Magnetorheological Damper Design For An All Terrain Vehicle

K. Ravikumaran

Amrita School Of Engineering, Coimbatore, Tamil Nadu, India

Abstract

Background: Use of conventional dampers in shock-absorber applications intends to dissipate the energy generated from vibrations through specific preset damping forces. The intention of this study is to introduce a controllable system in order to replace this existing conventional damping application for an All Terrain Vehicle designed for Baja SAE competitions.

Application of COMSOL: A basic 2D axi-symmetric model of a piston and cylinder design has been generated using the Comsol platform. Physics controlled mesh is applied for AC/DC and CFD module physics application. The AC/DC module intends to provide the interface required to design a multi turn coil for applied current inputs as to generate the magnetic field required for specified on state operation. The CFD module is used to study the shear stress generated by the magneto-rheological fluid in its off state operation, Considering relative motion the CFD module also intends to suffice for the axial motion of the piston within the cylinder arrangement.

Results: Magnetic Flux density and shear stress values are obtained within expected ranges. Damping force is calculated by extrapolating results with proposed design equations within the software, and interpreted through graphical representation.
Clear variation of damping force with induced magnetic field for applied current is observed supporting the designed system

Conclusion: Creation of a reliable damper design has been completed using comsol software with wide implications.

Figures used in the abstract

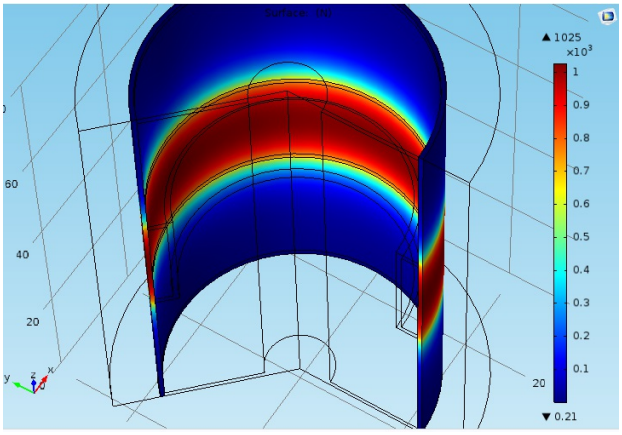

Figure 1 : Damping Force value for specific current input