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NMR and Spin Relaxation in Systems with Magnetic Nanoparticles: Effects of Size and Molecular Motion NATALIA NOGINOVA, TRACEE WEAVER, NSU, Norfolk, VA, ALEXANDR ANDREYEV, Virginia Tech, Blacksburg, VA, VADIM A. ATSARKIN, IRE, Moscow, Russia — To better understand the specifics of nuclear magnetic resonance and spin relaxation in systems with magnetic nanoparticles and test the limits of the outer sphere model for the diffusion related relaxation, iron oxide nanoparticle suspensions were studied in the dependence of the particle size, and for different degree of molecular motion. For the liquid suspensions with relatively small particles or clusters, spin relaxation rates well correspond to the theory, which predict maximum and decrease of the longitudinal rate and increase in the transverse rate with the increase in the effective radius, R. For the larger particle size $>$ 20 nm, as well as in cases of strong aggregation or slowdown of molecular motion, the relaxation rates are significantly lower than theoretical predictions. We discussed the results and frames of the fast-motion and fast-diffusion approximations.

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