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Stationary shapes of confined rotating magnetic liquid droplets[1]
JOSE MIRANDA, SERGIO LIRA, Depto. Fisica - UFPE, RAFAEL OLIVEIRA, Dept. Mech. Engineering - UCSB — We study the family of steady shapes which arise when a magnetic liquid droplet is confined in a rotating Hele-Shaw cell, and subjected to an azimuthal magnetic field. Two different scenarios are considered: first, the magnetic fluid is assumed to be a Newtonian ferrofluid, and then it is taken as a viscoelastic magnetorheological fluid. The influence of the distinct material properties of the fluids on the ultimate morphology of the emerging stationary patterns is investigated by using a vortex-sheet formalism. Some of these exact steady structures are similar to the advanced time patterns obtained by existing time-evolving numerical simulations of the problem. A weakly nonlinear approach is employed to examine this fact, and to gain analytical insight about relevant aspects related to the stability of such exact stationary solutions.

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