Progress in FY03
Simulation and Tests
Cavity Testing in FY04

L. Cremaldi, U. Mississippi

AE TESTS RF-BREAKDOWN

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Progress in FY03
Simulation and Tests
Cavity Testing in FY04
PZT Transducers for Pulse Counting & Timing

20-200 KHz
200-500 KHz

\[ V_n = g_n \times n \times t \]

\[ f = \frac{f_0^2 + f_{bulk}^2}{2 \times DT} \]

\[ DT \approx \frac{1}{10} = 5 \text{ ms} \]

Spacial Resolution

\[ v_l \approx 3560 \text{ m/s (Cu-STP)} \]

\[ D_x = v_l \times DT \]

Noise

- Transducer design
- Thermal
- Electronics
- Band Width
- Noise

\[ \frac{1}{f_0} \approx \frac{1}{2 \times DT} \]

ALP2004 - SLAC Jan 7-10

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TUNERPZEPOXY

20-200 KHz 200-500 KHz

PZT Transducers for Pulse Counting & Timing
Figure 4: Features of transient signals

- RMS (Root Mean Square) of the continuous background noise (before the burst)
- Error (integral of the squared root of absolute amplitude over time of signal duration)
- Number of threshold crossings (counts)
- Signal duration (time between first and last threshold crossing)
- Rise time (time between first threshold crossing and peak amplitude)
- Peak amplitude
- Arrival time (time of first threshold crossing, needed for location calculation)

Detailed list of features:

- Most common features are:
  - Waveform information (based on a database of detected signals)
  - Waveform parameters
  - Waveform parameters
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  - Waveform parameters

In some very few cases, AE testing is based on only a few bursts. In general, some hundreds of thousands of
Conditioning Electronics
Ohms

ITC 9070 Impedance Curve

Dan Kleinert
NCPA
In order to understand the behavior of the ITC transducers we have modeled the impedance as a complex RLC network. The split resonance is obtained by adding a series inductance. These simulations will be helpful in modeling signal-to-noise and response characteristics of the RF breakdown source frequencies.
Basic Measurement of $V_l$

Calculation of $V_l$

$V_l = 8.2\,\text{cm} / 13.0\,\text{ms} = 0.63 \,\text{cm/ ms}$
OPEN RING GEOMETRY

A ring 15.0 cm O.D. 13.0 cm I.D.
FFT

Series 1

audio FFT