

**Nataliya Vasylyeva**

*On the Muskat problem with nonregular initial interface*

We consider the nonlinear free boundary problem which arises in many applications, for instance, in the filtration theory, in biology. The specific of two-phase Hele-Shaw problem (the Muskat problem) consists in that one is the transmission problem for the elliptical equations with a dynamic boundary condition. Moreover, in our case an unknown interface is not regular in the initial time. In the present moment, there are a lot of results connected with investigation of the one-phase Hele-Shaw problem (see, corresponding papers of J. Ockendon, S. Howison, A. Friedman, J. King, J. Esher, G. Simonett and others). In the particular case for the one-phase Hele-Shaw problems the case of nonregular initial interfaces was studied and the next result was found. If the inner angle of the initial shape of the free boundary is enough small, then there is the “waiting time” phenomenon (the vertex and the opening of the angle do not change during some time). We find the certain sufficient conditions on initial data for existence of a unique solution to the Muskat problem with the “waiting time” property. To this end we use the results of the elliptic theory (Schauder method), the theory of difference equations, the fix point theorem, and introduce the special weighted Hölder spaces.