NEW AND RAPID D-T_1 CORRELATION MEASUREMENTS AND DIRECT NMR T_1 DISTRIBUTION MEASUREMENT METHOD

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The presentation mainly approaches two articles published in the Journal of Magnetic Resonance. In the first article [1], we studied four D-T_1 sequences for TD-NMR combining Stejskal-Tanner Pulse Gradient Spin Echo (PGSE) diffusion measurement with Inversion-Recovery (IR), Saturation-Recovery (SR), Small-Angle Continuous Wave Free Precession (CWFP-T_1), and Small-Angle Flip-Flop (SAFF) for T_1 measurement. The results show that rapid D-T_1 measurements can be obtained with single shot CWFP-T_1 and SAFF sequences. The two sequences were two and eight times faster than sequences based on SR and IR, respectively. Although the two fast sequences yield lower signal-to-noise ratio, they can be as fast as the traditional D-T_2 experiment, or even faster, because it is not necessary to wait a recycle delay of 5 T_1. Another advantage of the CWFP-T_1 and SAFF methods, when compared to the ones based on SR or CPMG (for D-T_2) are the low specific absorption rate (SAR) of these sequences due to the low flip angles employed, which reduce sample heating problems. In the second article [2], a new method to measure T_1 without using ill-posed fitting methods is introduced. The usual Nuclear Magnetic Resonance (NMR) experiments for measuring spin–lattice relaxation time (T_1) distributions are Inversion-Recovery (IR) and Saturation-Recovery (SR), followed by data processing based on ill-posed multi-exponential curve fitting methods. Recently, a new method combining SR and IR, called Saturation-Inversion-Recovery (SIR), has been proposed to obtain sharper T_1-dependences than IR and SR. In this work, we propose an appropriate combination of SIR signals to directly obtain T_1 distributions without using any multi-exponential fitting methods.

References

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