Orientation of Tensorial Interactions Determined from Two-dimensional Nutation Exchange NQR and NMR Powder Spectra

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The method for determining the mutual orientation of molecular interaction tensors in powders is described. The technique is based on 2D nutation exchange NQR and NMR spectroscopy. It is shown that the 2D nutation exchange spectra exhibit characteristic ridges, which reflect the motional mechanism in a model-independent fashion. The angles through which the molecule rotates can be read from elliptical ridges in the 2D spectra. The 2D nutation exchange NMR and NQR powder patterns are calculated for spins $I = 1$ and $I = 3/2$ for different symmetry of reorienting molecular groups.

Key words: 2D Spectroscopy; NQR; NMR; Exchange; Nutation.