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Abner J Salgado* (asalgad1@utk.edu). *A diffuse interface model for two-phase ferrofluid flows*. Preliminary report.

We develop a model describing the behavior of two-phase ferrofluid flows using phase field-techniques and present an energy-stable numerical scheme for this model. For a simplified version of this model and the corresponding numerical scheme we prove, in addition to stability, convergence and as by-product existence of solutions. With a series of numerical experiments we illustrate the potential of these simple models and their ability to capture basic phenomenological features of ferrofluids such as the Rosensweig instability. (Received September 02, 2014)