Investigation of the Spin Hamiltonian Parameters of Yb^{3+} in $CaWO_4$ Crystal

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In this paper, the spin Hamiltonian parameters g factors $g_{\|}$ and $g_{\perp}$ of Yb^{3+} and hyperfine structure constants $A_{\|}$ and $A_{\perp}$ of $^{171}Yb^{3+}$ and $^{173}Yb^{3+}$ in $CaWO_4$ crystal are calculated from the two-order perturbation formulae. In these formulae, the contributions of the covalence effects, the admixture between $J = 7/2$ and $J = 5/2$ states as well as the second-order perturbation are included. The needed crystal parameters are obtained from the superposition model and the local structure of the studied system. The calculated results are in reasonable agreement with the observed values. The results are discussed.

Key words: Electron Paramagnetic Resonance; Crystal-field Theory; Superposition Model;Yb^{3+}; $CaWO_4$.