L^∞-Error Estimates and Superconvergence in Maximum Norm of Mixed Finite Element Methods for Nonfickian Flows in Porous Media

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On the basis of the estimates for the regularized Green's functions with memory terms, optimal order L^∞-error estimates are established for the non Fickian flow of fluid in porous media by means of a mixed Ritz-Volterra projection. Moreover, local L^∞-superconvergence estimates for the velocity along the Gauss lines and for the pressure at the Gauss points are derived for the mixed finite element method, and global L^∞-superconvergence estimates for the velocity and the pressure are also investigated by virtue of an interpolation post-processing technique. Meanwhile, some useful a-posteriori error estimators are presented for this mixed finite element method.