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On the interplay between hydrodynamic and dipolar particle interactions in suspensions[1] RAFAEL GABLER GONTIJO, Universidade Estadual de Campinas - Unicamp, FRANCISCO RICARDO CUNHA, Universidade de Braslia - UnB — The long range nature of particle interactions in the framework of sedimenting suspensions of magnetic particles is discussed. We present new results on the topic, obtained by an in-house code named SIMS. This code solves simultaneously the equations of translational and rotational motion for each magnetic particle in colloidal and non-Brownian suspensions. We use a sophisticated technique of Ewald summations to compute both hydrodynamic and long-range dipolar interactions for force and torque. A brief discussion on the nature of the spatial decays of the sums used to model our multi-body system and the demand for a periodic geometrical representation of the suspension structure is presented. Examples on the calculation of transport properties of colloidal and non-Brownian suspensions of magnetic spheres are presented and validated. Moreover, we discuss how magnetic interactions affects classical transport properties of sedimenting suspensions and also how hydrodynamic interactions modify the micro-structural dynamics of magnetic colloidal suspensions and consenquently the equilibrium magnetization of the so called ferrofluids. The quantitative results are interpreted in terms of the suspension structure evolution in time.

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