Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Fingering Patterns of Ferrofluid Droplets In a Radial Field
CHING-YAO CHEN, W.-L. WU, Y.-S. YANG, Dept. of Mechanical Engineering, National Chiao Tung University, Taiwan, JOSE MIRANDA, Universidade Federal de Pernambuco, Brazil — Complex pattern formation abounds in nature and has been actively studied in many different physical, chemical, and biological systems. One major point of interest is to understand the morphology of the rising patterns. In this context, the investigation of growth phenomena in ferrofluids has drawn considerable attention during the last few decades. Due to its unique response to applied magnetic fields, this fluid material has become a prototypical dipolar system for the study of a number of pattern-forming processes and interfacial instabilities. Pattern formation in a ferrofluid system under an in-plane radial magnetic field is experimentally investigated. Visually striking patterns are obtained. For miscible ferrofluids, the morphologies change from circular at a zero field to complex starburst-like structures at a finite field. Less vigorous fingering patterns evolve if the fluids are immiscible. The number of fingers can be tuned by applying a perpendicular field to introduce desired initial perturbation before the switching to in plane field. The evolution of ferrofluid droplets of various initial diameters, subjected to different magnetic field strengths is considered to investigate their influences.

Ching-Yao Chen
Dept. of Mechanical Engineering, National Chiao Tung University, Taiwan

Date submitted: 21 Jul 2010 Electronic form version 1.4