A simple method to do gradient calibration on an AV with a Z axis probe

A short method written by Mike Brown
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First you have set up the experiment. Use a sample of 50% H_2O/D_2O with the smallest amount of Copper Sulphate, just enough to cause the meniscus to turn slightly blue.

Use about 700 micro liters (0.7 milliliters) .

1. Insert the sample, lock and shim
2. Set up a new experiment with the following parameters
    a. pulse prog is calibgp
    b. sw = 150 PPM
    c. qsim
    d. ns = 2
    e. p1 and pl1 set to the Proton 90 for the probe
    f. gpz1 = 10%
    g. dig mod = digital
    h. de = 6 (or 6.5 microseconds)
    i. td = 512
    j. si = 1024
    k. td0 = 16
3. Tune the probe
4. type zg
5. process with fmc
6. If you notice the spectra looks as figure 1 you should use backward linear prediction to get rid of the glitch at the beginning of the echo.

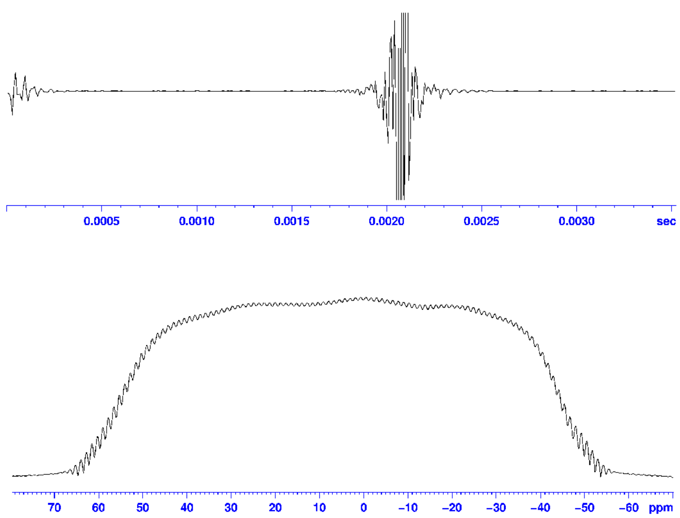

Figure 1 showing the "glitch" at the beginning of the echo and the resultant spectra.

7. To remove the weird "squiggles" on the spectra do the following.
    a. Type convdta (answer with expno 999 or any convenient number)
    b. Set ME_mod = LPbr

c. Set TDodd to either 32 or 64 (adjust for a pleasing appearance)
d. Reprocess with fmc
e. See figure 2 below:

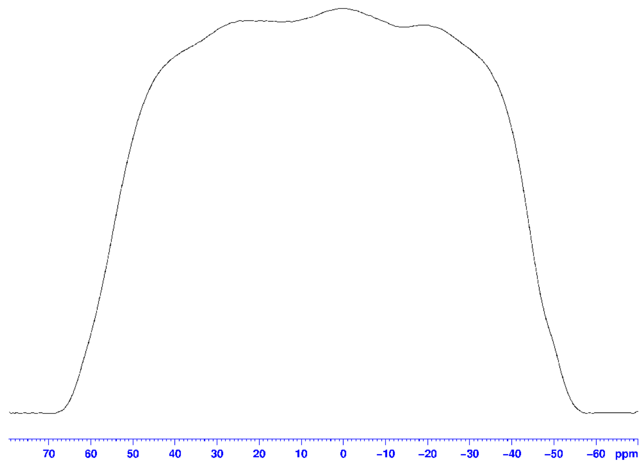

Figure 2 Spectra after judicious use of Linear prediction.

Save these parameters under a name such as GRADCAL or what ever you like.

Now you are ready to do your actual Gradient calibration.

Make sure you use the same sample tube. Insert your phantom so the "active" region is centered about the center of your RF coil. Check it with the depth gauge.

You may not be able to lock it. In that case tune the lock off, and the sweep off too.

Of course you have measure to the nearest 0.1 mm all of the relevant measurements on your phantom long before you insert it. Measure the distances between the holes before you put it in the NMR tube.

I have two phantoms, one with 2 holes exactly 1 centimeter apart. I like this one so we will use it. It is made of Teflon so will never absorb the water as the Brown ones will. The other is made of some Brown phenolic material, it absorbs water and becomes unusable after a few weeks in the NMR tube.

Set the gradient strength to 10% (gpz1 to 10%)

You will get the results as in figure 3 below

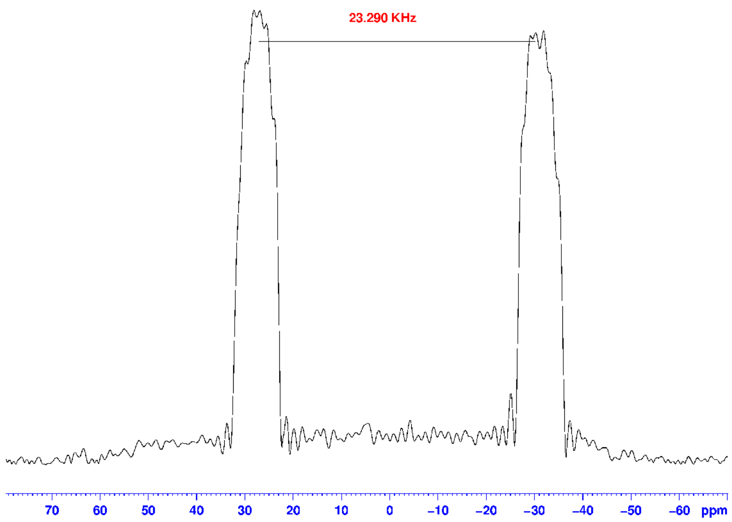

Figure 3 showing measurement

Measure the frequency between the two peaks on the spectra and plug it into the following formula:

$$G_Z = \frac{\Delta\omega\,(\text{kHz})}{[4.258]\,(\text{distance in cm})}$$

In the above case the calculations are:

$$G_Z = \frac{23.290\,(\text{kHz})\ \text{X}\,10}{[4.258]\,(1\,\text{cm})} = 54.7\ \text{Gauss/Cm}$$

Since we are using a gz1 = 10% we do our calculations and multiply the results by 10 to get the value at 100% gradient strength.