Mathematical Modeling of a Single and Double Magneto-Rheological for Car Suspension System

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Abstract

Vehicle suspension systems have been used widely. With responsive fluid behavior, Magneto-Rheological (MR) car suspension was the most efficient suspension technology today. A mathematical model of a single and double MR vehicle suspension was created for this study using Modified Bouc-Wen model, and the ride comfort of the models was compared. Second order linear differential equations were used to create and solve the model, and MATLAB software was used to visualize the outcomes. To verify the accuracy and dependability of the models, experimental data from the Proton Preve automobile is compared with the findings of simulations from MATLAB software. Lastly, the displacement and settlement time performance of a single MR, and the double MR systems is compared and analyzed. The results reveal that the double MR systems model produces the lowest displacement and shortest time of settlement when compared to a single MR suspension model. By improving the double MR suspension systems' performance, this study helps to increase ride comfort and stability on a variety of roads. For the automobile industry, the study on system displacement also provides an improvement in vehicle safety. A significant new endeavor in all car models in the automotive industry is aided by the new mathematical modeling for MR systems.

Keywords

Single, Double, MR Suspension System, Modified Bouc-Wen.