High Order Fully Discrete Discontinuous Galerkin Methods for Miscible Displacement

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Abstract: We derive error estimates for a fully discrete scheme using primal discontinuous Galerkin discretization in space and backward Euler discretization in time. The estimates in the energy norm are optimal with respect to the mesh size and suboptimal with respect to the polynomial degree. The proposed scheme is of high order as polynomial approximations of pressure and concentration can take any value. In addition, the method can handle different types of boundary conditions and is well-suited for unstructured meshes.