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**A comparative study of different ferrofluid constitutive equations.**
PURNA KALONI, University of Windsor — Ferrofluids are stable colloidal suspensions of fine ferromagnetic monodomain nanoparticles in a non-conducting carrier fluid.The particles are coated with a surfacant to avoid agglomeration and coagulation.Brownian motion keeps the nanoparticles from settling under gravity.In recent years these fluids have found several applications including in liquid seals in rotary shafts for vacuum system and in hard disk drives of personal computers,in cooling and damping of loud speakers, in shock absorbers and in biomedical applications. A continuum description of ferrofluids was initiated by Neuringer and Rosensweig [1] but the theory had some limitations. In subsequent years,several authors have proposed generalization of the above theory.Some of these are based upon the internal particle rotation concept, some are phemonological,some are based upon a thermodynamic framework,some employ statistical approach and some have used the dynamic mean field approach.The results based upon these theories ane in early stages and inconclusive. Our purpose is, first, to critically examine the basic foundations of these equations and then study the pedictions obtained in all the theories related to an experimental as well as a theoretical study. [1]J.L.Neuringer and R.E. Rosensweig, Physics Fluids,7.1727 (1964)..

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