Heat Transfer Research of Magnetic Fluids in a Two-Dimensional Rectangular Cavity

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ABSTRACT

The Rayleigh-Benard instability, occurring in the nature convection of a magnetic fluid in a Hele-Shaw cell and a two-dimensional rectangular cavity, heated from below with an imposition of an even vertical magnetic field was studied experimentally. On the experimental side, heat transfer measurements, liquid crystal thermography was used to observe the influence of the external magnetic field on the stability characteristics of the flow fields. The basic experimental tools for the research are building up, an automatic data acquisition system with high-accuracy resistance temperature detectors for heat transfer measurements and two temperature controlling systems for assuring the constant-temperature boundary conditions of the top and bottom walls .The results of the research presented the numerical simulations of Yamaguchi, et al [15] and Wen, et al [1] of the nature convection of a magnetic fluid in a Hele-Shaw cell and a two-dimensional rectangular cavity.

Keywords : Magnetic Fluid, Natural Convection, Rayleigh-Benard Instability, Liquid Crystal Thermography .

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