Microphonics and Dynamic Lorentz Detuning Measurements in Medium Beta Cryomodule (a work in progress as of 25 June 2002

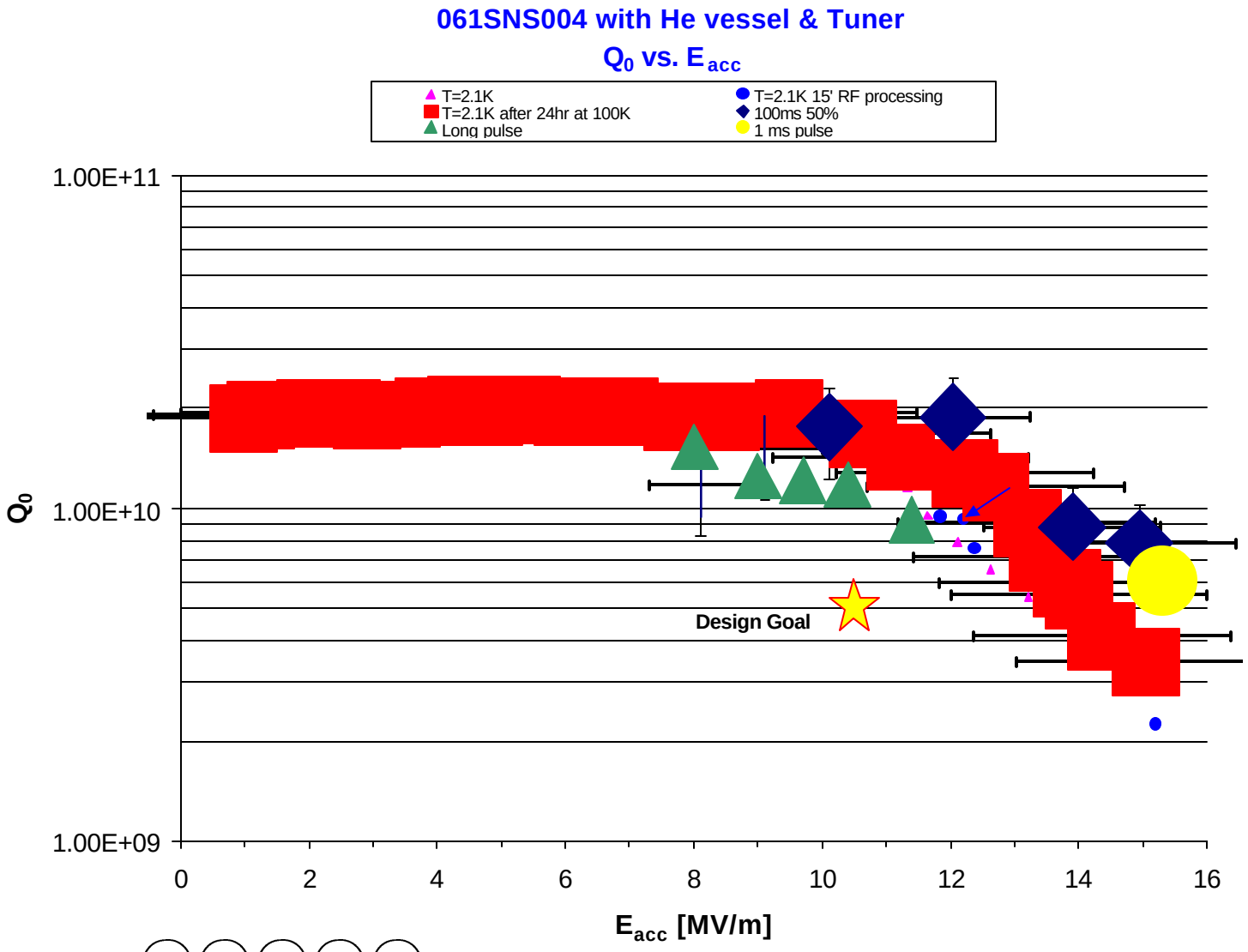
Jean Delayen

JLab

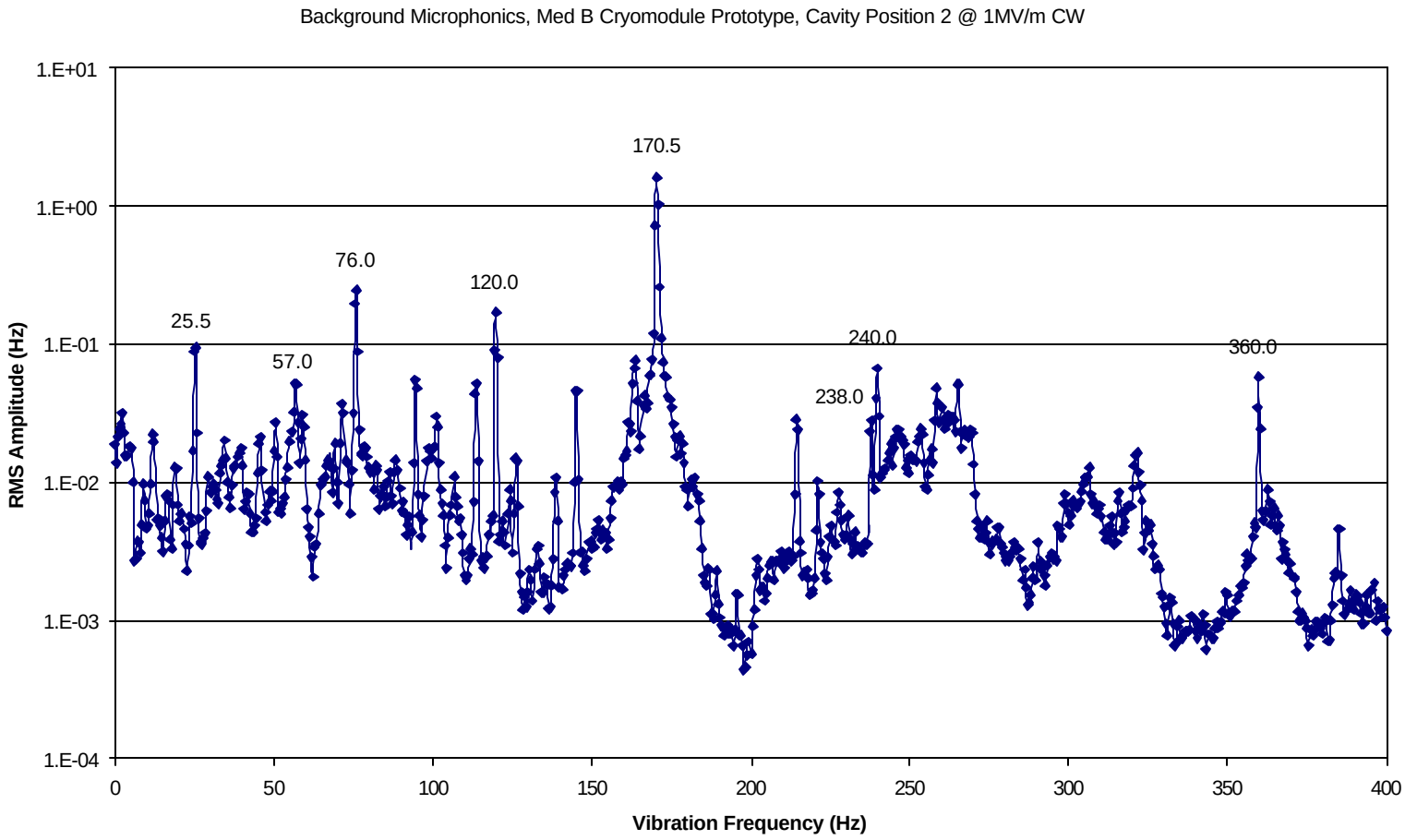
Summary of main parameters

RF Measurements Summary								
Cavity	Emax pulse	Qo pulse	Emax CW	Qo CW	FPC Qext	FPC max pulse power (kW)	FPC max average power (kW)	HOM
1	-	-	-	-	4.0E+05	-	-	-
2	15.9	6.0E+09	15	1.5E+10	5.5E+05	3.0E+02	1.2E+02	Damped
3	*16*	-	-	-	4.0E+05	4.0E+02	-	Damped
Q ext w/Stub tuner		1.0E+07	Stub tuner+iris		2.5E+08			
HOM at 2783MHz			1.4E+06	Dipole or sextupole				
Tuner range 400 kHz								
Tuner resolution 3 Hz								

