framework for future investigations.

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