

Abstract Submitted
for the DFD11 Meeting of
The American Physical Society

Onset of Convection in a Diffusive Miscible Displacement Porous Media Flow with Viscosity Contrast DON DANIEL, AMIR RIAZ, University of Maryland, College Park — One of the typical yet important type of flows in porous media is the case in which two miscible fluids begin to interact with each other due to the gravitational instability that exists due to the density differences between the underlying fluids. This problem has been extensively studied in literature. However many of these studies, have not considered the role the viscosity difference can play during the onset of convection. The onset of convection cannot be captured by most typical linear stability analysis, due to the continuous spectrum of the concerned operator. We convert our governing equations such that they effectively involve a discrete spectrum which in turn provides more accurate and reliable platform for conducting linear stability analysis. In order to verify our analysis, we compare the obtained growth rates with those obtained by fully resolved non-linear 2D simulations.

Don Daniel
University of Maryland, College Park

Date submitted: 29 Jul 2011

Electronic form version 1.4