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Convective stability of CO₂ sequestration in a porous medium. (English) Zbl 07446961
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Summary: We considered an incompressible fluid-saturated porous layer bounded by two infinite parallel plates. The Boussinesq approximation and Darcy's law are applied. The permeability is assumed to be a linear function of the depth z . The linear stability is investigated. The long wavelength expansion method is applied to conduct the weakly nonlinear stability analysis. The evolution equation is derived and analyzed. A uniformly valid periodic solution of the evolution equation is obtained by the application of the Poincaré-Lindstedt method. Some numerical simulations are presented.

MSC:

- 76E20 Stability and instability of geophysical and astrophysical flows
- 76E15 Absolute and convective instability and stability in hydrodynamic stability
- 76S05 Flows in porous media; filtration; seepage
- 76-10 Mathematical modeling or simulation for problems pertaining to fluid mechanics
- 76E06 Convection in hydrodynamic stability

Keywords:

stability analysis; long wavelength method; Poincaré-Lindstedt method; periodic solution; carbon sequestration

Full Text: [Link](#)

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