Viscous fingering instability for miscible fluids in a porous medium

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Patterns created as fluid 1 (blue) displaces a more viscous miscible fluid 2 in a porous granular medium. Images, bottom to top, show fingering at 5s, 8s and 15s after the injection of fluid 1. All images are the same scale.

Fluid 1: Water (viscosity = 1 mPas)
Fluid 2: Water-glycerol mixture (viscosity = 424 mPas)
Granular medium: Close-packed spheres, diameter = 718 μm, in a two-dimensional cell of gap size 1143 μm.

Upper right: Fingering resulting from the displacement of wet sand by air.
Background: Wet sand in a two-dimensional cell.