

DOUBLY NONLINEAR THIN-FILM EQUATIONS IN ONE SPACE DIMENSION

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ABSTRACT. We consider a free boundary problem for a class of fourth order nonlinear parabolic equations which are degenerate both with respect to the unknown and to its third derivative. The problem is relevant in the description of the surface tension driven evolution of a thin film of non-Newtonian liquid over a solid surface in the “complete wetting” regime. Relying solely on global and local energy estimates and on Bernis inequalities, we prove existence of solutions to this problem, and obtain sharp bounds for the propagation of their free boundary. A necessary condition for the occurrence of waiting time phenomena is also derived.

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