Saffman-Taylor fingering with lateral injection with applications to imbibition coarsening dynamics BERTRAND LAGREE, TOTAL SA/Institut Jean le Rond d'Alembert, STEPHANE ZALESKI, Institut Jean le Rond d'Alembert/CNRS - Universite Pierre et Marie Curie (UMR 7190), IGOR BONDINO, TOTAL SA, CHRISTOPHE JOSSERAND, Institut Jean le Rond d'Alembert/CNRS - Universite Pierre et Marie Curie (UMR 7190), STEPHANE POPINET, Institut Jean le Rond d'Alembert/CNRS - Universite Pierre et Marie Curie (UMR 7190)/NIWA — We report 2D simulations of Saffman-Taylor fingering motivated by the analysis of experiments on the imbibition of porous media in square slab geometries. We use a Volume-of-Fluid (VOF) method to model a two-phase Darcy flow with a sharp interface between the two fluids. The Gerris code which allows efficient parallel computations with quad-tree mesh refinement is used. It is tested for accuracy and precision using several levels of refinement and comparing to reference simulations in the literature. A fingering pattern is observed after lateral injection of a less viscous fluid into a region filled with a more viscous one. Large fractal-like clusters are observed allowing the measurements of several scaling exponents which are compared to the known Diffusion-Limited-Aggregation (DLA) and Saffman-Taylor scalings. An interesting effect is the transition from a transient cylindrical DLA pattern to a small number then a single Saffman Taylor finger.

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