

## Classical solutions of degenerate elliptic-parabolic free boundary problems

Borys Bazaliy

bazaliy@iamm.ac.donetsk.ua

*Institute of Applied Mathematics and Mechanics, Ukraine*

### Abstract

We consider the free boundary problem modelling fluid flow in a partially saturated porous media. An unknown function represents the pressure and satisfies an elliptic equation in the saturated domain and a quasi-linear parabolic equation in the unsaturated domain. The existence and uniqueness of a classical solution locally in time is proved.

We study a classical solution of a degenerate elliptic-parabolic free boundary problem. Here an interface separates the filtration domain into an elliptic and parabolic region. In the parabolic domain the governing parabolic equation is degenerated. The existence of a smooth solution in the weighted Hölder space is proved.

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