H2020 MSCA - ITN - 2017 - 766007

Magnetics and Microhydrodynamics, from guided transport to delivery

ESR 6 Computational (magneto-) hydrodynamic modelling

Research project	Strong magnetic properties of colloidal solutions of magnetic nanoparticles allow to observe different figures of equilibrium due to the balance of ponderomotive forces of self-magnetic field of droplets and capillary forces [1]. For example, sequence of equilibrium shapes in a high-frequency rotating magnetic field is determined by a set of bifurcations oblate-prolate-oblate-star fish. Numerical calculation of these shapes and their comparison with experimental findings give Important information about physical properties of magnetic droplets. At present the numerical algorithm based on boundary integral equations is elaborated which allows to calculate the figures of equilibrium of droplets and their bifurcations in a high frequency rotating field. We propose further development of the algorithm in order to account for the viscosity difference of magnetic fluid and surrounding fluid. This will allow to study in detail dynamics of magnetic droplets in a wide variety of external conditions, which so far is not well understood. This includes, besides the dynamics of magnetic droplets in all frequency range of a rotating field, for example behavior of magnetic droplets in a shear flow, formation of spike instability of magnetic fluid interface and other phenomena. [1] J.Erdmanis, G.Kitenbergs, R.Perzynski, A.Cebers, Journ.Fluid Mech.,v.821,266 (2017)
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Host Institution	University of Latvia Faculty of Physics and Mathematics Laboratory of Magnetic Soft Matter 25 Zellu, Riga, LV-1002,Latvia http://mmml.lu.lv/
Required profile	The candidate should hold a MS degree in Physics or Applied Mathematics, with a strong background in hydrodynamics, electromagnetism and numerics. Interest for interdisciplinary research is important. Research stays are planned at the University of Latvia. The candidate should not have stayed in Latvia in the past 12 months.