

Magnetic and Magneto-Optical Properties in Paramagnetic NdF_3 Under High Magnetic Field

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Abstract: In this paper, we first theoretically report the magnetic and magneto-optical properties in paramagnetic media under high external magnetic field. Considering the action of the external magnetic field H_e and indirect exchange interaction H_v , the characteristic of the magnetic saturation and the property of the Faraday rotation to be nonlinear with external magnetic field are presented in paramagnetic NdF_3 . In terms of our theory, the indirect exchange interaction plays an important role in the magnetization M and the Faraday rotation θ in NdF_3 under high external magnetic field. The theory is in good agreement with experimental results. On the other hand, a reasonable explanation for the temperature dependence of the ratio of the Verdet constant to the magnetic susceptibility V/χ is obtained.

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Key words: magneto-optical property, Verdet constant, exchange interaction, high magnetic field, nonlinear

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