The Study of Using Shape Memory Alloy Helical Spring in The Vibration Reduction of Semi－Active Suspension Platform

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ABSTRACT

Shape memory alloys (SMA), beside their shape memory effects, are capable of changing their material Young’s modulus and damping properties upon the actuation of temperature. This study focused on the application of the controllable stiffness difference between the martensite and austenite phases of the shape memory materials. The suspension springs of the platform were constructed using this type of material. Hence, by controlling the temperature of the suspension springs the stiffness of the suspension and, consequently, the natural frequency of the platform can be tuned. However, the spring constants in axial and lateral vibration were shown to be deviated from those of the static measurement. The effect of deformation amplitude and frequency on the natural frequency and damping of the helical SMA spring was investigated. It was shown that the effective spring constant decreased with the deformation amplitude while increased with the loading frequency. The use of SMA helical spring with tunable dynamic characteristics has been proposed in the semi-active suspension platform.

Keywords : SMA ; helical spring ; semi-active vibration control system

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