

Abstract Submitted
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Nonlinear saturation and secondary bifurcation in gravitationally unstable boundary layers in porous medium ZOHREH GHORBANI, AMIR RIAZ, Univ of Maryland-College Park — The convective mixing, triggered by gravitational instability, plays an important role in CO₂ sequestration in saline aquifers. For this problem, the characteristics of the saturation event and the post saturation period over which a second onset of bifurcation occurs is investigated using discrete mode perturbation approach via high accuracy numerical simulation. We find that the critical time for the onset of nonlinear saturation scales linearly with the inverse of the Rayleigh number. The effect of initial perturbation as well as the critical wavelength at the onset of saturation is explored. In the post saturation period the flux decays as t^{-1} . It is also observed that the second bifurcation is triggered beyond a critical point when the CO₂ flux dips below the level associated with the corresponding unperturbed flow.

Zohreh Ghorbani
Univ of Maryland-College Park

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