Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Rayleigh-Taylor convection in confined porous media[1] FRANCESCO ZONTA, MARCO DE PAOLI, ALFREDO SOLDATI, Vienna Univ of Technology — Motivated by the dissolution phenomena occurring during carbon sequestration processes, we analyze Rayleigh-Taylor convection in isotropic porous media. In the Rayleigh-Taylor configuration, a layer of dense fluid (CO2+brine) lyes on top of a layer of light fluid (brine). The velocity field is computed with the Darcy law, whereas the concentration field is determined by the advection-diffusion equation. We used a pseudospectral scheme (Fourier discretization in periodic direction and Chebyshev polynomial in wall-normal direction) to run Direct Numerical Simulations (DNS) of the present system. We focused in particular on the behavior of the mixing length h (the tip-to-rear finger distance), a fundamental quantity to characterize all the transfer phenomena (solute, convection and energy) occurring in the analyzed case. In particular, we observed that the time behavior of h is twofold: during the initial transient evolution, h has a self similar universal behavior; later, due to the presence of boundaries, the behavior becomes more complex and hard to predict. Physical implications of the present results on dissolution modeling approaches will be also addressed.

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Date submitted: 31 Jul 2017 Electronic form version 1.4