

Additive role of attapulgite nanoclay on carbonyl iron-based magnetorheological suspension

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Abstract

Attapulgite (ATP), a fibrous nanoclay mineral, was adopted as an additive in this study to improve the sedimentation problem of soft magnetic carbonyl iron (CI)-based magnetorheological (MR) fluids caused by the density mismatch between the CI particles and medium oil. The MR characteristics of the two MR fluid systems with and without ATP were measured and compared using a rotational rheometer under different magnetic field strengths. Scanning electron microscopy indicated that ATP filled the interspaces among the CI particles, explaining the improved dispersion stability of the MR fluid based on the Turbiscan sedimentation measurements. Despite the slight decrease in MR characteristics, the MR fluid with the additive exhibited the typical MR performance of an increase in shear stress in an applied magnetic field.