Experimental Investigation of Static Properties of Magnetorheological Elastomer

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Abstract

Magnetorheological elastomer (MRE) is a type of smart material made of natural or synthetic rubber filled with micron-sized magnetic particles. Its shear modulus and elasticity can be controlled by applying an external magnetic field. In this study, a mounting system model is used to obtain displacement transmissibility factor. In the experimental analysis, three different MRE samples are manufactured by varying the percentage of magnetic particles. The experimental investigations are carried out to characterize the quasi-static properties of these MREs by attaching them with universal testing machine in compression and tensile mode. In both modes, different currents and velocities are applied to the samples. From the experimental results, a proportional relationship has been observed among the resisting force from MREs and applied excitation current, displacement and velocity. In most cases, the force has increased with the increasing percentage of magnetic particles in the sample. However, the highest force is obtained from the sample with 30% magnetic particles, at 2 A current and velocity of 4 mm/min. The results observed in this research would be useful for vibration control in applications such as engine mounting system.

Keywords

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