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DYNAMICS OF FLEXIBLE MAGNETIC MICRORODS[1]

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The mechanisms of self-propulsion of microorganisms and dynamics of flexible filaments have obtained considerable interest recently [1].

Rather promising approach for the creation of different microdevices which mimics the mechanisms used by living organisms is application of flexible magnetic microrods [2; 3].

Here we review the present state of the art of this field. Principles of the construction of models of magnetic filaments are described and the numerical algorithms for the solution of corresponding nonlinear partial differential equations are considered.

The general principles and algorithms are illustrated by numerical solutions of the self-propelling motion of superparamagnetic and ferromagnetic filaments, the loop formation by the ferromagnetic filament at field inversion, anomalous orientation of a ferromagnetic filament under the action of an AC field and behavior of magnetic filaments under the action of a rotating field.

The comparison of the results of numerical solution with physical eksperiments is given.

REFERENCES

[1] T.R.Powers. Dynamics of filaments and membranes in a viscous fluid. *Reviews of Modern Physics*, **82** :1607, 2010.

[2] R.Dreyfus, J.Baudry, M.L.Roper, M.Fermigier, H.A.Stone and J.Bibette. Microscopic artificial swimmers. *Nature*, **437** :862, 2005.

[3] A.Cebers. Flexible magnetic filaments. *Current Opinion in Colloid and Interface Science*, **10** :167, 2005.

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