

Abstract Submitted  
for the MAR09 Meeting of  
The American Physical Society

**Flexible ferromagnetic filaments and the interface with biology<sup>1</sup>**

ANDREJS CEBERS, MIHAILS BELOVS, KASPARS ERGLIS, University of Latvia  
— Flexible ferromagnetic filaments exist in Nature (magnetotactic bacteria use them for the navigation purposes in the magnetic field of the Earth) and may be synthesized artificially by linking the functionalized ferromagnetic particles by DNA fragments of definite length. Ferromagnetic filaments allow to mimic self-propulsion of microorganisms by using AC magnetic fields. It is investigated both theoretically and experimentally. The elastic properties of the filaments are studied by kinetics of their orientation in an AC magnetic field of enough high frequency and allow to describe the observed deformation of the filaments at reversal of the magnetic field. By numerical analysis the Floquet coefficients for the dynamics of ferromagnetic filaments are calculated and the existence of stationary oscillations of U-like shapes is confirmed. These shapes self-propel perpendicularly to the AC magnetic field.

<sup>1</sup>Supported by grant Y2-ZP10-100 of University of Latvia.

Andrejs Cebers  
University of Latvia

Date submitted: 03 Nov 2008

Electronic form version 1.4