THE HELE-SHAW PROBLEM WITH THE NONREGULAR INITIAL DATA

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The classic Hele-Shaw problem models the fluid motion between two parallel plate, a small distance apart. The mathematical problem is to determine the evolution of the two- dimensional fluid domain $\Omega(t)$, $\partial\Omega(t) = \Gamma_0 \cup \Gamma(t)$, $\Gamma_0 \cap \Gamma(t) = \varnothing$, where Γ_0 is fixed and $\Gamma(t)$ is unknown, and a harmonic function $P(y,t)$ in $\Omega(t)$, the fluid pressure, with some boundary conditions that are defined by $\Gamma(t)$.

The existence and uniqueness of a solution for an smooth initial curve $\Gamma(0)$ for small time interval were proved by X.Chen (1993), J.Escher and G.Simonett (1997), B.Bazaliy (1997), G.Prokert (1998), and B.Bazaliy and A.Friedman (2003) by different methods.

In this talk we will discuss the case of the nonregular initial boundary $\Gamma(0)$, in particular, a linear model problem corresponding to the initial nonlinear free boundary problem. The linear model problem deals with an elliptic equation in an angular domain and the dynamic boundary conditions. We introduce the weighted Hölder classes of functions and prove the coercive estimates to a solution of the model problem.

REFERENCES

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