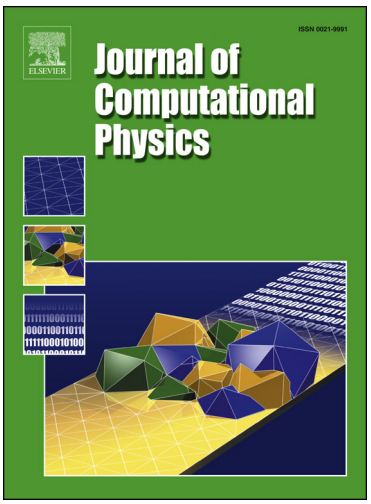
Accepted Manuscript



High resolution viscous fingering simulation in miscible displacement using a p-adaptive discontinuous Galerkin method with algebraic multigrid preconditioner

G. Becker, C.M. Siefert, R.S. Tuminaro, H. Sun, D.M. Valiveti et al.

PII: S0021-9991(18)30457-1
DOI: https://doi.org/10.1016/j.jcp.2018.07.003
Reference: YJCPH 8127

To appear in: *Journal of Computational Physics*

Received date: 5 October 2017
Revised date: 25 March 2018
Accepted date: 1 July 2018

Please cite this article in press as: G. Becker et al., High resolution viscous fingering simulation in miscible displacement using a p-adaptive discontinuous Galerkin method with algebraic multigrid preconditioner, *J. Comput. Phys.* (2018), https://doi.org/10.1016/j.jcp.2018.07.003

Highlights

- We present two techniques to speedup large scale simulations of viscous fingering in miscible displacement.
- The first technique relies on a simple p-adaptive scheme and results in significant reduction in the number of degrees of freedoms.
- In the second technique, we design an algebraic multigrid (AMG) to improve the solver efficiency.
- With the two improvements, we can perform high resolution three-dimensional viscous fingering simulations required for miscible displacement with high Peclet number and mobility ratio in greater detail than before.