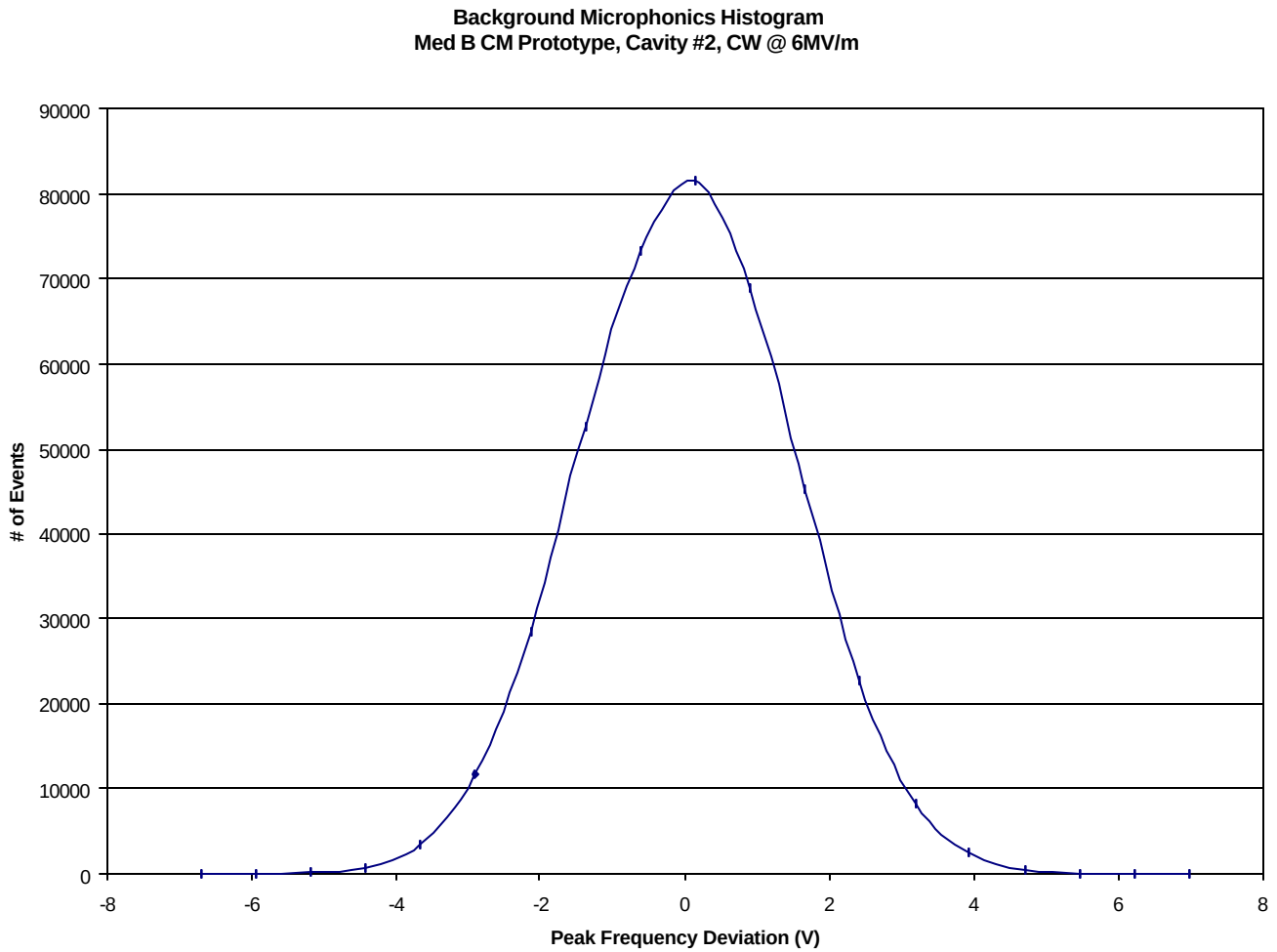
Cavity #2 performance



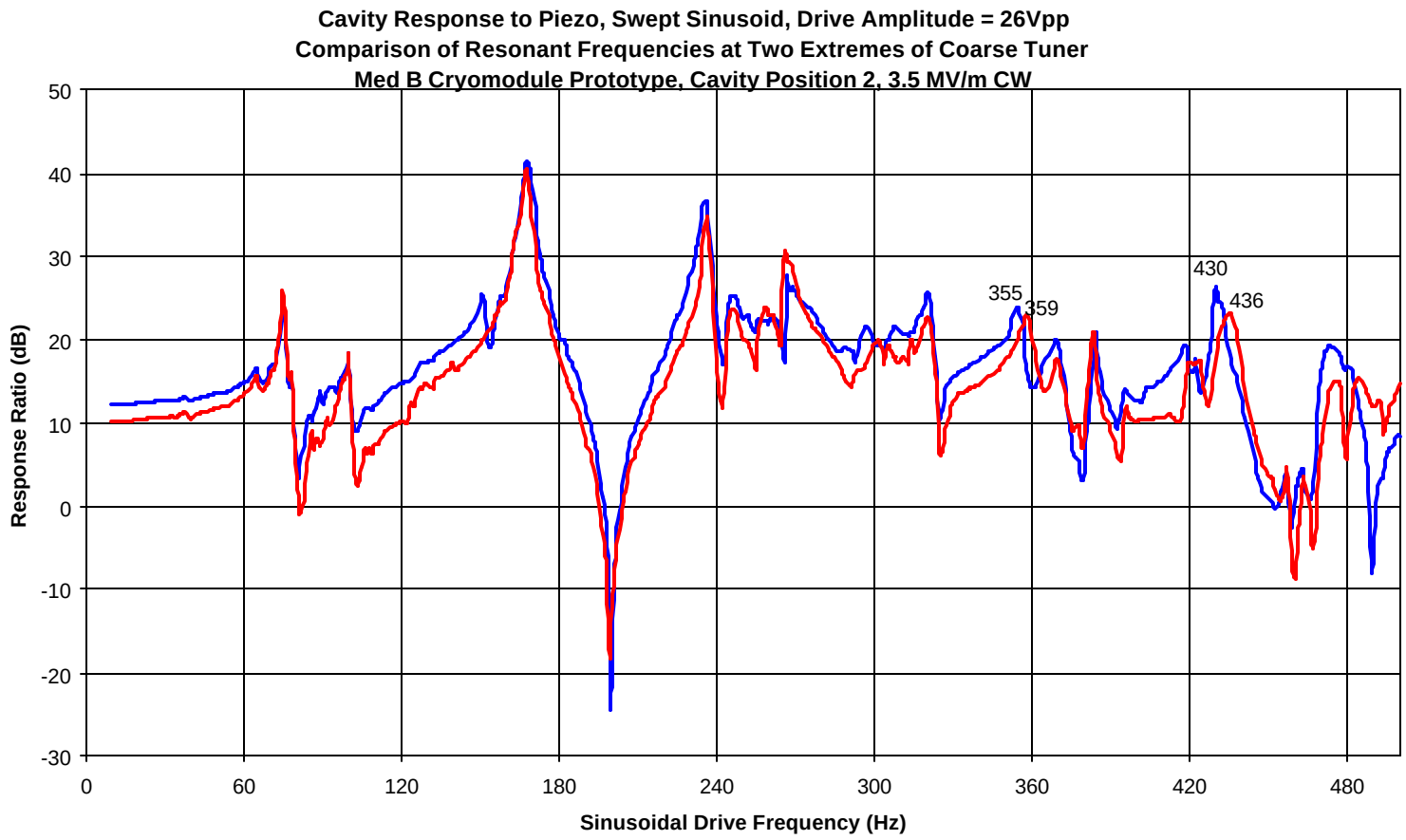
