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Multi-stability of a Body with Magnetizable Elastomer in a Non-Uniform Magnetic Field

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In [1-3] unambiguous deformation of the body with the magnetizable elastomers (ME) in a magnetic field is studied theoretically. In [4] two stable equilibrium shapes of thin bodies with ferrogel (be-stability) are found experimentally. In this work, the existence of more than two stable equilibrium shapes (multi-stability) of a thin ME body with length $L_0$ in the non-uniform magnetic fields is investigated theoretically. Various methods for generating such fields, for example, using three electromagnetic coils (Fig. 1), are considered.

In Fig. 2 the dependence of the dimensionless length of the deformed body $L^*$ on $L_0^*$ is given. The characteristic length equals to $R$. When some parameter $G_0 \sim j^2$ changes, the number of equilibrium shapes of the body with a given length $L_0^*$ varies from 1 to 5. The instability condition is obtained: $dL_0/dL<0$. It is shown that for a certain range of $L_0$ and $j$, three stable equilibrium shapes (multi-stability) are possible (Fig. 2).

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References