The study of using hybrid shape memory helical spring in the ...

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ABSTRACT

In this study, the natural frequency and the associated damping capacity of a platform suspended by four helical springs were investigated at different controlled temperatures. The helical spring was fabricated with multiple layers of pyro condensation polymeric sleeve wrapped outside a superelastic NiTi core which has been heat-treated into helical configuration beforehand. The dynamic characteristics of the hybrid shape-memory helical spring was first investigated experimentally. It was found that the first natural frequency of the spring can be decreased to 50% of the o frequency at room temperature when the temperature was raised to 90 C. On the other hand, a decrease in the damping capacity of the spring was found accompanying the increase in temperature. Then, the change in the natural frequency of a platform supported by four helical springs was studied. The prediction of the natural frequency of the first few lower modes of the sprung-mass correlated well with the result from measurement. Moreover, we demonstrated the displacement amplitude of vibration for the platform under eccentric loading of imbalance mass was reduced significantly with the control temperature raised to 90°C.

Keywords : Helical spring, Semi-active suspension platform, Shape memory alloy, Shape memory polymer

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