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Dynamic Characteristics of an Eddy Current Shock Absorber

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Summary

This paper is concerned with a new concept for the electromagnetic shock absorber which consists of a couple of permanent magnets and a conducting material cylinder. The opposite pole magnets produce the repulsive forces. The relative motion between magnets and conductive material produces the eddy currents thus resulting in the electromagnetic force which turns out to be the damping force. These forces due to magnets and eddy currents are substituted for the coil spring and damping fluid of the conventional shock absorber. This shock absorber can be called the eddy current damper (ECD). The important advantages of the proposed ECD are that it does not required any kind of damping fluid and external power and is non-contacting and relatively insensitive to temperature. In the present study, the dynamic characteristics of the proposed shock absorber are investigated analytically and experimentally. The analytic model of the electromagnetic field and the eddy current damping was established and verified from experiments. From this model the proposed ECD was modeled analytically and simulated. The ECD was constructed and the experiments were performed to investigate its dynamic characteristics. The simulations and experiments show that the proposed ECD has excellent damping ability.