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**Absolute stability of control system with electromagnetoelastic actuator for nanotechnology****S M Afonin**

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The application of the electromagnetoelastic actuator based on the electromagnetoelasticity (piezoelectric, piezomagnetic, electrostriction, magnetostriction effects) is promising in the nanotechnology, the nanobiology, the power engineering, the microelectronics, the adaptive optics equipment. The correcting devices are chosen for providing the high quality of the control systems for the deformation of the piezoactuator. The analytical expressions for the sufficient absolute stability conditions of the system with the hysteresis nonlinearity of the electromagnetoelastic actuators are written using the Yakubovich absolute stability criterion, which is the development of the Popov absolute stability criterion. For the Lyapunov-stable control system, the Yakubovich absolute stability criterion for the systems with the single hysteresis nonlinearity provides the simplest and pictorial representation of results of the investigation of the stability and the possibility of the synthesis of the correcting devices of the system ensuring the stability of the strain control systems with the electromagnetoelastic actuators. The characteristics of the electromagnetoelastic actuators are the alternating-sign hysteresis type for the piezoactuators and the constant-sign butterfly type for the electrostriction actuators. In the magnetostriction and electrostriction actuators their initial operating point is chosen on one wing of the butterfly, for example, in the first quadrant, for the deformation range to be symmetric at both sides of the initial point. For the butterfly characteristic the initial working point displaced by the half deformation range. The values of the tangents of the inclination angles of the tangent line to the hysteresis nonlinearity on the butterfly wing for the electromagnetoelastic actuator are determined similar to the hysteresis characteristic. The stationary set of the control systems is the segment of the straight line. The absolute stability conditions of control systems with piezoactuator deformation in the case of longitudinal, transverse and shift piezoeffect for the hysteresis characteristic of deformation of the piezoactuator are obtained. The obtained absolute stability conditions for the control system with the electromagnetoelastic actuator allow one to estimate and calculate the characteristics of the control system of the deformation of the electromagnetoelastic actuator.

**Biography**

Sergey Mikhailovich Afonin is working as an Associate Professor of Department of Intellectual Technical Systems of National Research University of Electronic Technology (Moscow Institute of Electronic Technology MIET). He has completed his Engineering in Electronic Technology from National Research University of Electronic Technology MIET in 1976; PhD degree in Electronic Technology Engineering and Control Systems from MIET in 1982. He was a Junior Researcher in MIET during 1979–82; Senior Researcher in MIET during 1983–93. He received his academic title of Senior Researcher in MIET 1991. He has published more than 200 scientific papers to professional publications and 16 inventions and a Recipient of silver medal and two bronze medals from VDNKh Russia.

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