Well-posedness and stability for the two-phase periodic quasistationary Stokes flow

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23. May 2024

The two-phase horizontally periodic quasistationary Stokes flow in $\mathbb{R}^2$, describing the motion of two immiscible fluids with equal viscosities that are separated by a sharp interface, which is parameterized as the graph of a function $f = f(t)$, is considered in the general case when both gravity and surface tension effects are included. Using potential theory, the moving boundary problem is formulated as a fully nonlinear and nonlocal parabolic problem for the function f. Based on abstract parabolic theory, it is proven that the problem is well-posed in all subcritical spaces $\mathrm{H}^r(\mathbb{S})$, $r \in (3/2, 2)$. Moreover, the stability properties of the flat equilibria are analyzed in dependence of the physical properties of the fluids.