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Design and analysis of a magneto-rheological damper for an all terrain vehicle

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A shock absorber design intended to replace the existing conventional shock absorber system with a controllable system using a Magneto-rheological damper is introduced for an All Terrain Vehicle (ATV) designed for Baja SAE competitions. Suspensions are a vital part of an All Terrain Vehicles as it endures various surfaces and requires utmost attention while designing. COMSOL multiphysics software is used for applications that have coupled physics problems and is a promising new tool that aids in designing complex problems. The model is optimized using Taguchi model using DOE software. A unique model based on finite element analysis is generated using COMSOL multiphysics platform to model, analyze and interpret the observed results. The magneto-rheological damper is designed to maximize the damping force with measured geometric constraints. The MR damper makes use of the properties of the magneto rheological fluid, a smart material, which alters its physical behaviour with actuating magnetic field. The varying terrain endured by an ATV makes it necessary for the variable damping properties that can be introduced by the magneto-rheological damper to be put into use.

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