Cavity Microphonics – Power Spectrum



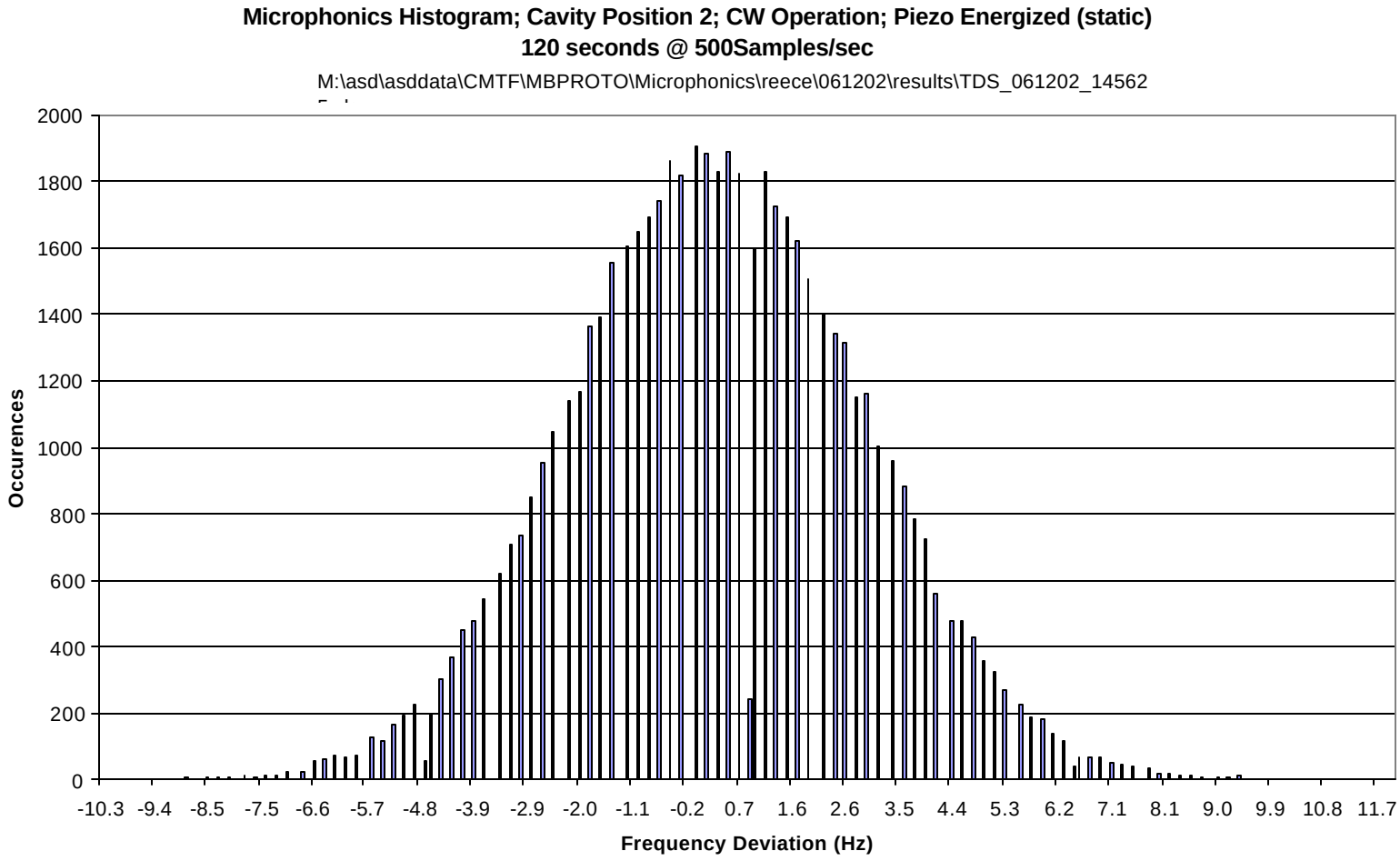
Cavity Microphonics – Probability Density



