Vibration Isolation With Passive Linkage Mechanisms

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Abstract

This study is to present a novel way to achieve superior passive vibration isolation by employing a specially-designed and compact linkage mechanism. The proposed anti-vibration system has beneficial nonlinear inertia, inspired by swinging motion of human arms, and is constructed with an adjustable nonlinear stiffness system inspired by animal or human leg skeleton. It is shown with comprehensive theoretical analysis and consequently validated by a series of well-designed experiments that the nonlinear stiffness, nonlinear damping and nonlinear inertia of the proposed system are very helpful for significantly reducing natural frequency and enhancing damping effect in a beneficial nonlinear way. This results in excellent vibration isolation performance with lower resonant frequency and resonant peak of faster decay rate. This study provides an innovative solution to a cost-efficient vibration control demanded in various engineering systems.

Full Text

Due to technical limitations, full-text HTML conversion of this manuscript could not be completed. However, the manuscript can be downloaded and accessed as a PDF.

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