**ABSTRACT**

A number of experiments were performed on an installed and operational 5-cell CEBAF cavity to determine the minimum time required to reestablish stable gradient after a cavity window arc trip. Once it was determined that gradient could be reestablished within 10 ms by applying a constant power RF signal using a voltage controlled Oscillator-phase locked loop based system (VCO-PLL), a second experiment was performed to determine if stable gradient could be reestablished using a fixed frequency RF system with a simple gradient based closed loop control system. During this test, instabilities were observed in the cavity forward power signal, which were determined to be microphonics in nature. Three microphonic effects were quantified using a cavity resonance monitor and a VCO-PLL RF system. Two types of microphonic effects were observed depending on the type of arc event. If the arc occurred in the vacuum space between the warm and cold windows, the transient frequency shift was about 75 Hz peak-to-peak. If the arc occurred on the cavity side of the cold window the transient frequency shift was about 400 Hz peak-to-peak. The background microphonics level for the tested cavity was approximately 50 Hz peak-to-peak. Experimental results indicate that the transient vibrations produced when there is an arc on the cavity side of the cold window take approximately 0.75 seconds to decay to the level twice that of the background microphonics.

**SUMMARY**

There are microphonic vibration modes that, coupled with beam loaded klystron power margins, limit the recovery of CEBAF cavities after an arc event. The most likely source of the excitation function is the dynamic Lorentz force detuning which occurs when the cavity gradient is rapidly reduced by the event. This effect is substantially worse for an arc which occurs on the cavity side of the cold window where the gradient decays in less than 100 µs. Using the existing low level RF system one would probably have to wait for at least 0.5 seconds prior to applying RF and about 1.5 seconds prior to loading the system with beam.