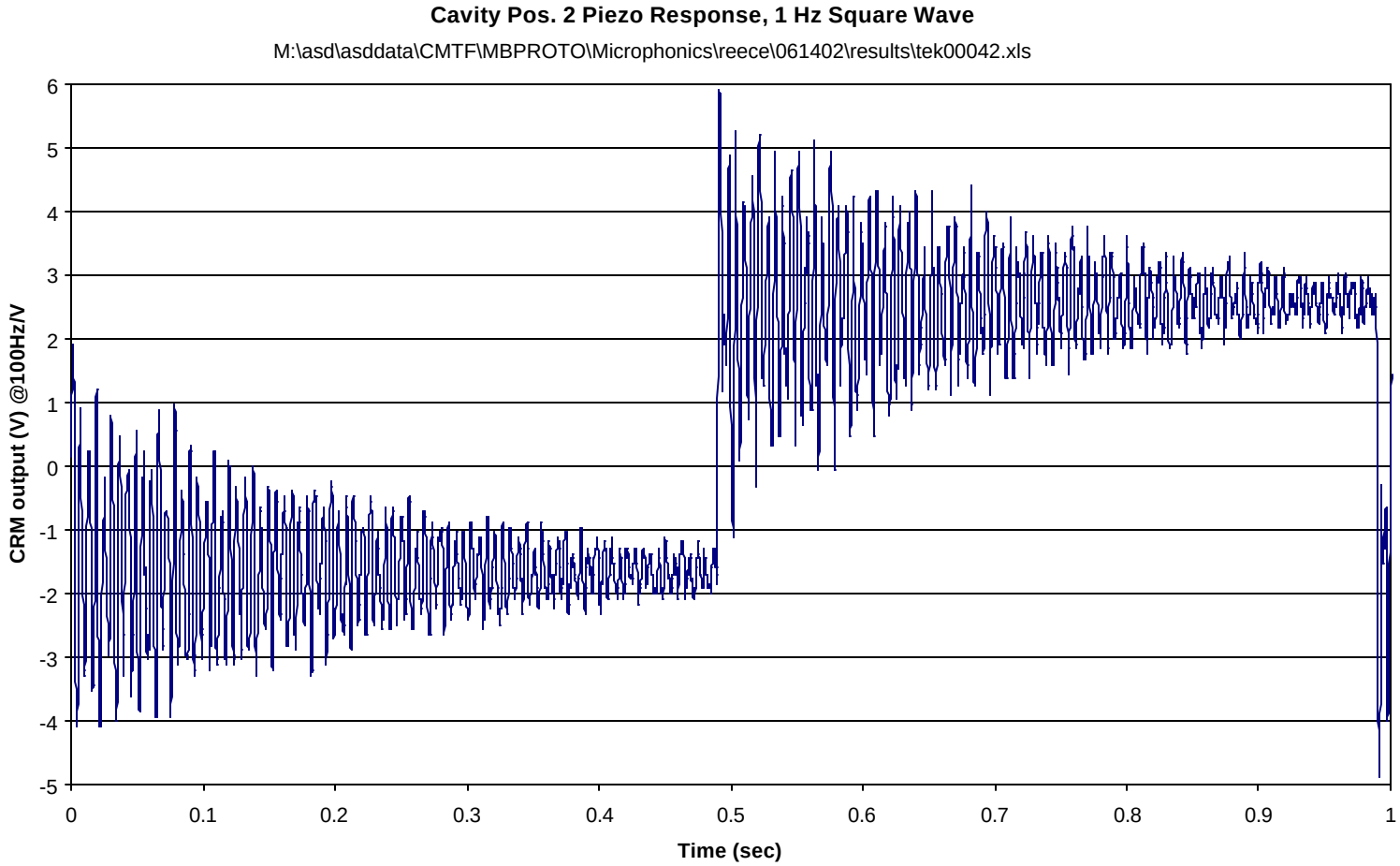
Cavity Response to Piezo, Swept Sinusoid



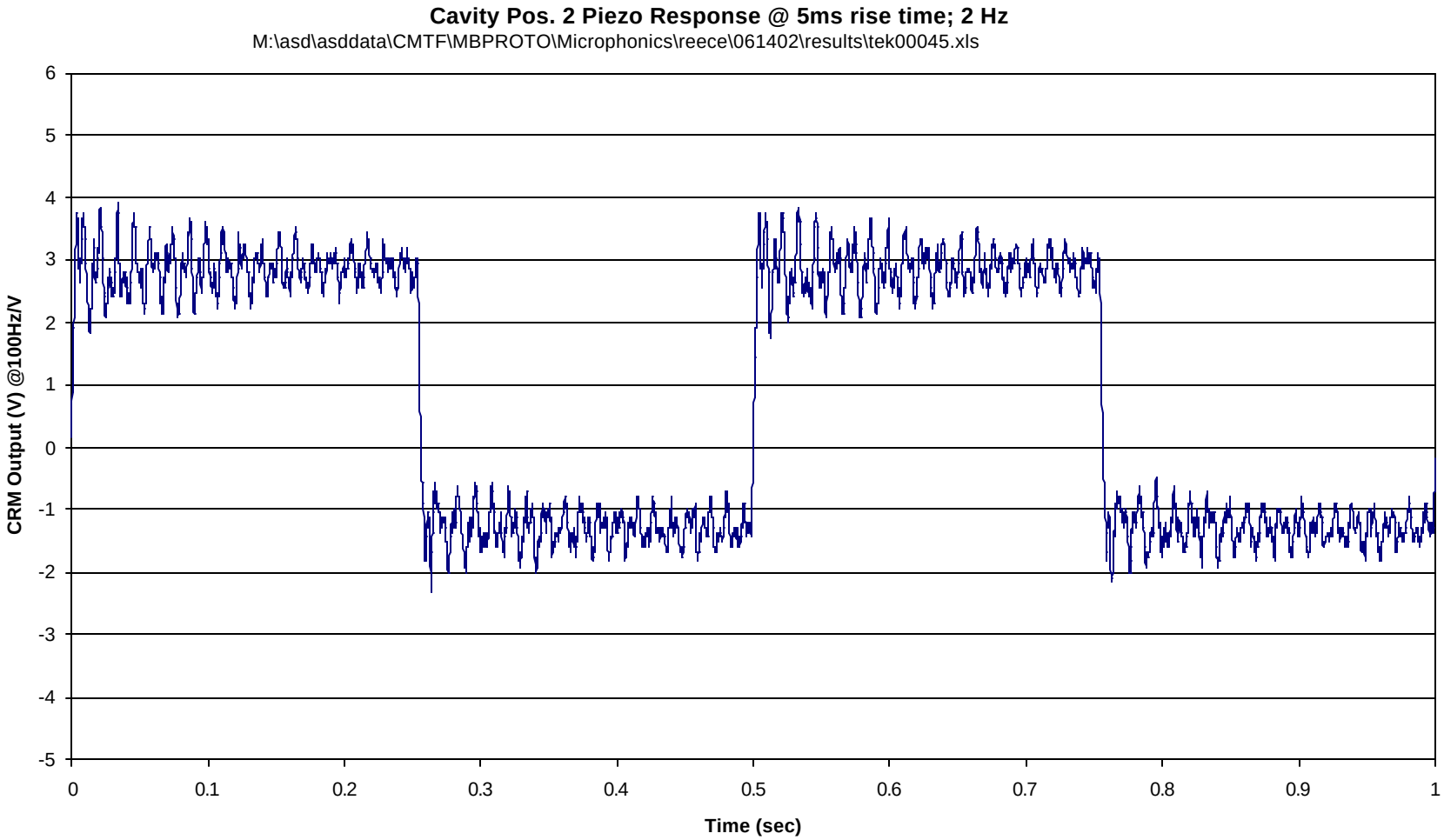
Cavity Microphonics – Probability Density



