STEADY AND QUASI-STEADY THIN VISCOUS FLOWS NEAR THE EDGE OF A SOLID SURFACE

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Abstract. A new approach is proposed to the description of thin viscous flows near the edges of a solid surface. For a steady flow, the lubrication approximation and the no-slip condition are assumed to be valid on most of the surface, except for relatively small neighborhoods of the edges, where an universality principle is postulated: the behavior of the liquid in these regions is universally determined by flux, external conditions and material properties. The resulting mathematical model is formulated as an ordinary differential equation involving the height of the liquid film and the flux as unknowns, and analytical results are outlined. The form of the universal functions which describe the behavior in the edge regions is also discussed, obtaining conditions of compatibility with lubrication theory for small fluxes. Finally, an ordinary differential equation is introduced for the description of moderate time asymptotic profiles of a liquid film which flows off a bounded solid surface.