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Numerical Methods for Solving the Miscible Displacement Problem.

The miscible displacement of a solvent with a resident fluid occurs in tertiary oil recovery processes. The resulting mathematical model is a system containing an elliptic equation for the fluid pressure coupled with a convection dominated parabolic equation for the concentration of the solvent.

This talk presents high order schemes for solving the coupled pressure and concentration equations. The underlying discretization techniques employ the finite element method, the mixed element method and the discontinuous Galerkin method. Convergence results are obtained, under minimal regularity assumptions. (Received August 05, 2009)