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ODWROTNE ZADANIE DYSKRETNYCH DRGAJĄCYCH UKŁADÓW MECHATRONICZNYCH

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THE REVERSE TASK OF MECHATRONIC DISCRETE VIBRATING SYSTEMS

Abstract

In this thesis reverse task of mechatronic discrete vibrating systems has been presented and studied . Mechatronic structures have been built from mechanical models combined with piezostack actuators. Piezoelectric element has been connected to external electric *LRC* network, which can exist within different damping configurations. In each case designed structures must comply with the dynamical properties in form of frequency spectrum, relatively resonant and antiresonant frequencies.

By use of well known different synthesis methods it is possible to determine cascade, branched and mixed structures. By dint of non dimensional transformation mechanical substitute models can be transformed to dimensionless forms. Also, by use of algorithm of retransformation it's receivable to convert non dimensional models to final mechatronic structures which complies with given requirements. In each case received parameters of the designed system are physically feasible.

In this paper problem of designing of mechatronic vibrating systems has been formalized for "*n*" degree of freedom. Dynamical characteristics have been received by the distribution into partial fraction method, distribution into continuous fraction, extended and mixed method. Influence of dimensionless parameters of the mechanical replacement models into behavior of final mechatronic structures has been investigated. Additionally, possibility of modeling mechatronic structures by use of graphs has been shown.

The monograph is the first approach in synthesis of mechatronic discrete vibrating systems. It's a verification as well as a continuation of current science achievements from synthesis of mechanic or electric systems.