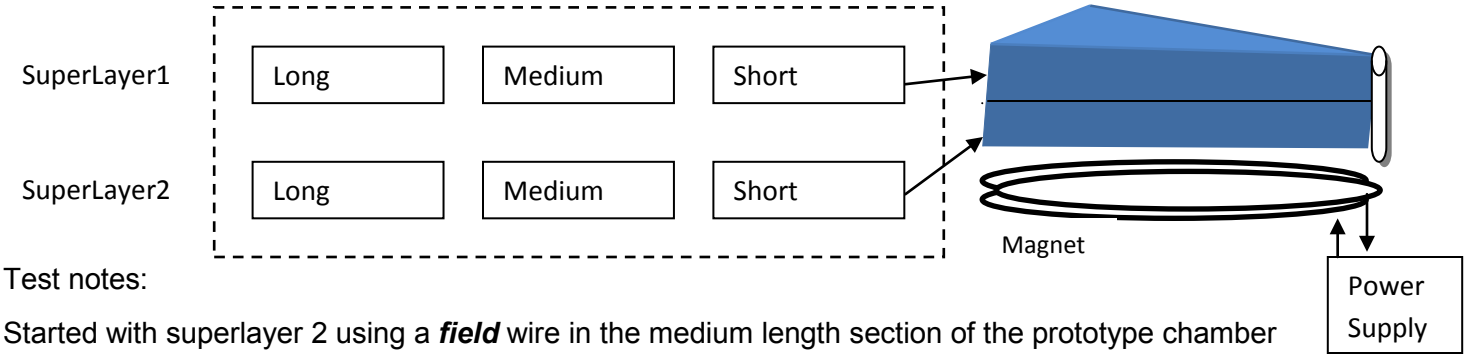
CLAS12 Wire tension measurements ODU Region 1 Wire Chamber prototype 23Oct2009

Parameters:

Pulse width: 5ms
Current pulse amplitude: <20mA
Pulse repetition: 27ms (37Hz)
Magnet voltage: 19V
Magnet current: 70A
Field(Guass probe): ~60G
Simple end plate drawing and test setup below:



Test notes:

Started with superlayer 2 using a ***field*** wire in the medium length section of the prototype chamber

Without the magnet power supply turned on, the tension monitor was connected and there was a significant signal from the wire that had a frequency response of 540Hz. We do not see this frequency response in our EEL109 lab at Jlab, but we will move on with tension measurements and note the presence of this nuisance signal.

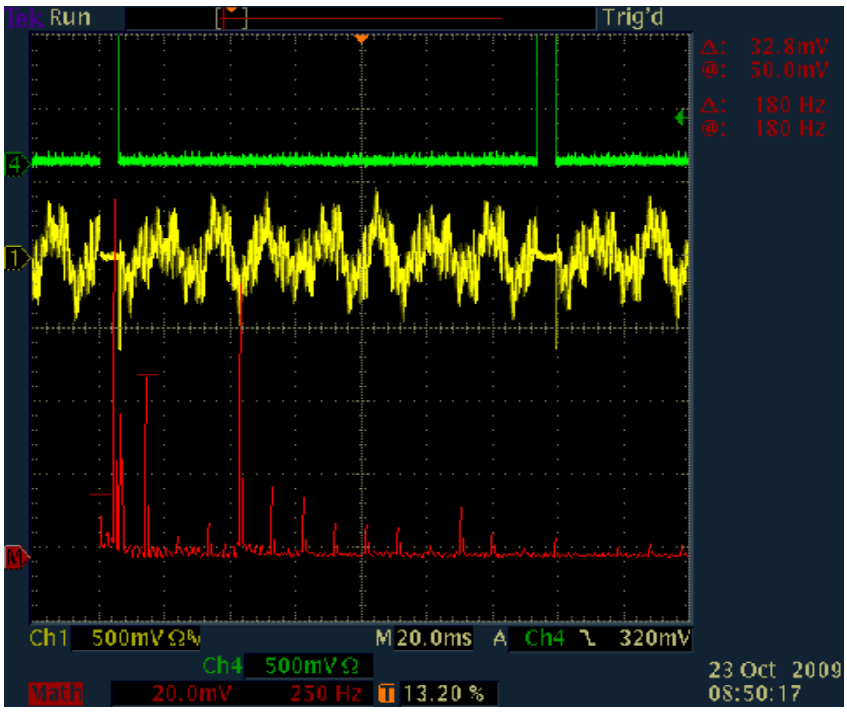


Figure 1

Figure 1 shows the pulse width and repetition of the tension circuit's pulse structure (Green trace)

The yellow trace is the signal measured across the field wire. There is a strong signal and the red trace shows the FFT math function derived from the yellow signal.

