ABSTRACT

Over the past three decades, a great deal of interest has been generated regarding the use of structural protective systems to mitigate the effects of dynamic environmental hazards, such as vibration, on mechanical engineering structures and automobile sectors for human comfort, earthquakes and strong wind, on civil engineering structures. These systems usually employ supplemental damping devices to increase the energy dissipation capability of the protected structure. One of the most promising new devices proposed for structural protection is magnetorheological (MR) fluid dampers.

MR fluids possess rheological properties, which can be changed in a controlled way. These rheological changes are reversible and dependent on the strength of an excitation magnetic field. MR fluids have potentially beneficial applications when placed in various applied loading (shear, valve and squeeze) modes.

Magnetorheological dampers, or as they are more commonly called, MR dampers, are being developed for a wide variety of applications where controllable damping is desired. MR fluid dampers have the capability of changing their effective damping force depending on the current input to the damper. These applications include dampers for automobiles, heavy trucks, prosthetic limbs, gun recoil systems, bicycles, and possibly others related to mechanical discipline like brake, clutch etc.

Magnetorheological (MR) fluid dampers having very good mechanical simplicity, high dynamic range, low power requirements, large force capacity, and robust ness, this class of devices has been shown to mesh well with application demands and constraints to offer an attractive means of protecting infrastructure systems.

This work issues the design and analysis of the linear magnetorheological damper. Basic information concerning the characteristics of the typical magnetorheological fluid and the damper incorporating it, were presented with the detail description of the applied fluid developed in our premises. With reference to the computations, the prototype damper was designed, manufactured and tested under different operating conditions. Performed calculations were verified with the experimental results and their accuracy was evaluated. The conclusions and observations from the research were compiled in the summary.