Double Resonance Detection Using Zero Field Level Crossing *

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Double resonance level crossing detection cannot normally be used to record transitions between the quadrupole Zeeman levels. Neither can it be used if the quadrupole resonance frequency is larger than the proton NMR frequency in high field. A simple variation of the level crossing experiment is demonstrated which allows energy to be efficiently transferred from quadrupole to proton system and hence lead to detection in these two cases. In the case of the quadrupole Zeeman levels it allows transitions between the $\pm\frac{1}{2}$ levels to be detected in a small magnetic field, allowing measurement of the asymmetry parameter (η) for spin 3/2 systems. This is demonstrated for the ^{11}B nucleus in triethanolamine borate. Detection of high frequency quadrupole transitions is demonstrated from which relaxation information is obtained.

Key words: NQR; Asymmetry Parameter; Relaxation; ^{11}B; ^{35}Cl.
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