

Application of the Elliptically Polarized Radio Frequency Fields in Spin-3/2 Nuclear Quadrupole Resonance Spectroscopy

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A possibility to excite the spin-3/2 quadrupolar nuclei in sites with a non-zero asymmetry parameter of the electric field gradient (EFG) tensor by means of an elliptically polarized radio frequency (RF) magnetic fields is discussed. Closed analytical formulas for the intensities of nuclear quadrupole resonance (NQR) nutation spectra and nutation frequencies of powder samples were obtained. Characteristic singularities in the nutation spectra were determined which allow the measurement of the asymmetry parameter η . It was found that in the general case of $\eta \neq 0$ the excitation of the nuclear spins in $+m$ and $-m$ states by using the circularly polarized RF fields is not fully selective.

Key words: Nuclear Quadrupole Resonance; Elliptically Polarized RF Field; Electric Field Gradient Tensor; Asymmetry Parameter.