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Dynamics and rheological applications of chiral nanostructures
ARIJIT GHOSH, Department of Electrical Communication Engineering, Indian Institute of Science, Bangalore, AMBARISH GHOSH, Department of Physics; Centre for Nano Science & Engineering, Indian Institute of Science, Bangalore — We have developed a system of magnetic chiral (helical) nanostructures that can be actuated in fluidic environments with rotating magnetic fields. These objects demonstrate interesting dynamical behavior, determined by the counteracting applied and viscous torques. Under certain experimental conditions, a bistable chaotic dynamics could be observed. This is surprising, since motion at low Reynolds' numbers is typically deterministic. We have developed an analytical theory to understand this dynamics, which has led to the development of a novel tool for micro-rheological measurements. We will demonstrate how the helical nanostructures can be used to map a complex rheological environment with micron scale spatial resolution, in a measurement time significantly shorter than all other currently used techniques.

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