Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Thermo-miscible fluid displacement in a porous media flow THOMAS WARD, TEJASWI SOORI, Iowa State University — The an-isoviscous displacement of a generalized Newtonian liquid in an impulsively heated axisymmetric pipe geometry is studied at low to moderate Reynolds numbers using computational analysis. The temperature dependent viscosity is modeled using an empirical correlation that has been shown to fit experimental data for a range of temperature values. The governing Cauchy momentum equations for the generalized Newtonian fluid are solved in primitive variables using a 4th order Runge-Kutta method. For viscous liquids with a high Prandtl number radial and axial variations in temperature are significant leading to modification of the steady state pressure loss when compared to isoviscous displacements. We characterize the steady state pressure loss and average Nusselt number using the Reynolds $0.1 < Re < 10$, viscous Atwood $0 < At < 0.8$, and Peclet $100 < Pe < 10,000$ numbers.

Thomas Ward
Iowa State University

Date submitted: 31 Jul 2016 Electronic form version 1.4