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The dynamical behaviour of the support splitting and merging phenomena appearing in the flow through an absorbing medium

We are concerned with the dynamical behaviour of non-stationary seepage in the flow through an absorbing medium. In particular, it is expected that such a seepage exhibits “support splitting and merging phenomena”, which are caused by the interaction between the nonlinear diffusion and the penetration of the fluid from the boundary on which the flowing tide and the ebbing tide occur. Here the support means the region where the fluid exists. The model equation which describes such phenomena is written in the form of the nonlinear initial-boundary value problem. We treat it in the one-dimensional case, and demonstrate some numerical examples which show “support splitting and merging phenomena”. From mathematical points of view we state some results which is concerned with the profile of the stationary solution of it. Moreover, we show the stabilization theorem; that is, the solution of the initial-boundary value problem converges to the unique stationary solution as the time tends to the infinity.