Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Lattice Boltzmann simulations of immiscible displacement process with large viscosity ratios PARTHIB RAO, LAURA SCHAEFER, Rice University — Immiscible displacement is a key physical mechanism involved in enhanced oil recovery and carbon sequestration processes. This multiphase flow phenomenon involves a complex interplay of viscous, capillary, inertial and wettability effects. The lattice Boltzmann (LB) method is an accurate and efficient technique for modeling and simulating multiphase/multicomponent flows especially in complex flow configurations and media. In this presentation we present numerical simulation results of displacement process in thin long channels. The results are based on a new psuedo-potential multicomponent LB model with multiple relaxation time collision (MRT) model and explicit forcing scheme. We demonstrate that the proposed model is capable of accurately simulating the displacement process involving fluids with a wider range of viscosity ratios (¿100) and which also leads to viscosity-independent interfacial tension and reduction of some important numerical artifacts.

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Date submitted: 01 Aug 2017 Electronic form version 1.4