

Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Modeling and simulation of multiphase multicomponent multiphysics porous media flows in the context of chemical enhanced oil recovery¹ SOURAV DUTTA, PRABIR DARIPA, Department of Mathematics, Texas A&M University, College Station, TX - 77843, FLUIDS TEAM — One of the most important methods of chemical enhanced oil recovery (EOR) involves the use of complex flooding schemes comprising of various layers of fluids mixed with suitable amounts of polymer or surfactant or both. The fluid flow is characterized by the spontaneous formation of complex viscous fingering patterns which is considered detrimental to oil recovery. Here we numerically study the physics of such EOR processes using a modern, hybrid method based on a combination of a discontinuous, multiscale finite element formulation and the method of characteristics. We investigate the effect of different types of heterogeneity on the fingering mechanism of these complex multiphase flows and determine the impact on oil recovery. We also study the effect of surfactants on the dynamics of the flow via reduction of capillary forces and increase in relative permeabilities.

¹Supported by the grant NPRP 08-777-1-141 from the Qatar National Research Fund (a member of The Qatar Foundation).

Prabir Daripa
Texas A&M University

Date submitted: 31 Jul 2015

Electronic form version 1.4