Relaxation of Spin 1/2 in the Scalar Coupled Spin System AMX with Quadrupolar Nuclei in the Presence of Cross-correlation Effects

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We present the formal theory of the nuclear magnetic relaxation of spin $1/2$ A in a scalar coupled spin system AMX with quadrupolar nuclei of spin 1 (M, X) considering cross-correlation relaxation based on second order time-dependent perturbation theory and the product operator formalism. The expressions for longitudinal and transverse relaxation times and dynamic frequency shifts of each component of the spectral pattern are derived. Several experimental schemes for the selective determination of the cross-correlation rate between different spin orders are proposed.

Key words: Magnetic Relaxation; Cross-correlation; Dynamic Frequency Shift; Quadrupolar Nuclei.