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Anisotropic Light Scattering from Ferrofluids CORNELIU RABLAU, PREM VAISHNAVA, Kettering University, Flint, MI, RATNA NAIK, GAVIN LAWES, RON TACKETT, C. SUDAKAR, Wayne State University, Detroit, MI — We have investigated the light scattering in DC magnetic fields from aqueous suspensions of Fe_3O_4 nanoparticles coated with tetra methyl ammonium hydroxide and γ-Fe_2O_3 nanoparticles embedded in alginate hydrogel. For Fe_3O_4 ferrofluid, anomalous light scattering behavior was observed when light propagated both parallel and perpendicular to the magnetic fields. This behavior is attributed to the alignment and aggregation of the nanoparticles in chain-like structures. A very different light scattering behavior was observed for γ-Fe_2O_3 alginate sample where, under the similar conditions, the application of the magnetic field produced no structured change in scattering. We attribute this difference to the absence of chain-like structures and constrained mobility of iron nanoparticles in the alginate sample. The observation is in agreement with our relaxation and dissipative heating results[1] where both samples exhibited Neel relaxation but only the Fe_3O_4 ferrofluid showed Brownian relaxation. The results suggest that Brownian relaxation and nanoparticle mobility are important for producing non-linear light scattering in such systems.
[1]P.P. Vaishnava, R. Tackett, A. Dixit, C. Sudakar, R. Naik, and G. Lawes, J. Appl. Phys. **102**, 063914 (2007).

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