

Accepted Manuscript

Research articles

Experimental verification of negative magnetorheological characteristics in spindle-like hematite particle suspensions

Akira Satoh, Rafael Cuadra

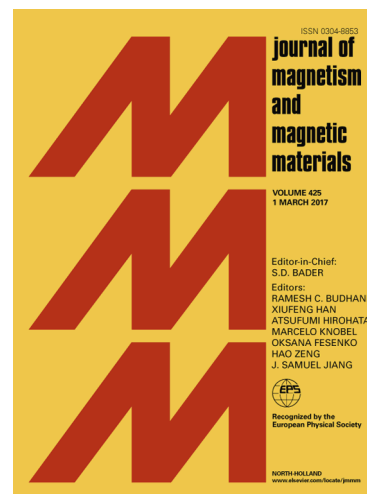
PII: S0304-8853(18)31425-2
DOI: <https://doi.org/10.1016/j.jmmm.2018.09.004>
Reference: MAGMA 64286

To appear in: *Journal of Magnetism and Magnetic Materials*

Received Date: 10 May 2018
Revised Date: 2 September 2018
Accepted Date: 3 September 2018

Please cite this article as: A. Satoh, R. Cuadra, Experimental verification of negative magnetorheological characteristics in spindle-like hematite particle suspensions, *Journal of Magnetism and Magnetic Materials* (2018), doi: <https://doi.org/10.1016/j.jmmm.2018.09.004>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Experimental verification of negative magnetorheological characteristics in spindle-like hematite particle suspensions

Akira Satoh^{a*} and Rafael Cuadra^b

^{a*} *Department of Machine Intelligence and System Engineering, Akita Prefectural University, Yurihonjo, Japan*

^b *Graduate School of Akita Prefectural University, Yurihonjo, Japan*

Short running title: Negative magnetorheological characteristics

*Corresponding author: A. Satoh, Tel/Fax: +81-184-27-2129, asatoh@akita-pu.ac.jp

Highlights of the present paper:

- (1) Negative magnetorheological effects have been verified experimentally.
- (2) The dependence of the negative viscosity on the magnetic field strength has been clarified.
- (3) Several situations of the weight percent concentration have been addressed.

Abstract

In the previous experimental study, we succeeded in verifying that the negative magnetorheological characteristics are observable in a hematite particle suspension, which was predicted by a theoretical study based on the orientational distribution function. The present study further advances the experimental investigation of the negative magnetorheological effect in order to obtain more detailed data of these negative magnetorheological characteristics. The viscosity contribution from magnetic properties has been measured using a cone-plate-type rheometer, located in the uniform area of the magnetic field, under various conditions of the magnetic field strength and the weight percent concentration. It is seen that a contribution to the viscosity of a hematite-glycerol-water dispersion from its magnetic properties, becomes negative and attains to a minimum value, after which the effect decreases and finally becomes positive with increasing magnetic field strength. These characteristics of the negative viscosity are in good agreement with the theoretical prediction that was obtained by the orientational distribution function.

Keywords: Magnetic colloidal dispersion, Hematite particle, Magnetorheology, Negative viscosity,

Download English Version:

<https://daneshyari.com/en/article/10129044>

Download Persian Version:

<https://daneshyari.com/article/10129044>

[Daneshyari.com](https://daneshyari.com)