1 Hz Square Wave Piezo Drive

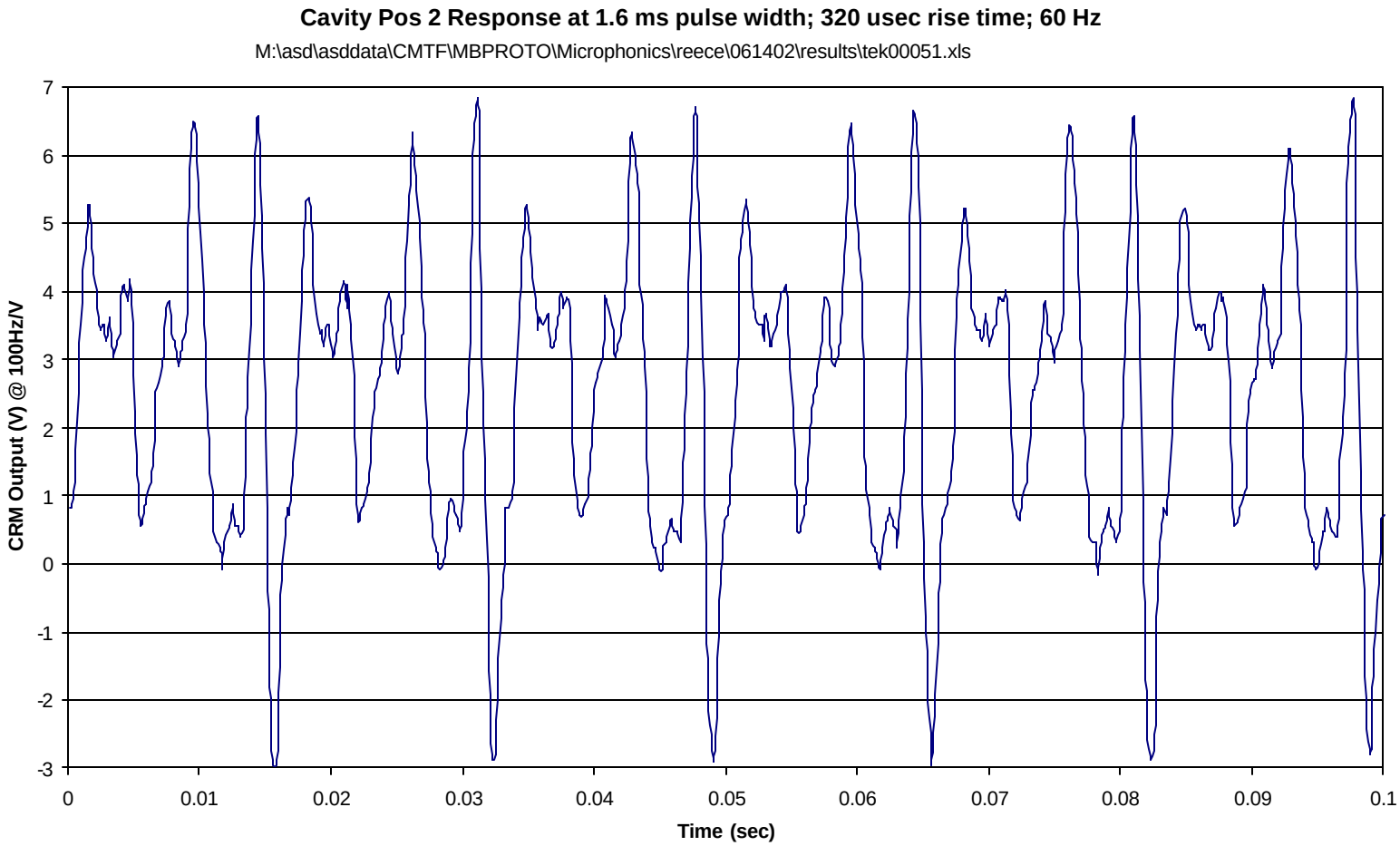


1 Hz Trapezioidal Wave Piezo Drive

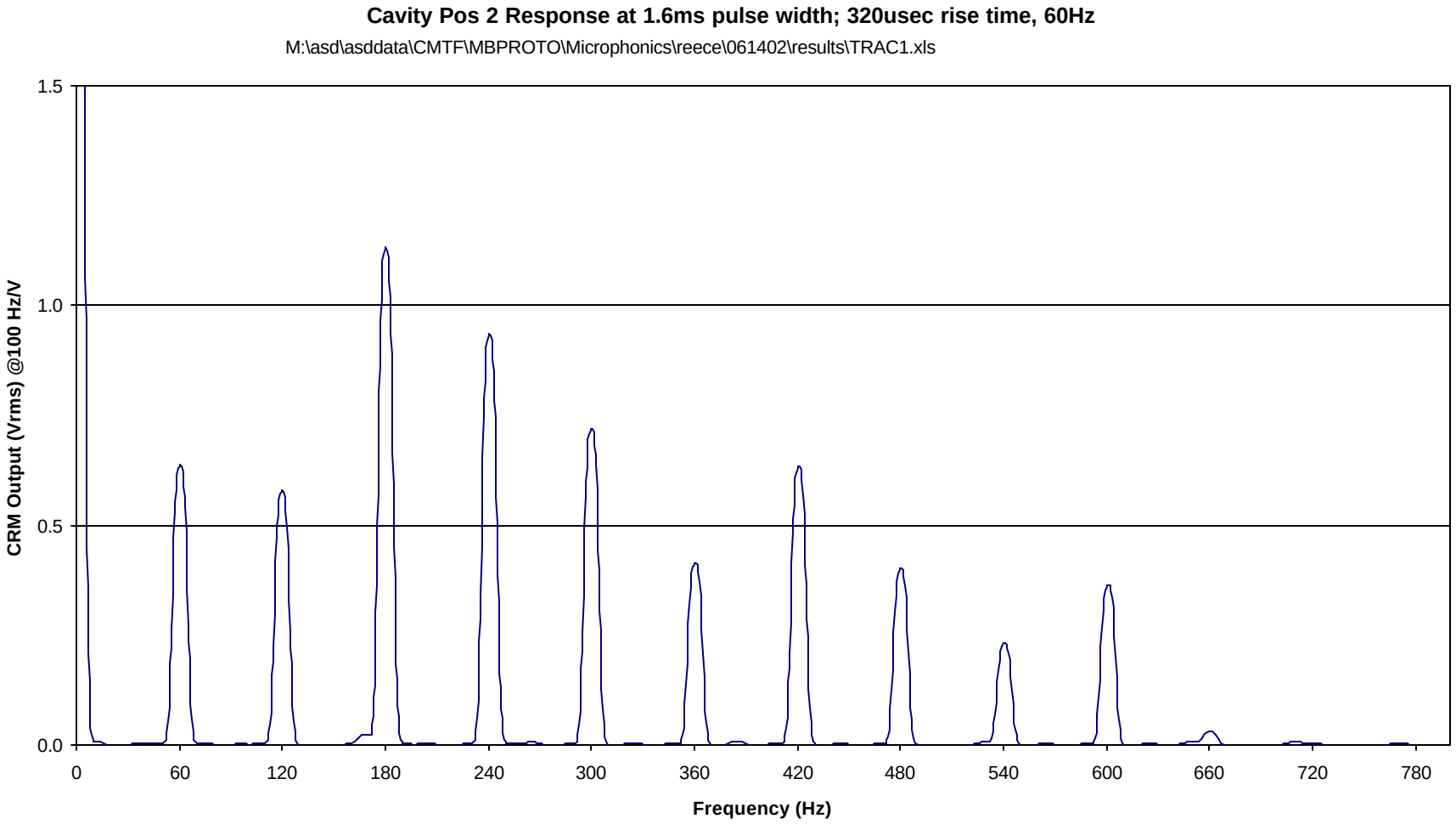


60 Hz Piezo Drive

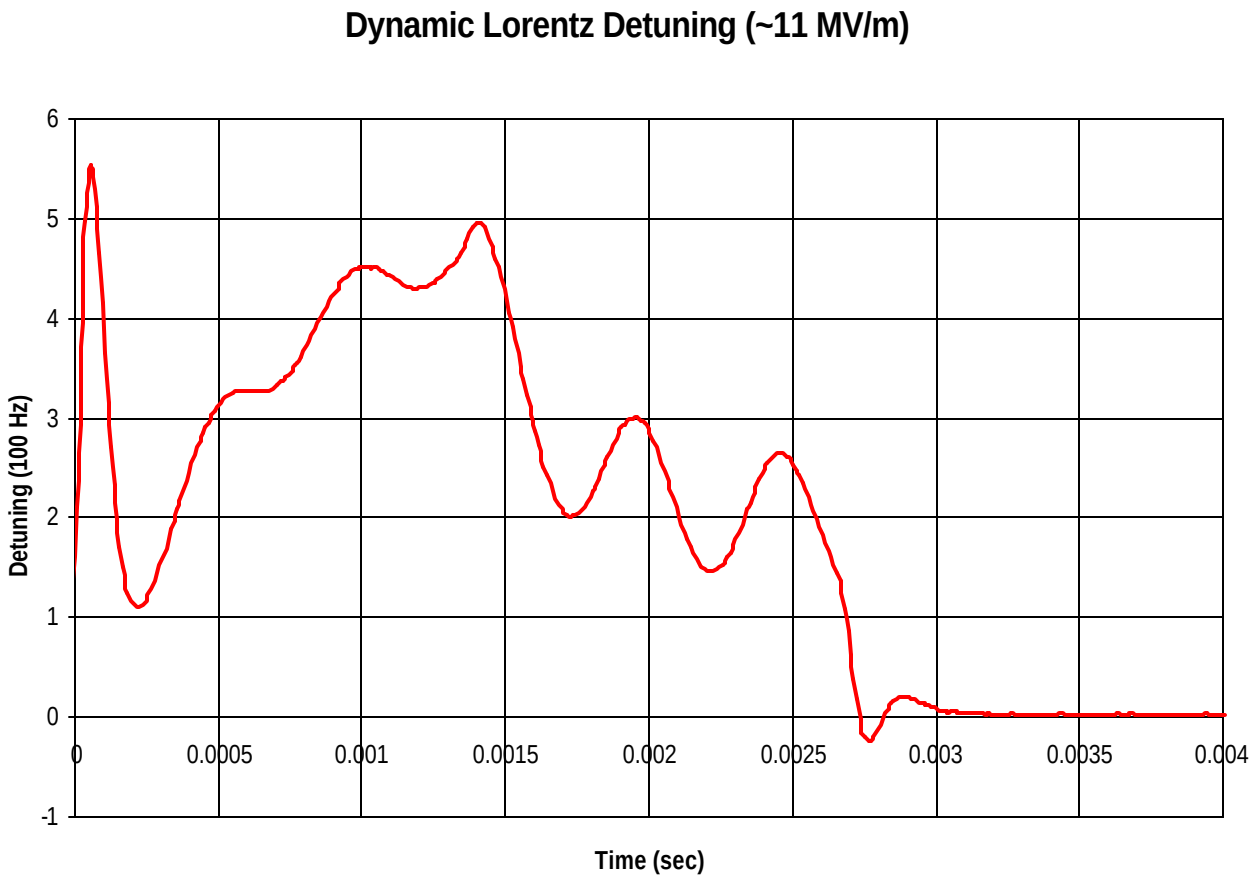
