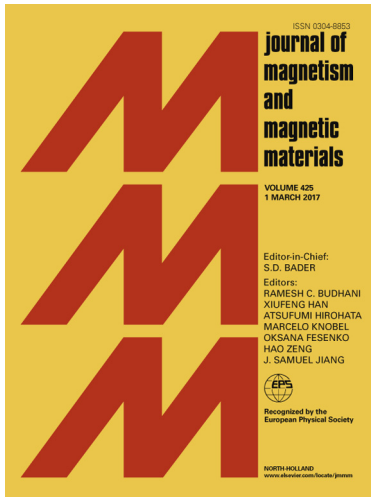

The response force and rate of magneto-rheological elastomers with different fillers and magnetic fields

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The response force and rate of magneto-rheological elastomers with different fillers and magnetic fields

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Abstract

This study looks at the response rate and magnitude of magneto-rheological elastomers (MREs) upon applying magnetic field depending on the type and content of iron powder. Specimens were prepared under different magnitudes of an applied magnetic field during vulcanization. S1640 (carbonyl) iron powder has a round shape and small size (3-5 μm), and Fe#400 (electrolytic) has irregular shape and large size (6-11 μm). Both of these were used at up to 80 phr. In general, the specimen with S1640 has a better response force and more rapid response to an external magnetic field than the specimen with Fe#400. However, the compressive characteristics of the Fe#400 specimen with low iron powder content (40 phr) and isotropic conditions are better than those of the S1640 specimen. The experimental results show better mechanical properties and rapid response with an applied magnetic field of 1.5 T compared to 2.0 T during the specimen vulcanization. This means that the smaller iron powder can move faster when applying the magnetic field than the bigger iron powder, and the iron powder distribution influences the compressive modulus and response behaviors. Therefore, the response and force to an applied magnetic field and the durability of the MRE are better with the S1640 iron powder, and the pattern is similar to the compressive modulus.

Keywords: Magnetic field, Response rate, Iron particles, Compressive modulus

1. Introduction

The mechanical properties of magneto-rheological elastomers (MREs) can be altered