Finite element - finite volume type method for nonlinear convection-diffusion problems and its application

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This talk concerns the analysis of error estimates of the combined finite element-finite volume method for the numerical solution of a nonlinear conservation low equation with a nonlinear diffusion term. A semi-implicit scheme is presented where the diffusion term is discretized by standard Galerkin finite element method on triangular grid, whereas the convective term is approximated by finite volume method in the framwork of finite element for obtaining upwinding. Under the assumption that the weak solution of problem possesses some regularity properties and the triangulation are of weakly acute type, the discrete maximum principle and the error estimates are proved. This method is also applied to an approximation of immiscible displacement in porous media.