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STABLE FEM DISCRETIZATIONS FOR FREE FILM AND STRONG-SLIP LUBRICATION MODELS

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Existence of global weak solutions is shown as well as stable FEM discretizations are constructed for one-dimensional lubrication models that describe the dewetting process of nanoscopic thin polymer films on hydrophobyzed substrates and take account of large slippage at the polymer-substrate interface. Convergence of these solutions as either the Reynolds number or the capillarity goes to zero, as well as their limiting behaviour as the slip-length goes to zero or infinity are investigated. The latter case corresponds to the well-known model describing evolution of free suspended films. Finally, the FEM discretization is used for numerical simulations of rupture and coarsening phenomena in the thin films.