



Institut für
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Leibniz
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Institut für Angewandte Mathematik
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Oberseminar Analysis und Theoretische Physik

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“On the Muskat problem with a nonregular initial data”

Abstract:

We consider the nonlinear free boundary problem (the Muskat problem) which arises in many applications, for instance, in filtration theory, in biology. The Muskat problem (the two-phase Hele-Shaw problem) models the evolution of an interface between two immiscible fluids in a porous media under applied pressure gradients. The distribution of the pressure in each phase is subject to the Laplace equation together with a given boundary condition on a fixed boundary. On a free boundary the mass conservation law, the Darcy law and the certain discontinuity of the pressure are fulfilled.

The specific of the two-phase Hele-Shaw problem consists in that one is the transmission problem for the elliptical equations with a dynamic boundary condition. Moreover, in our case the unknown interface is not regular at 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. Escher, G. Simonett and others). One-phase Hele-Shaw problems in some cases of non regular initial interfaces were studied and the next result was found. If the inner angle of the initial shape of the free boundary is small enough, then there is the "waiting time" phenomenon (the vertex and the opening of the angle do not change during some time). We find 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, a fix point theorem, and introduce the special weighted Hölder spaces.

**Dienstag, 24.01.2012, 15:15 Uhr, Raum G005
Hauptgebäude der Universität**

Über Ihren Besuch würden sich freuen:

**Prof. Dr. Joachim Escher
Prof. Dr. Olaf Lechtenfeld
Prof. Dr. Elmar Schrohe
Prof. Dr. Christoph Walker**