

MAGNETO-RHEOLOGICAL BRAKE OPERATION ANALYSIS

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Introduction. The magneto-rheological fluid is a magnetic one. A magnetic fluid changes its properties (viscosity) under the influence of an external magnetic field. The viscosity of magneto-rheological fluid changes by magnetic field (from carrier fluid till like frozen butter). The ferromagnetic particles are single domains when magnetic field is off and the same particles are orientated and concentrated along of the magnetic field. This paper describes magneto-rheological brake operation principles and analysis of it. The design, optimal dimensions of MR brake, mathematical functions of shear stresses and torque. The aim of this work is to develop a magneto-rheological brake system that has performance over conventional hydraulic brake system.

Magneto-rheological brake operation principle. The MR brake is a device that can generate the necessary resistance torque by varying the shear stress of MR fluid. The braking torque changes quickly in response to an applied magnetic field, produced by a current in a coil. MR fluid is placed between housing and rotor. Magneto-rheological brakes are able to operate in not continual movement, when the torque value is convertible. Tender MR brake construction is shown in Fig 1. MR brake is one shaped and operating in direct-shear mode. MR fluid is filling the gap between the rotor and two housings. Tender MR brake construction is shown in Fig 1. MR brake is one shaped and operating in direct-shear mode. MR fluid is filling the gap between the rotor and two housings.

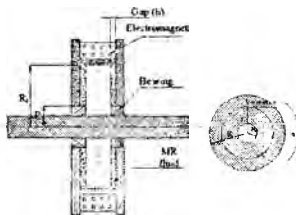


Figure 1– Tender MR brake scheme

Conclusions. Application of MR fluid is very wide, but there is one restriction, maximal velocity can be about 1500 rpm. This paper describes MR brake modes physical components such as torque, shear stresses and other. The working principles of MR brake were analysed. Analysed are also all optimal geometric parameters and materials.

References

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