10th Conference on
Dynamical Systems - Theory and Applications

DSTA-2009, December 7-10, Łódź, Poland

Paweł Olejnik, Jan Awrejcewicz

Department of Automatics and Biomechanics, Technical University of Łódź, POLAND

Active Control of a Rheologically Modelled Human Chest with the Use of LQR Method

Abstract: The work is a continuation of some investigations derived in some previous papers of the authors. Active control of some industrial or biological structures is not a new topic but can be still explored with a success. This time the qualitative extension to our work focuses on application of one controlling force to control a relative internal deformations in the human chest that have been caused by an external action of impact force. The first force controlling the analyzed rheological system acts on the front side of the thorax and is estimated on the basis of minimization of the *LQR* performance index. The problem of vibrations optimization with respect to minimization of internal displacements in the human chest has been solved numerically. As the practical result we provide some sets of coefficients of *Q* and *R* matrices that are non-zero only in the trace as well as some useful deformation and energy dissipation time characteristics and parameters estimation for realization of fast responses of that control forces reducing measured relative deformation in about 30 percent.