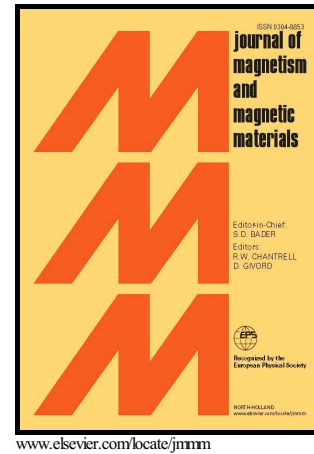# Author's Accepted Manuscript

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Magnetic fluid axisymmetric volume on a horizontal plane near a vertical line conductor in case of non-wetting

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Abstract

Static shapes of a magnetic fluid axisymmetric volume on a horizontal plane in the magnetic field of a vertical line conductor are studied theoretically in case of non-wetting while the current is slowly changing in a quasi-static manner. The possibility of the fluid shape hysteresis for a cyclic increase and decrease of the current and of spasmodic changes at certain values of the current is investigated.

Keywords: magnetic fluid, free surface, magnetic field, line conductor, non-wetting

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1. Introduction

The behavior of the free surface of an infinite magnetic fluid (MF) volume near a vertical line conductor with current is considered to be a classical problem in ferrohydrodynamics and it was firstly developed in [1]. In [2] a rapid jump of the MF ascension height was discovered theoretically and confirmed in the experiment for some value of the current in case of small magnetic fields. In [1] and [2] only the case of wetting was considered. The problem of a finite MF volume on a horizontal plane near a vertical line conductor was studied in [3] in case of wetting for any magnetic fields. It was shown that the fluid shape

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