The largest component is from the pulser repetition , then you see the 540Hz 'backround' peak, plus the 180Hz that we considered the wire's resonance.

Next we connect the tension pulse drive to a sense wire in the medium length section of superlayer 2. The signal response is rather remarkable and again a very large amplitude is recorded on the oscilloscope.

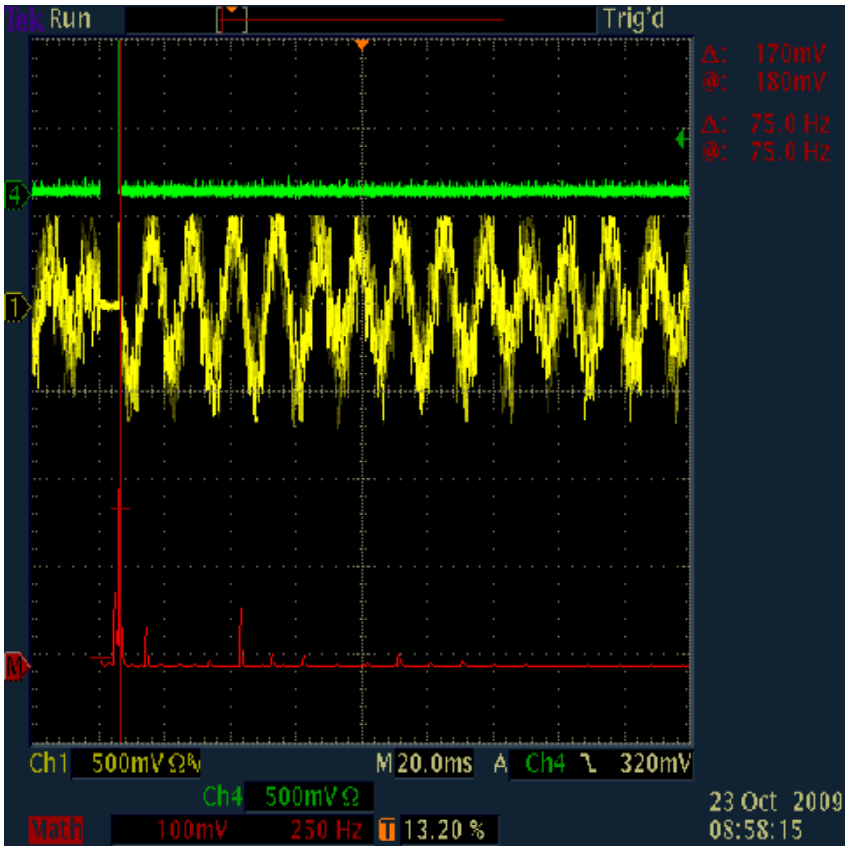


Figure 2

Figure 2 shows a very clear response from the sense wire at 75Hz which dominates the FFT. Note that the 540Hz peak still exists on the FFT trace, but the resonant response is clear.

We kept the magnet current amplitude at 70A for these tests.

We then attempted to measure the tension of the short wires for both superlayer sections. The magnet is not in the optimum position, and the readback signal from the tension monitor showed no clear indication of a resonant signal. ***The 'short' wire measurements were not successful***.

We then moved the magnet coil so the center of the field was perpendicular to the longest wire sections. Starting with a sense wire in the longest section of suplerlayer 2, the response from the wire was very clear and measured 40Hz.

