

SEMINÁRIO DE MECÂNICA

Ferrofluid stability investigated by means of Monte Carlo simulations

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Abstract.

Most technological and biomedical applications of ferrofluids require some repulsive force to counterbalance magnetic and van der Waals forces, which tend to agglomerate the colloidal particles. That repulsion is usually provided by surfactant or charge density on particles' surfaces. We show some results of Monte Carlo simulations of cobalt ferrite nanoparticles dispersed in water with variable pH, which affects particle surface charge. Particle interaction was modeled by means of magnetic dipolar, van der Waals and electrostatic energy terms. Surface charge was modeled by means of the so-called "2-pK charging model", which represents a charging process that depends on two subsequent chemical reactions on particle surfaces. We compare the results with experimentally observed pH-dependent phase transitions.