# INFLUENCE OF THE MAGNETIC FIELD ON THE DYNAMIC MECHANICAL PROPERTIES OF MAGNETORHEOLOGICAL ELASTOMERS

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**Abstract:** *Machinery and buildings often have to be protected from vibrations. During the past two decades the interest in intelligent material based solutions has shown a huge growth.*

*The needed reduction of dynamic response can be achieved efficiently with semi-active isolation. One way to use semi-active isolation is to install vibration isolators between the base and the object to be protected and control the dynamic properties of these isolators.*

*Magnethoreological Elastomer (MRE) are a kind of smart material whose mechanical, electrical and magnetic properties are controllable under applied magnetic field. The effect of particle concentration, the intensity of uniform magnetic field as well as the spatial distribution of particles on the magnetic field may induce different behaviors of these materials.*

*Finite element models presented in this paper are taking into account magneto-rheological materials as a part of automotive shock absorbers and building foundations for taking over seismic shocks.*

**Keywords:** *magneto-rheological elastomers, magnetic field, carbonyl iron particles.*

## 1. Introduction

Magneto-rheological materials (MR) is a group of materials whose rheological properties can be changed by applying an external magnetic field [1]. Magneto-rheological fluids are Newtonian fluid behavior which in the absence of magnetic field are visco-elastic solid with a certain amount of blood flow when a magnetic field is applied [3]. Elastomers of this type have a solid polymer matrix and elastic elements are controllable magnetic carbonyl iron particles. MR elastomers promise adaptive behavior vibration absorber structure, changing mechanical stiffness, which can be used successfully in the automotive suspension and biomechanics [4], in making artificial muscles [2].

MR elastomers are mainly composed of magnetic particles and polymer matrix elastic magnetically neutral. Magnetic particles, usually iron carbonyl particles, the matrix polymer may include silicone, polyvinyl alcohol, natural rubber, high density [5], [6] and RTV polyurethane (RTV - Room Temperature Vulcanizing). Typically magnetic particles are included in the polymer untreated mixture is then subjected to a strong magnetic field. In this magnetic field is oriented to the direction of the field particles, forming a chain-like structure. The material thus obtained is an anisotropic MR elastomer. This type of anisotropic elastomer manufactured is complicated because it requires the application of high intensity fields in a relatively small area and is difficult to use widely. M. Lokander and others [7], [8] studied the magneto-rheological material rubber matrix, isotropic, which are obtained without the need to apply a magnetic field. Particles used by these researchers are large, irregular and