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## A Hybrid Finite Element-Finite Volume Method for Immiscible Two-Phase Flow in Porous Media

### Communication Info

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- (1) Biphasic Flow
- (2) Porous Media
- (3) IMPES Scheme

### Abstract

This study focuses on the mathematical modelling of the displacement of one fluid (oil) by another (water) in porous rock. The flow is assumed to be governed by Darcy's law and mass conservation equations for each phase [1]. An Implicit Pressure, Explicit Saturation (IMPES) scheme is employed to handle the different physical characters of variables. The elliptic pressure equation is obtained through the Finite Element Method (FEM) that provides global smoothness. Whereas, the hyperbolic saturation transport equation is discretized using the Finite Volume Method (FVM) which is indispensable for ensuring the local mass conservation and capturing the sharp saturation fronts [2]. The one-dimensional Buckley-Leverett problem has been used for validating the numerical methods besides testing the two-dimensional cases with heterogeneous permeability fields [3]. FEM accurately predicts pressure, while FVM eliminates interface oscillations [4]. This study proves hybrid FEM-FVM efficiently simulates complex flows in heterogeneous media [5].

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