MULTI-CHANNEL ACTIVE VIBRATION CONTROL IN ENGINE MOUNT ISOLATION SYSTEM

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ABSTRACT

THIS THESIS DESCRIBES AN ACTIVE VIBRATION CONTROL (AVC) SYSTEM FOR SINGLE-DEGREE-OF-FREEDOM (SDOF) AND MULTIPLE-DEGREES-OF-FREEDOM (MDOF) ISOLATION PLATFORMS. THREE VARIOUS ACTIVE VIBRATION CONTROL TECHNIQUES ARE COMPARED AND IMPLEMENTED IN TERMS OF CONTROL STRUCTURES AND CONTROL ALGORITHMS BY USING A FINITE-IMPULSE-RESPONSE (FIR) IN EXPERIMENTAL WORKS. THE ADAPTIVE FEEDFORWARD AND FEEDBACK CONTROL STRUCTURE USING FILTERED-X LEAST-MEAN-SQUARE (FXLMS) WITH SYNTHETIC REFERENCE IS EMPLOYED, THE LINEAR QUADRATIC GAUSSIAN (LQG) ALGORITHM WITH COMPENSATOR AND THE H-INFINITY (H∞) OF ROBUST THEORY ARE APPLIED IN FEEDBACK CONTROL SYSTEM. A HYBRID CONTROLLER COMBINES THE ADAPTIVE FEEDFORWARD WITH FEEDBACK ALGORITHMS OF LQG AND TO OBTAIN THE DESIRED ROBUST PERFORMANCE AND FAST CONVERGENCE IS PROPOSED. TWO CONTROL PLANT CONFIGURATIONS ARE IDENTIFIED BY A FREQUENCY-DOMAIN TECHNIQUE AND IMPLEMENTED BY USING A TMS320C32 DIGITAL SIGNAL PROCESSOR (DSP). EXPERIMENTS ARE CARRIED OUT TO EVALUATE THE PROPOSED SYSTEM FOR REDUCING THE VIBRATION OF ISOLATION PLATFORM AT VARIOUS CONTROL CONDITIONS. THE COMPARISON OF THREE CONTROL STRUCTURES AND THREE ALGORITHMS FOR TWO ISOLATION PLATFORMS IS ALSO DESCRIBED IN THIS THESIS.

Keywords : ACTIVE VIBRATION CONTROL, ENGINE MOUNT SYSTEM, FINITE-IMPULSE-RESPONSE, DIGITAL SIGNAL PROCESSOR

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