60 Hz Piezo Drive



60 Hz Piezo Drive – Frequency Spectrum

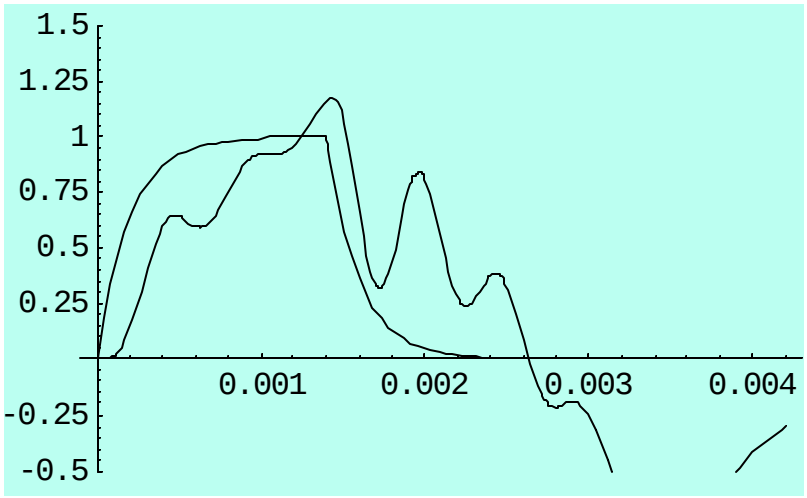


Cavity Frequency Response to RF Pulse

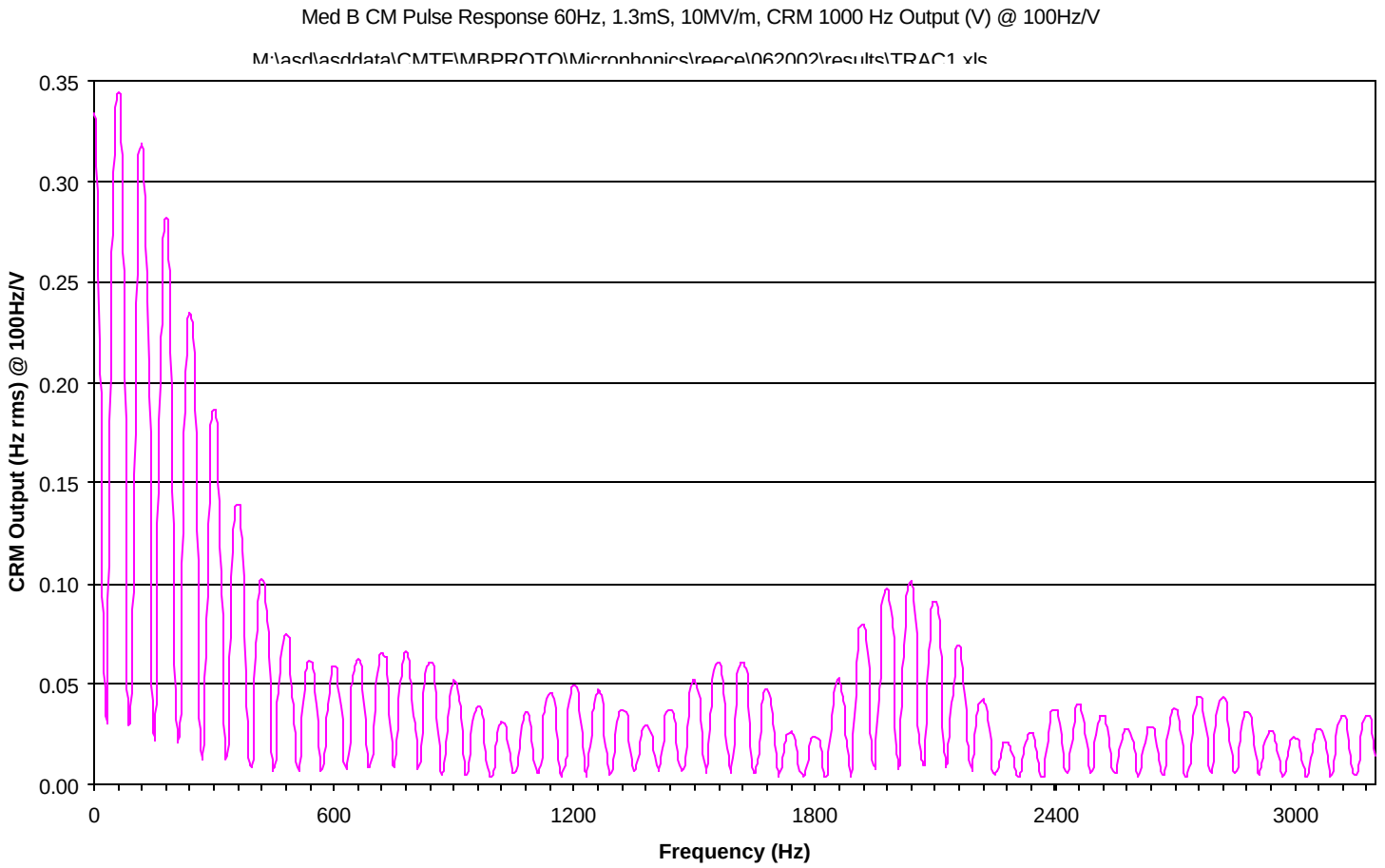


