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**Nonlinear dynamics of semiflexible magnetic filaments in an external ac magnetic field<sup>1</sup>**

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Chains of magnetic particles exist in nature (magnetotactic bacteria, magnetic colloids) and can be created artificially by linking magnetic particles with some polymer (PAA,DNA). Theoretical description of magnetic filaments is based on models of semiflexible polymers extended by incorporation of the effects of body torques due to long-range magnetic interactions. On the basis of these models different phenomena are described - buckling due to body torques, self-propulsion in an AC field, tumbling in the shear flow, orientation of ferromagnetic filaments in the direction perpendicular to an AC field, liquid flow excited by oscillating in an AC field tips of magnetic filaments floating on the surface of the liquid and others. Connection of equilibrium shapes of magnetic filaments with solutions of elastica problem is established. Different regimes of magnetic response of the suspension of magnetic filaments are analyzed by taking into account the thermal noise.

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