Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Ferrofluid patterns in Hele-Shaw cells: Exact, stable, stationary shape solutions[1] SERGIO LIRA, Universidade Federal de Alagoas, Maceio, Brazil, JOSE MIRANDA, Universidade Federal de Pernambuco, Recife, Brazil — We investigate a quasi-two-dimensional system composed by an initially circular ferrofluid droplet surrounded by a nonmagnetic fluid of higher density. These immiscible fluids flow in a rotating Hele-Shaw cell, under the influence of an in-plane radial magnetic field. We focus on the situation in which destabilizing bulk magnetic field effects are balanced by stabilizing centrifugal forces. In this framing, we consider the interplay of capillary and magnetic normal traction effects in determining the fluid-fluid interface morphology. By employing a vortex-sheet formalism we have been able to find a family of exact stationary N-fold polygonal shape solutions for the interface. A weakly nonlinear theory is then used to verify that such exact interfacial solutions are in fact stable.

[1]We thank CNPq (Brazilian Research Council) for financial support.

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Date submitted: 01 Aug 2016 Electronic form version 1.4