Modeling of Cavity Response

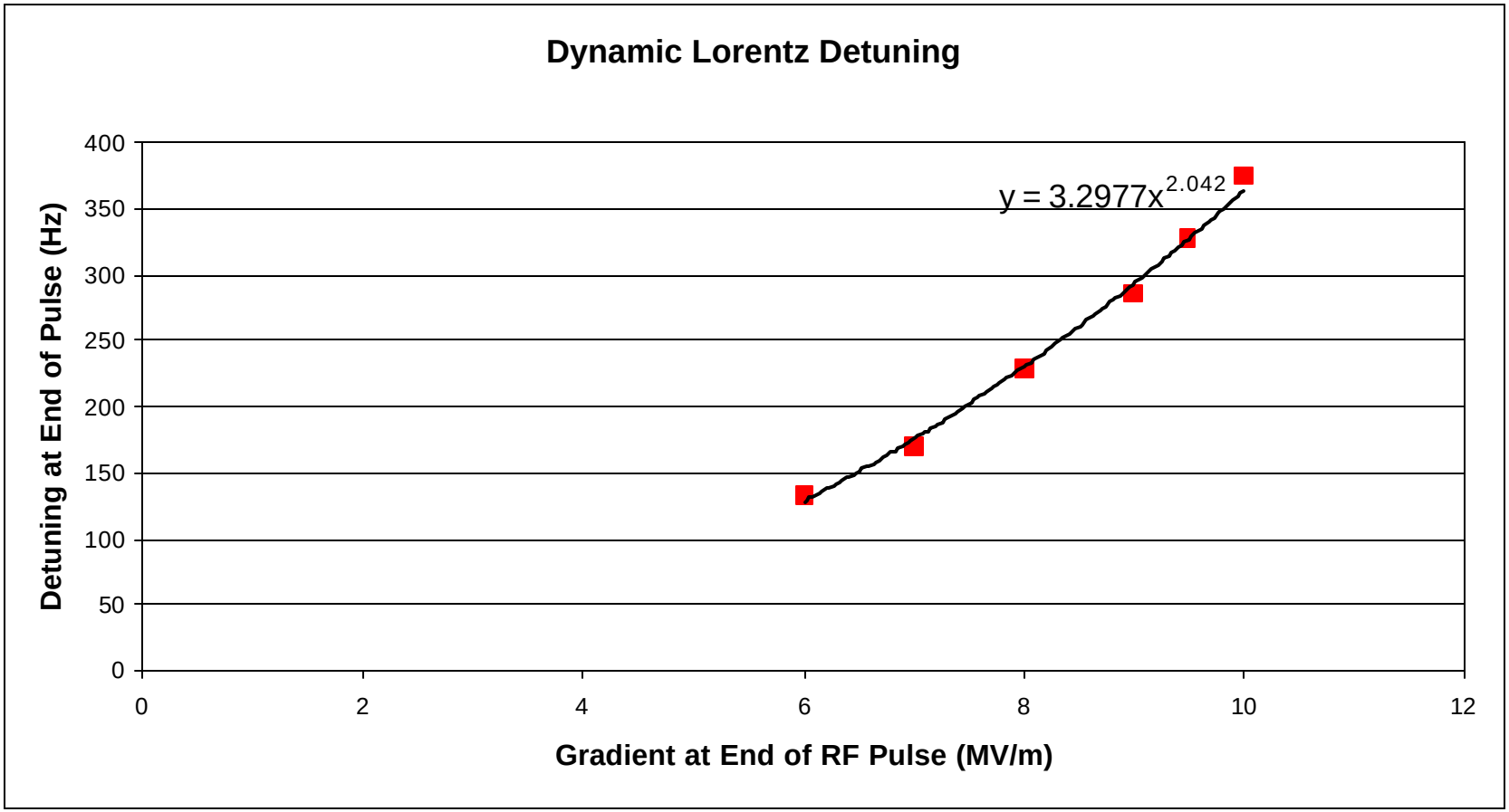
- Mathematica model with:
- Rf pulse :1.4 msec
- Field rise/decay time: 200 μsec
- 2 mechanical modes
  - 280 Hz, 300 msec
  - 2000 Hz, 1 msec



