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Bistability in a simple fluid network due to viscosity contrast

BRIAN STOREY, Olin College, JOHN GEDDES, Olin College and University of Aberdeen, Scotland, DAVID GARDNER, Olin College, RUSSELL CARR, University of New Hampshire — We study the existence of multiple equilibrium states in a simple fluid network using Newtonian fluids and laminar flow. We demonstrate theoretically the presence of hysteresis and bistability, and we confirm these predictions in an experiment using two miscible fluids of different viscosity; sucrose solution and water. Possible applications include bloodflow, microfluidics, and other network flows governed by similar principles.

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