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On the anisotropic thermal conductivity of magnetorheological suspensions JERRY SHAN, BENJAMIN REINECKE, KARL SUBEDISSEN, ANNA CHERKASOVA, Rutgers University — The thermal conductivity of an iron-based magnetorheological suspension is experimentally investigated and found to be enhanced, anisotropic, and hysteric under magnetic fields due to the formation of field-induced chains. The component of the thermal conductivity in the field direction more than doubles under the applied field in some instances, while the conductivity remains essentially unchanged in the directions perpendicular to the field. Hysteresis is found in which the effective conductivity, once enhanced by the field, remains high until the fluid is disturbed to break the particle chains. A two-level homogenization model for both components of the effective thermal-conductivity tensor is developed and compared with the data. The structural implications of the model are discussed in relation to theoretical predictions of the microstructure of the saturated suspension.

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