

Dynamic Modeling and Optimization of Inerter Systems with SMA Damping: Postprint

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Abstract

Based on the high damping characteristics of shape memory alloy (SMA), the energy analysis method is employed to integrate it into a single-degree-of-freedom inerter system. The restoring force of SMA is derived through the relationship between the free energy function and the dissipation function, and computational analysis of the system's time-domain and frequency-domain responses is conducted. Since the inertance coefficient of the inerter is independent of mass, parametric analysis of its relevant parameters can be performed without altering the mass. Parameter optimization is realized through contour plots of resonance peak projections, and the results demonstrate that selecting appropriate parameters can enable the inerter to achieve superior vibration reduction performance, thereby achieving the optimization objective.

Full Text

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Note: Figure translations are in progress. See original paper for figures.

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