

On Features of Magnetic Convection in Ferrofluid

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Magnetically driven convection in nonconducting fluids is actively investigated last years due to uses in the field of materials processing including crystal growth from protein solution and insulating paramagnetic melts. However, the pondermotive forces exerted in natural media by typical magnets are very weak. Therefore ferrofluid – colloidal suspension of monodomain particles – well approaches for modeling of magnetoconvection. The experiment was performed to examine the influence of external homogeneous magnetic field on the convection instability, heat transfer and flow patterns in ferrofluid. Both driving force connected with a spatial variation in magnetization and comparatively weak suppressive force arising due to interaction between applied field and distortions of magnetization induced by flow were studied. It was revealed that the competitive action of density gradients of thermal and concentration nature results in spatiotemporally chaotic convection. Concentration heterogeneities arise due to settling of magnetic particle aggregates in gravity field.

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