

Abstract Submitted
for the DFD19 Meeting of
The American Physical Society

A Control strategy for Radial Miscible Viscous Fingering: Non Linear Simulations. VANDITA SHARMA, Department of Mathematics, Indian Institute of Technology Ropar, Punjab India, CHING-YAO CHEN, National Chiao Tung University, Taiwan, MANORANJAN MISHRA, Department of Mathematics, Indian Institute of Technology Ropar, Punjab India — The displacement of a more viscous fluid by a less viscous one in a porous medium results in a hydrodynamic instability called viscous fingering (VF). Chui *et al.*, Phys. Rev. E 92, 041003(R) (2015), experimentally reported the existence of a competition between advective and diffusive forces during the later stages of miscible radial VF. We numerically capture the competition between the aforementioned opposing forces from start to end of the instability. Many attempts have been reported in literature to control VF by utilising time-dependent strategies, modifying the geometry and altering the fluid properties. However, we utilize the competition to control the instability. Stable displacement is observed despite a less viscous fluid displacing a more viscous one. The $M-Pe$ parameter space is divided into stable and unstable zones by critical parameters following the relation $M_c = Pe_c^{-0.55}$. The results are validated by diligently designed experiments.

Vandita Sharma
Department of Mathematics, Indian Institute of Technology Ropar

Date submitted: 01 Aug 2019

Electronic form version 1.4