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## Structural-parametric model of electromagnetoelastic actuator for astrophysics and optical astronomy

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In the astrophysics, the optical astronomy for the large telescopes and the antennas, the space radio telescope, the satellite telescopes, the adaptive optics and the nanotechnology are used the mechatronic systems with the electromechanical actuator based on electromagnetoelasticity (piezoelectric, piezomagnetic, electrostriction, magnetostriction effects). The piezoactuator is the piezomechanical device intended for actuation of the mechanisms, the systems or the management based on the piezoelectric effect, converts the electrical signals into the mechanical movement or the force. Using the solutions of the wave equation and the matrix equation of the electromagnetoelastic actuator with the Laplace transform and taking into account the features of the deformations along the coordinate axes, it is possible to construct the generalized structural-parametric model of the actuator and to describe its dynamic and static properties. Effects of geometric and physical parameters of electromagnetoelastic actuator and external load on its dynamic characteristics are determined. Structural-parametric model, decision wave equation and matrix equations of electromagnetoelastic actuator are obtained, its transfer functions are bult. Static and dynamic characteristics of piezoactuator are determined. For calculation of control systems for nanometric movements the generalized parametric structural schematic diagram Figure 1 and the transfer functions of the electromagnetoelastic actuator are obtained. The generalized structural-parametric model of the electromagnetoelastic actuator provides the determination of its transfer functions and use methods of control theory in calculation of its static and dynamic characteristics for the electromagnetoelastic actuator for astrophysics and optical astronomy. The transfer functions and the parametric structural schematic diagram of the piezoactuator for the transverse, longitudinal, shift piezoelectric effects are obtained from the structural-parametric model of the piezoactuator.



Figure 1: Generalized parametric structural schematic diagram of electromagnetoelastic actuator.
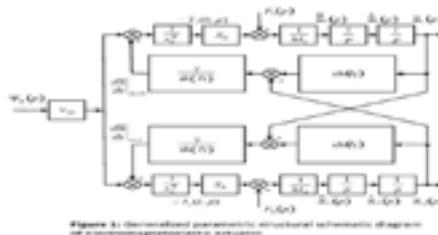
## Biography

Sergey M Afonin (PhD) now is an Associate Professor of Department of Intellectual Technical Systems of National Research University of Electronic Technology (Moscow Institute of Electronic Technology MIET). He is a graduate of the National Research University of Electronic Technology MIET, Engineer in Electronic Technology 1976. He did his Degree PhD in Electronic Technology Engineering and Control Systems received in National Research University of Electronic Technology MIET 1982. He has Academic title of Senior Researcher received in MIET 1991. He is aspirant MIET 1976–79, Junior Researcher MIET 1979–82, Senior Researcher MIET 1983–93 and Associate Professor at MIET since 1993 to present time. He has more than 200 scientific papers to professional publications. He is the recipient of silver medal VDNKH Russia and two Bronze medals VDNKH Russia.

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