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Spectroscopic properties of Fe^{2+} (S=2) ions at tetragonal sites in K_2FeF_4 and K_2ZnF_4

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Crystal field (CF) effects and energy levels $Fe^{2+}(3d^6)$ ions in K_2FeF_4 with the ground state multiplet ^5D split due to a tetragonal crystal field are considered. Microscopic spin Hamiltonian parameters, i.e. the zero field splitting (ZFS) and Zeeman electronic ones, within the orbital singlet ground state $^5B_{2g}$ with the spin S=2 are modeled for various ranges of the microscopic parameters, i.e. the spin-orbit coupling constant λ, the spin-spin coupling constant ρ, the CF energy level splittings Δ_i, and the mixing coefficient q, suitable for Fe^{2+} (S=2) ions in K_2FeF_4 and K_2ZnF_4. The results are compared with the available experimental data.