

Design Optimization And Vibration Control Of Adaptive Structures Modeling Of Smart Dampers And Optimization In Semiactive Structures

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Design Optimization And Vibration Control

In the present research work the optimization of structures and the vibration suppression are studied. First, a methodology to find the simultaneous size, geometry and topology design optimization of structures using Genetic Algorithms (GAs) is proposed. The methodology considers that the large structures are constructed from the duplication of some basic structures called bays.

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In order to have realistic optimal designs, the cross-sectional areas are extracted from the standard profiles and the optimization process is performed considered the AISC design standards. The second part of the work is concerned with the suppression of the vibration in structural systems.

Design optimization and vibration control of adaptive ...

Active vibration control of structures using piezoelectric materials is a new approach for damping unwanted vibrations in structures lacking sufficient stiffness or passive damping. The finite elements method is used to model active damping elements which are piezoelectric actuators bonded to a box beam.

Application of design optimization techniques for ...

Demands for both high accuracy and throughput levels of ultra-precision motion systems lead to a lightweight and flexible design, which makes the vibration control indispensable. Simultaneous optimization of vibration controllers and actuators' configuration (sizes and locations) could result in better vibration control performance.

Simultaneous optimization of actuators' configuration and ...

Based on the optimal vibration control theory, an integrated design optimization model is proposed. The linear quadratic performance index is taken as the objective function, and the control voltages as well as the number and volume of the actuators are considered as the constraints. The design variables include not only the locations and control voltages but also the thicknesses of the piezoelectric actuators.

Integrated design optimization of structure and vibration ...

elements and the order of the model is reduced by modal coordinate transformation. The vibration control system is designed by solving the H2 control problem using a reduced-order modal model. The multidisciplinary design optimization is performed with respect to the smart composite by a simple genetic algorithm method (SGA)

Multidisciplinary Design Optimization for Vibration ...

Therefore, this paper develops an integrated design technique making use of both the advantages of structural optimization and vibration control with an empirical cost model of the control devices. While the structural optimization is based on a very efficient optimality criteria (OC) method, a smart tuned mass damper (STMD) is used for the structural control purposes.

INTEGRATED STRUCTURAL OPTIMIZATION AND VIBRATION CONTROL ...

Design optimization for SST wing-body configurations was performed based on NAL design competition. Design objectives were to improve aerodynamic performance at Mach number 2.0 and to reduce sonic boom at Mach number 1.6. These two objectives were optimized by using MOGA. To evaluate aerodynamic performance, an Euler calculation was used.

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The vibration control design is an intricate engineering problem and must be set up by qualified professionals. Many factors specific to the individual work station govern the choice of the vibration isolation material and the machine mounting methods.

Vibration - Measurement, Control and Standards : OSH Answers

The Control of Vibration at Work Regulations 2005 require more specific duties compared to earlier general health and safety regulations such as the Management of Health and Safety at Work Regulations 1999 which still apply. If employers comply with the Vibration Regulations and follow guidance, it may be possible to eliminate any new incidence ...

Hand arm vibration - Control of Vibration at Work ...

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Check how it should be operated to ensure you get reduced vibration levels. Promote techniques that reduce grip force. Improve the design of workstations to limit the loads on hands, wrists and arms caused by any possible poor posture. Devices, such as jigs and suspension systems, can be used to take the weight and vibration of the tools away ...

Vibration - Controlling physical health risks - Managing ...

based controller design and optimization for vibration suppression in flexible structures. The potential of GA is explored in three case studies. In the first case study, the potential of GA is demonstrated in the development and optimization of a hybrid learning control scheme for vibration control of flexible manipulators.

Genetic Algorithm Optimization and Control System Design ...

Active and adaptive control of sound and vibration: Analysis, design, smart structures and materials; Passive control of sound and vibration: Damping processes, design optimization, meta-materials, materials for optimum damping; Inverse problems in acoustics and vibration (linear); techniques for source or system identification; statistical methods

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The control algorithm is the core aspect to realize vibration mitigation effectively for the intelligent system. In this chapter, equations of the motion of an intelligent vibration control system are introduced firstly, and fundamental theories of different control algorithms for intelligent vibration control system are introduced in detail.

Intelligent Vibration Control in Civil Engineering ...

Nonlinear energy sinks (NES) are efficient vibration control devices, which have been studied and applied in mechanical, automobile, and aerospace engineering. However, there are few applications in civil engineering. A new type of NES, which is termed as track NES, is proposed in this paper. The optimal mass ratio and track shape expression of NES were determined based on a preliminary optimization design process.

Optimization design and experimental verification of track ...

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