

MAGNETO-RHEOLOGICAL BRAKE OPERATION ANALYSIS

A. Bubulis (KTU Chief Researcher), V. Maciukiene (KTU Phd student).

Introduction. First of all the magneto-rheological fluid were used in brakes and dampers. Now MR fluids are used in many actuators, automobile shock absorber, coupling, prosthesis limbs, and exercise equipment. The rheological properties of MR fluids in particular the dynamic yield stress are based on a Bingham plastic model. This paper describes magneto-rheological brake operation principles and analysis of it. Design, optimal dimensions of MR brake, mathematical functions of shear stresses and torque [1].

Magneto-rheological fluid brake operation principle. Design and MR fluid gap considerations. 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 an current in a coil. In designing the MR brake, several factors should be taken into consideration, including gaps, electromagnet, fluid behaviour, chamber and seals.

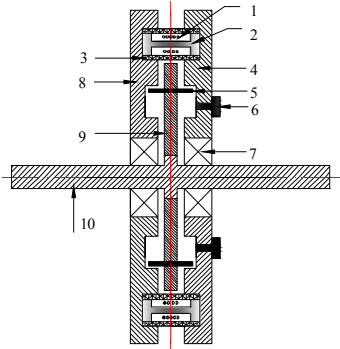


Fig. 1 Construction elements of MR brake

As it is shown in the Fig. 1, magneto-rheological fluid is placed into the brake through two holes in the housing. It is confined within the chamber formed by the enclosure, housings, rotary plate and the seals. The bearings are chosen special one: ball bearings with special sealing from the flow fluid.

Conclusion. Application of MR fluid is very wide, but there is one restriction, maximal velocity can be about 1500 rpm. So we can't use in the systems with higher velocity.

Literature

Ronjia Tao "Electro-Rheological Fluids and Magneto-Rheological Suspensions".

Phillips, R. W. "Engineering Applications of Fluids with a Variable Yield Stress", Ph.D. Thesis, University of California, Berkeley (1969). p. 12-42.