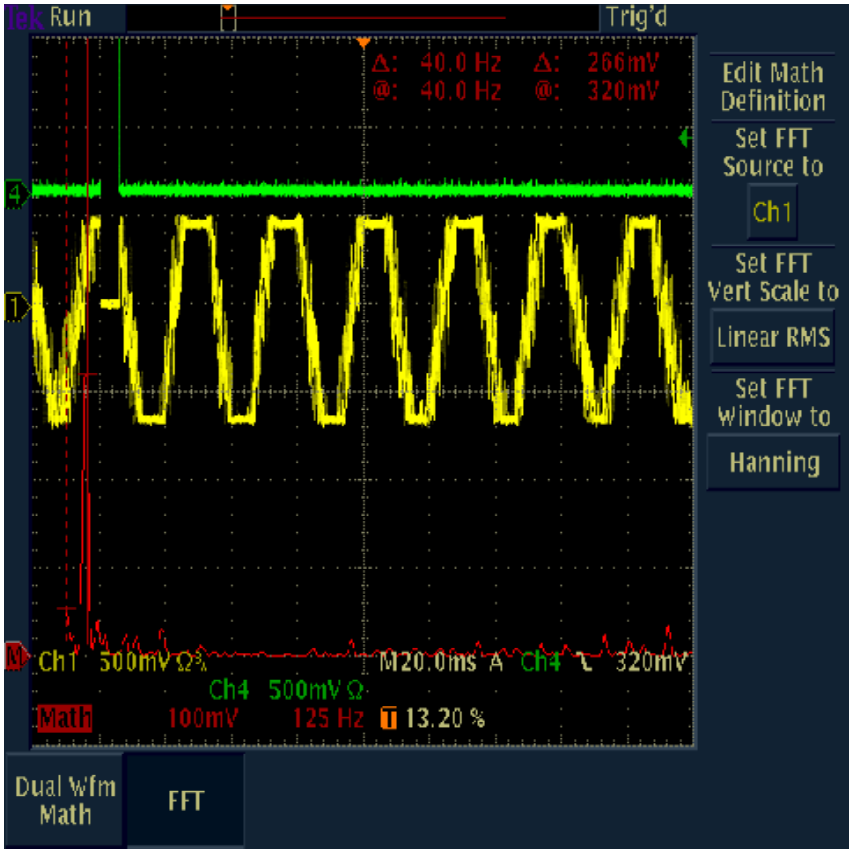


Figure 3 shows a very clear response from the sense wire at 40Hz and note that the amplitude of the response is saturating the amplifier. One could measure the frequency without the FFT match function!

Figure 3

Next was the measurement of a field wire in the long wire section of superlayer1. The amplitude was not as remarkable as the sense wire, but the resonant FFT result was clear. Depending on where the cursor is located, the largest peak on the FFT plot is approximately 25Hz.

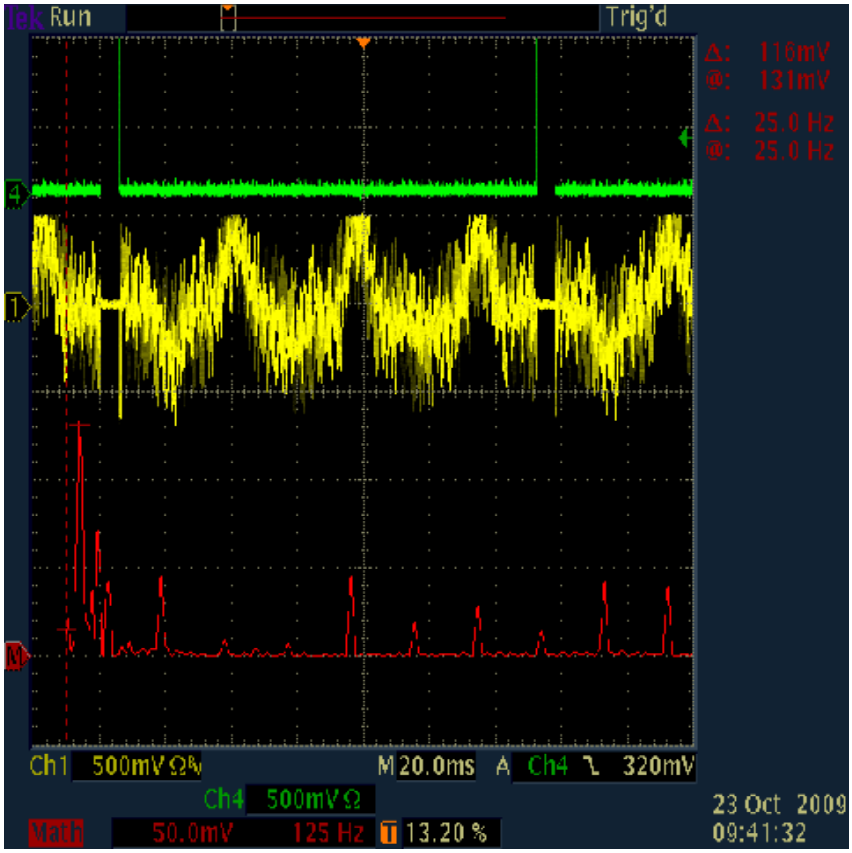


Figure 4

Figure 4 shows a very clear response from the field wire at 25Hz and note that the amplitude of the response has a significant amount of other frequency components.