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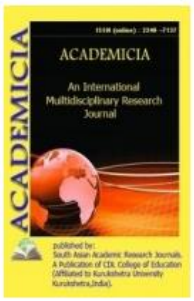

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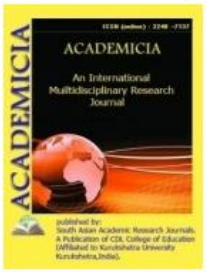

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MODULATED MAGNETIC STRUCTURES AND MODELS OF THEIR THEORETICAL EXPRESSION

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ABSTRACT

This paper is devoted to study of physical processes occurring in weak ferromagnetics iron - borate doped diamagnetic magnesium under external influence. The ideas of phase transitions are not only successfully applied in various fields of modern physics, but also in biology, chemistry, geology, and even economics and other social sciences. Thus, the article presents the results of the study of changes in the magnetic properties of iron borate when a magnesium mixture is added and the properties of this change as a result of external influences (temperature, mechanical impact, magnetic field and light).

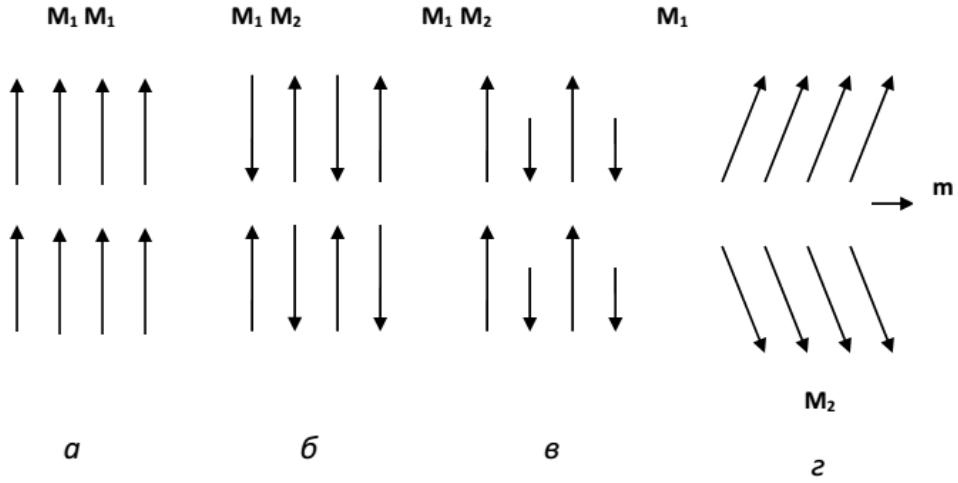
KEYWORDS: *Modulated Magnetic Structure, Linear Magnetic To Refracting Rays Domain Structure.*

INTRODUCTION

In today's world, where the division of physics into many disciplines is taking place, the ideas and ideas that generalize the different branches of physics play an important role. Such synthesizing assumptions can lead to scientific ideas related to phase transitions. The ideas of phase transitions are not only successfully applied in various fields of modern physics, but also in biology, chemistry, geology, and even economics and other social sciences. Phase transitions are the subject of traditional research in condensed matter physics, and magnetically ordered crystals are known to be the classic object of this research.

Picture 1. Magnetic arrangement of crystals: a - ferromagnetism, b - antiferromagnetism, c - ferrimagnetism, g - weak ferromagnetism (**M1, M2** - magnetic moments of neighboring atoms;

m - weak ferromagnetic moment). is devoted to the study of changes in physical processes that occur as a result of external influences.



Iron borate is a green, transparent, optically anisotropic crystal in the spectral field of view. Below the Neel temperature, $FeBO_3$ remains an optical two-axis, one of the optical axes coinciding with the symmetry head axis (C_3 axis) [3]. At room temperature, the maximum absorption spectra of iron borate in the light spectrum are 0.62 and 0.88 μm, and the value of the absorption coefficient is a ~ 50 cm-1 [4,5]. These two maxima in the absorption spectrum correspond to the separated states of Fe^3 + ions in the crystal field. They can be associated with transitions between cases $^4T_2$ (^4G) and $^4T_1$ (^4G), which are excited from the ground state, i.e., $^6A_1$ (^6S), respectively [1,2].

The study of the magneto-optical properties of this crystal is carried out in the field of transparency, i.e. mainly using the Faraday effect and magnetic linear dichroism methods [2,5]. The value of these effects is in the same order when light is scattered near the crystal optical axis (increases by 1.7 times when cooled to ~ 10^{-3}, 77 K at T = 300 K). Magnetic binary refraction (MBR) in the $FeBO_3$ crystal has been studied in the field of transparency of the crystal, i.e., in the field with a wavelength λ ~ 0.5 μm [1]. The value of MBR was the difference in refractive indices of the specific modes of the crystal when the temperature T = 77 K was ≈ 2×10^{-5}.

When a small amount of diamagnetic compounds was added to the iron borate, a change in its magnetooptic properties was observed without changing the Neel temperature [4].

CONCLUSION: Thus, the article presents the results of the study of changes in the magnetic properties of iron borate when a magnesium mixture is added and the properties of this change as a result of external influences (temperature, mechanical impact, magnetic field and light). This means that when the crystal is exposed to light, the displacement of Fe^{4+} ions is metastable, and when light is received, the Fe^{4+} ions return to their initial state over a period of time, ie the photoinduced changes in the magnetic parameters of the crystal "dissipate" in the absence of additional illumination. Similar photomagnetic phenomena can be observed in the $FeBO_3$: Mg crystal.

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