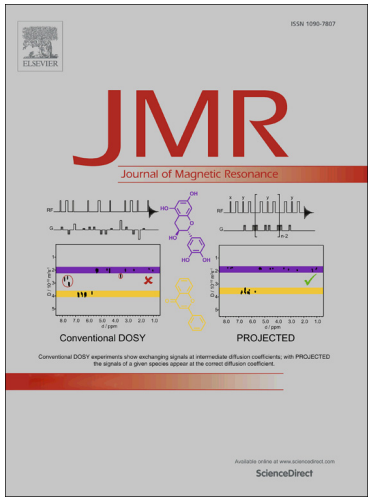
Accepted Manuscript



Recoupling pulse sequences with constant phase increments

Navin Khaneja, Ashutosh Kumar

PII: S1090-7807(16)30150-1
DOI: http://dx.doi.org/10.1016/j.jmr.2016.08.011
Reference: YJMRE 5934

To appear in: *Journal of Magnetic Resonance*

Please cite this article as: N. Khaneja, A. Kumar, Recoupling pulse sequences with constant phase increments, *Journal of Magnetic Resonance* (2016), doi: http://dx.doi.org/10.1016/j.jmr.2016.08.011

Recoupling pulse sequences with constant phase increments

Navin Khaneja *† Ashutosh Kumar ‡

August 22, 2016

Abstract

The paper studies a family of recoupling pulse sequences in magic angle spinning (MAS) solid state NMR, that are characterized by constant phase increments at regular intervals. These pulse sequences can be employed for both homonuclear and heteronuclear recoupling experiments and are robust to dispersion in chemical shifts and rf-inhomogeneity. The homonuclear pulse sequence consists of a building block $(2\pi)_{\phi^p}$, where $\phi^p = \frac{p(n-1)\pi}{n}$, where n is number of blocks in a rotor period and $p = 0, 1, 2, \ldots$. The pulse sequence repeats itself every rotor period when n is odd and every two rotor period when n is even. The heteronuclear recoupling pulse sequence consists of a building block $(2\pi)_{\phi_1^p}$ and $(2\pi)_{\phi_2^p}$ on channel I and S, where $\phi_1^p = \frac{p(2n-3)\pi}{2n}$, $\phi_2^p = \frac{p(2n-1)\pi}{2n}$ and n is number of blocks in a rotor period. The recoupling pulse sequences mix the z magnetization. Experimental quantification of this method is shown for $^{13}C_\alpha$-^{13}CO, homonuclear recoupling in a sample of Glycine and ^{15}N-$^{13}C_\alpha$, heteronuclear recoupling in Alanine. Application of this method is demonstrated on a sample of tripeptide N-formyl-[U-^{13}C,^{15}N]-Met-Leu-Phe-OH (MLF).

*To whom correspondence may be addressed. Email:navinkhaneja@gmail.com
†Department of Electrical Engineering, IIT Bombay, Powai - 400076, India.
‡Department of Biosciences and Bioengineering , IIT Bombay, Powai- 400076, India.