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Application magneto-elasticity problem solutions in medical diagnostics

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In the paper I consider an application of the magneto-elasticity methods for researching processes in medical diagnostics. It is allows create a new technologies of the treatment of various diseases people.

Soft magnetic alloys are easily magnetized and demagnetized. They are uniquely suited for specialized applications that require high permeability, low losses, and low residual magnetism. Magnetic materials can be applied to cell separation, immunoassay, magnetic resonance imaging (MRI), drug and gene delivery, minimally invasive surgery, radionuclide therapy, hyperthermia and artificial muscle applications. Physical properties which make magnetic materials attractive for biomedical applications are, first, that they can be manipulated by an external magnetic field – this feature is useful for separation, immunoassay and drug targeting, and second, hysteresis and other losses occur in alternating magnetic fields – this is useful in hyperthermia applications. Some magneto-tactic bacteria are known to respond to a magnetic field, they contain chains of small magnetite particles and they can navigate to the surface or bottom of the pools that they live in using these particles.

Often soft magnetic materials are heterogeneity technological, structural or structural nature, such as oral, enthetic inclusion holes. Research on strength, reliability and durability of structural elements leads to the need to determine the stress-strain state and the induced magnetic field in the body and heterogeneity. Therefore, it was decided a number of problems of plane and space for magnetically soft ferromagnetic materials by harmonic functions.

$$\vec{u} = \vec{u}_0 + 4(1-\nu)\vec{Z} - \mathrm{grad}(\vec{r}\cdot\vec{Z} + Z_0);\ \vec{Z} = Z_1\vec{i}_1 + Z_2\vec{i}_2 + Z_3\vec{i}_3;\ \nabla^2 Z_1 = \nabla^2 Z_2 = \nabla^2 Z_3 = \nabla^2 Z_0 = 0$$