1125-VM-332 **Layachi Hadji*** (lhadji@ua.edu), Mathematics Department, 345 Gordon Palmer Hall, Tuscaloosa, AL 35487, and **C. Taber Wanstall**, Mathematics Department, 345 Gordon Palmer Hall, Tuscaloosa, AL 25487. *A new model of the convective stability of geological carbon sequestration.*

The convective stability associated with carbon sequestration is modeled by an unstably stratified basic profile having a step function density with top heavy carbon saturated layer overlying a lighter carbon free layer. The resulting configuration mimics that of the Rayleigh-Taylor problem without the free interface. We carry out a linear stability analysis to derive the instability threshold parameters for two sets of boundary conditions. First, an upper boundary that is maintained at a concentration C_0 and a lower boundary that is impervious to mass flow. Second, we consider an upper boundary that is nearly impermeable and a lower boundary that is impervious to mass flow. We solve for the minimum thickness of the carbon-rich layer at which convection sets in. The threshold instability conditions are found to be much lower than those corresponding to continuous stratification. The investigation of the second case is extended to the nonlinear regime, the analysis of which leads to the determination of a uniformly valid super critical steady solution. Our model accounts for anisotropy in both diffusion and permeability and chemical reactions between the CO_2 rich brine and host mineralogy. (Received August 27, 2016)