

Abstract Submitted
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Tunable adhesion using field-activated “smart” fluids RANDY EWOLDT, Massachusetts Institute of Technology, PIOTR TOURKINE, Ecole Normale Supérieure, GARETH MCKINLEY, A.E. HOSOI, Massachusetts Institute of Technology — We demonstrate experimentally that field-responsive magnetorheological fluids can adhere to non-magnetic substrates. The tunable adhesive performance is measured experimentally with pull-off tests, i.e. probe-tack experiments, in which the external magnetic field and fluid geometry are varied. The adhesive force is predicted by a lubrication model which treats the adhesive as a yield stress fluid with field-dependent and inhomogeneous yield stress (caused by the inhomogeneous external magnetic field). The peak adhesive force, the “work of adhesion” and the mode of failure are all controlled by the field-responsive nature of the magnetorheological fluid forming the adhesive layer.

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