URN etd-0407109-183726-2173
Author Bing-Song Wu
Author's Email Address No Public.
Statistics This thesis had been viewed 37 times. Download 0 times.
Department
Year 2004
Semester 1
Degree Master
Type of Document Master's Thesis
Language zh-TW.Big5 Chinese
Title Active Vibration Control for a Flexible Beam Mounted on a Vibrating Elastic Base: Theory and Experiments
Date of Defense 0000-00-00
Page Count 77

Keyword
Active Vibration Control
Optimal Control
Independent Modal Space Control (IMSC)
Static Condensation
Modal Observer

Abstract
The objective of this study is to discuss the structural vibration and control of the base excitation in flexible beam with elastic base. The study used the finite element method to establish equations of motion into a system, then included the effects of shearing deformation and rotary inertia in the analysis to improve the analysis accuracy of short, sturdy beams in higher modes. The active feedback control was used to inhibit base excitation to generate structural vibration, and Optimal Independent Modal-Space Control was applied in design. Moreover, this study introduced the problem of control spillover taken place during the Optimal Independent Modal-Space Control, and solved the problem by using a weighting matrix with finite weights. This study also used finite number of sensors, along with the application of static condensation and modal space observer, to integrate Optimal Independent Modal-Space Control for detailed discussion and analysis. The results of numerical simulation and experiment were compared for their difference. As for numerical simulation, the higher modes analysis accuracy and vibration control efficiency of the slender beam, short and sturdy beams, and experimental parameters were discussed. The experiment used the voice coil motor of conventional DVD pick-up head, and selected mass, stiffness, and damping to be the elastic base. At the same time, this study analyzed the accuracy and sensitivity of the sensor and actuator made from the pick-up head. Static condensation was used to probe into the effects of the placement of sensors on different locations of the flexible beam on the system. Moreover, this study integrated the modal observer and mode switching main control, used one control force to control one or more modes at the same time. Lastly, the experimental results discussed the problem of control spillover and the control efficiency after using modal observer.
Advisory Committee Chih-Liang Chu - advisor

Files No Any Full Text File.
Date of Submission 2005-01-01