Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Disc-shaped colloids interacting in a nematic liquid crystal ALENA ANTIPOVA, COLIN DENNISTON, University of Western Ontario — We examine the behavior of (ferromagnetic) micron-sized structures such as disc-shaped colloidal particles in a nematic liquid crystal using Lattice Boltzmann algorithm. Without any external forces the position of the disc with respect to the liquid crystal director minimizes the free energy of the system and no distortion of the director field is observed. When the rotating magnetic field is present, the torque on the disc with homeotropic surface anchoring should change with analogy to electrostatic energy, which implies the disc continues turning following the field. However, when the disc reaches some critical position and the director field around it is highly distorted, the disc suddenly flips to minimize the free energy. Position and motion of pairs of such discs under similar conditions can be controlled by the angular velocity of magnetic field, it's magnitude and initial configuration of the system. As a result of analysis of discs' dynamics, a new way to control self-organization of disc particles was produced. We also will demonstrate some results on ferromagnetic torus micro-colloidal particle in nematic with more complicated boundary conditions.

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Date submitted: 13 Nov 2014 Electronic form version 1.4