Stability shifting and mixing solutions for the Muskat problem

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The Muskat equation governs the motion of an interface separation of two incompressible fluids in a porous media. In this talk I will present the following recent results:

(1) The existence of solutions which shift stability regimes in the following sense: they start stable, then become unstable, and finally return back to the stable regime before it breaks down (joint work with J. Gomez-Serrano and A. Zlatos).

(2) The existence of mixing solutions of the incompressible porous media equation for all Muskat type H^5 initial data in the fully unstable regime (joint work with A. Castro and D. Faraco).

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