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Vibration Response of Magneto-Rheological Elastomer Sandwich Plates

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Abstract:

In recent years, the research on magneto-rheological elastomer sandwich structures has increased due to the adjustable properties by varying the magnetic field. However, the study is mainly focused on the theoretical analysis of the magneto-rheological elastomers MRE sandwich plates. In this works, the numerical and experimental investigation on the vibration response of MRE sandwich plates has been conducted. The composition of the iron particles and silicon rubber varied with 30/70, 40/60, 50/50, 60/40, and 70/30% by its weight percentage, respectively. According to the finite element analysis, the magnetic field produced was 0.6, 0.9, and 1.3 T with 2, 4, and 6 mm of the gap between the magnet and MRE composites. The natural frequency and stiffness of the MRE sandwich structured plates was 19.68–23.97 Hz, and 152.6–23.97 N/m, respectively for 0.6, 0.9, and 1.3 T of the applied magnetic field. It is concluded that by increasing the magnetic fields, the stiffness of the material can be changed. This work will contribute to the understanding of the properties of the MRE in the sandwich structures application.