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# Well-posedness and regularity for a class of thin-film free boundary problems

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## Abstract

We investigate a free boundary problem for a thin-film equation with quadratic mobility and a zero contact angle condition at the triple point where air, liquid, and solid meet. This problem can be derived by a lubrication approximation from the Navier-Stokes system with a Navier-slip condition at the substrate. By treating the model problem of source-type solutions, we motivate why general solutions to this problem are generically singular. The method for proving well-posedness therefore requires to suitably subtract the leading-order singular expansion at the free boundary in the maximal regularity estimates for the linearized evolution. We also discuss the regularizing effect of the degenerate-parabolic operator to arbitrary orders of the singular expansion. Many of the presented results are joint with Lorenzo Giacomelli, Hans Knüpfer, and Felix Otto.

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