Abstract Submitted
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Centrifugal fingering in a curved Hele-Shaw cell: A generalized Euler's elastica shape for the two-fluid interface[1] JOSE MIRANDA, RODOLFO BRANDAO, Department of Physics, Univ Federal de Pernambuco, BRAZIL — We study a family of generalized elastica-like equilibrium shapes that arise at the interface separating two fluids in a curved rotating Hele-Shaw cell. This family of stationary interface solutions consists of shapes that balance the competing capillary and centrifugal forces in such a curved flow environment. We investigate how the emerging interfacial patterns are impacted by changes in the geometric properties of the curved Hele-Shaw cell. A vortex-sheet formalism is used to calculate the two-fluid interface curvature, and a gallery of possible shapes is provided to highlight a number of peculiar morphological features. A linear perturbation theory is employed to show that the most prominent aspects of these complex stationary patterns can be fairly well reproduced by the interplay of just two interfacial modes. The connection of these dominant modes to the geometry of the curved cell, as well as to the fluid dynamic properties of the flow, is discussed.

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