THEORETICAL AND NUMERICAL STUDIES OF MAGNETO-RHEOLOGICAL DAMPER

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Abstract

This paper presents a theoretical and numerical studies based on Finite Element Method (FEM) of a Magneto-Rheological (MR) damper. In this article, the design considerations and magnetic flux density at the clearance space of the piston and the cylinder of the MR damper are studied. A theoretical model for the magnetic circuit design of the MR damper is developed which is subsequently used to calculate the damping force at various level of current. A FEM modeling of the same problem is then developed using ANSYS software to validate the theoretical modeling. The FEM modeling gives the magnetic flux density in the clearance space of the damper which in turn is used to determine the damping force. The damping force of the above two modeling is compared with each other and found to be in good agreement. The studies indicate that the both the modeling are effectively portraying the behavior of a MR damper and adequate enough for control and design of the damper. The results obtained in this paper will help the designers to predict the damping force of the damper.

Key words: Magnetic circuit; MR damper; FEM

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