

Abstract

In this paper we consider a boundary value problem for a system of 2 nonlinear parabolic PDEs e.g. arising in the context of flow and transport in porous media. The flow model is based on the nonlinear Richard's equation problem and is combined with the transport equation through saturation and Darcy's velocity (discharge) terms. The convective terms are approximated by means of the method of characteristics initiated by P. Pironneau [Num. Math. 38 (1982), 871–885] and R. Douglas and T. F. Russell [SIAM J. Num. Anal. 19 (1982), 309–332]. The nonlinear terms in Richard's equation are approximated by means of a relaxation scheme applied by W. Jäger and J. Kačur [RAIRO Model. Math. Anal. Num. 29 (1995), 605–627] and J. Kačur [IMA J. Num. Anal. 19 (1999), 119–154; SIAM J. Num. Anal. 39 (1999), 290–316]. The convergence of the approximation method is proved.