

**REGULARITY OF A SOLUTION  
TO THE MULTIDIMENSIONAL FREE BOUNDARY  
PROBLEM FOR THE POROUS MEDIUM EQUATION**

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The regularity properties of solutions to the initial boundary value problem with free boundary for the nonlinear degenerate equation  $u_t = \Delta(u^m)$ ,  $m > 1$ , are studied in the multi-dimensional case. The condition  $u = 0$  holds on the free boundary whose velocity obeys the Darcy law. The differential properties of the free boundary are established in dependence on the smoothness of the initial data.

*Key words and phrases:* porous medium equation, free boundary, regularity of solution, Green function.

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