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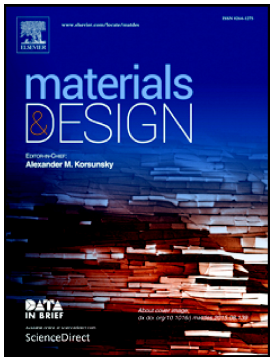

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A novel hybrid magnetorheological elastomer developed by 3D printing

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ABSTRACT

In this study, a novel magnetorheological (MR) hybrid elastomer has been developed using a 3D printing method. In such an MR hybrid elastomer, a controlled volume of an MR fluid was encapsulated layer by layer into an elastomer matrix by means of a 3D printer and each layer was a composite structure consisting of an MR fluid and an elastomer. Similar to current MR fluids and MR elastomers, mechanical properties of 3D printed MR hybrid elastomers could be controlled via an externally applied magnetic field. The experimental results showed that the relative change in the damping capability of the new MR elastomer was more pronounced than the change in its stiffness when exposed to an external magnetic field. The study demonstrated that the 3D printing technique is feasible for fabrication of MR elastomers with controlled microstructures including magnetic particles or MR fluids. The 3D printed MR hybrid elastomer is also a potential material as a tunable spring-damper element.

Keywords: MR elastomer; 3D printing; magnetic field; stiffness; damping

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