GENERAL CHARACTERISTICS OF SPIN-REORIENTATION TRANSITIONS IN ORTHOFERRITES

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S u m m a r y

The temperature dependences of the magnetization absolute value $|\mathbf{M}|(T)$ and its rotation angle $\theta(T)$ during the $\Gamma_4 \rightarrow \Gamma_{24} \rightarrow \Gamma_2$ spin-reorientation transition in $YbFeO_3$, $ErFeO_3$, and $TmFeO_3$ single crystals are measured and found to be incompatible with the conventional Landau mean-field theory. A modified mean-field theory describing experimental data with no fitting parameters was proposed. Its key point is the account of the anisotropic rare earth contribution to the total magnetization. The successful fitting of experimental data for several materials with a wide range of magnetic parameters demonstrates the generality of the proposed description of the $\Gamma_4(G_x, F_z) \rightarrow \Gamma_{24}(G_{xz}, F_{xz}) \rightarrow \Gamma_2(G_z, F_x)$ orientation phase transitions in orthoferrites.