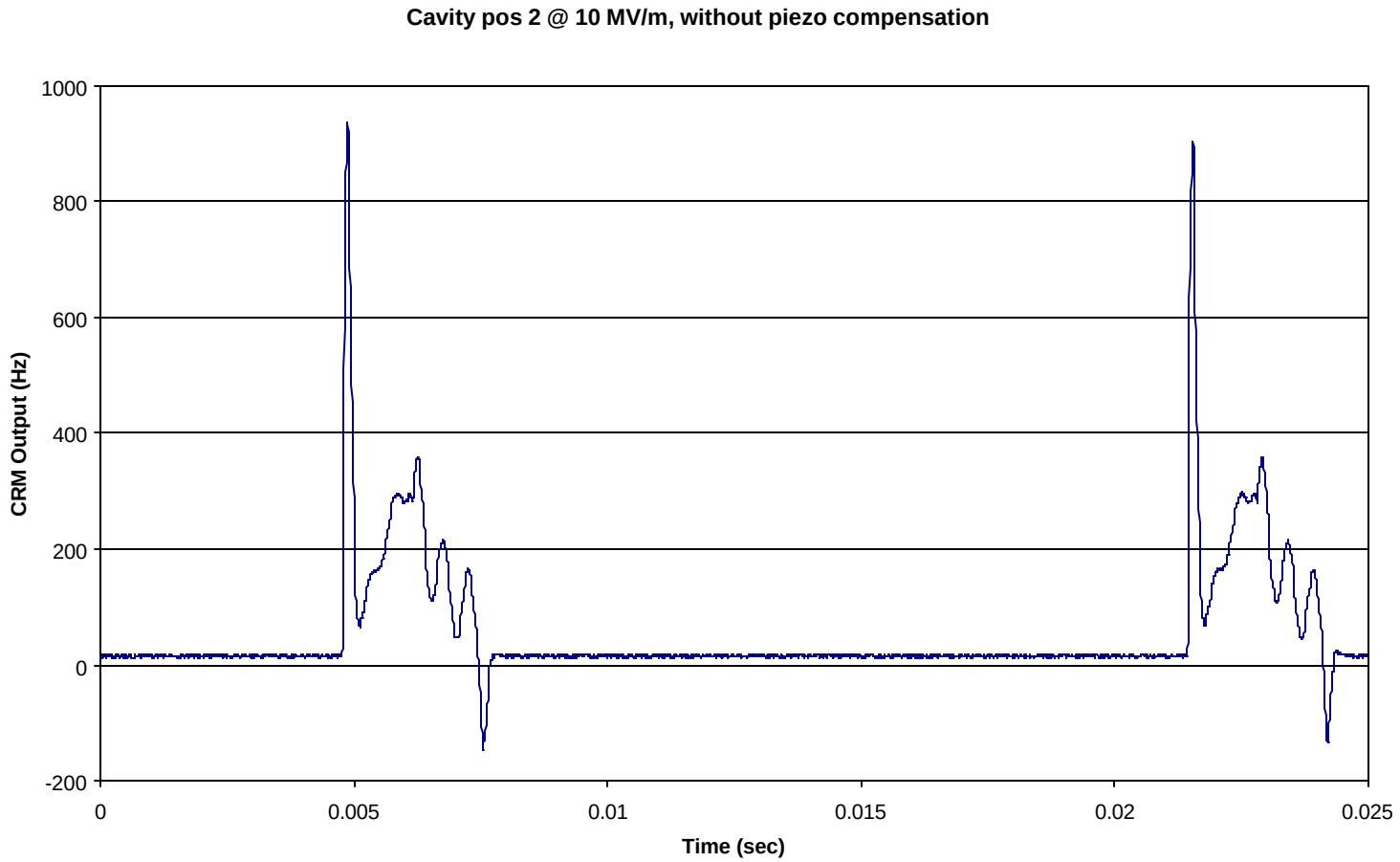
Cavity Resonance Monitor Output – Frequency Spectrum



Dynamic Detuning vs Gradient



60 Hz Cavity Frequency Response



Response with Piezo Compensation