The Hele-Shaw problem with surface tension in a half plane: A model problem, *Journal of Differential Equations*, 216 (2005), 387-438. (A. Friedman).

Abstract

Consider the Hele-Shaw problem with surface tension in the half-plane $\{y_1 > 0\}$ when at time $t = 0$ the domain $\Omega(t)$ lies partly on the line $y_1 = 0,$ and partly in $\{y_1 > 0\}$. In order to establish existence of a solution to this free boundary problem we need to study the (linear) model problem when the region $\Omega(t)$ is a fixed angular domain. In this paper, we consider this model problem and establish existence of a solution satisfying sharp weighted Hölder estimates. These estimates will be used in subsequent work to solve the full Hele-Shaw problem.