

Ferrohydrodynamic Instabilities in DC Magnetic Fields

Rinaldi, C.¹⁾ and Zahn, M.²⁾

1) *Department of Chemical Engineering, University of Puerto Rico at Mayagüez, Mayagüez, PR, U.S.A.*

2) *Department of Electrical Engineering and Computer Science and Laboratory for Electromagnetic and Electronic Systems, Massachusetts Institute of Technology, Cambridge, MA, U.S.A.*



Ferrofluid instabilities in DC magnetic fields for an Isopar-M based ferrofluid with saturation magnetization of about 400 Gauss. a) 1200 Gauss 5 mm diameter magnet behind small ferrofluid droplet surrounded by propanol to prevent ferrofluid wetting of 1 mm gap glass plates; Peak pattern with magnetic field perpendicular to ferrofluid layer. The peaks initiate in a hexagonal array when the magnetic surface force exceeds the stabilizing effects of fluid weight and surface tension – b) 200 Gauss, c) 330 Gauss, d) 400 Gauss; e), f) Labyrinth instability with ferrofluid between 1 mm gap glass plates in 250 Gauss vertical magnetic field.