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Systematic Investigation of Magnetostriction in Composite Magnetorheological Elastomers: the Effect of Particle Shape, Alignment, and Volume Fraction CHRISTOPHER KASSNER, WILLIAM RIEGER, PARIS VON LOCKETTE, SAMUEL LOFLAND, Rowan University — We have completed a study of the magnetoelastic properties of several types of magnetorheological elastomers (MREs), composites consisting of magnetic particles cured in an elastic matrix. We have made a number of samples with different particle arrangements (pseudo-random and aligned), volume fraction, and particle shape (rods, spheres, and disks) and measured the field dependent strain in order to determine the magnetostriction. We found that the magnetostriction in these samples is highly dependent on the sample particle shape (aspect ratio) and volume fraction and ordering to a lesser extent. While much of the past work has focused on spherical particles, our results indicate that both rods and disks can yield enhanced results. We discuss our findings in terms of magnetic energy of the particles and elastic energy of the matrix. We then consider the issue of optimization. This work was supported in part by NSF Grant CMMI - 0927326.

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