



Tidal Compensation Update

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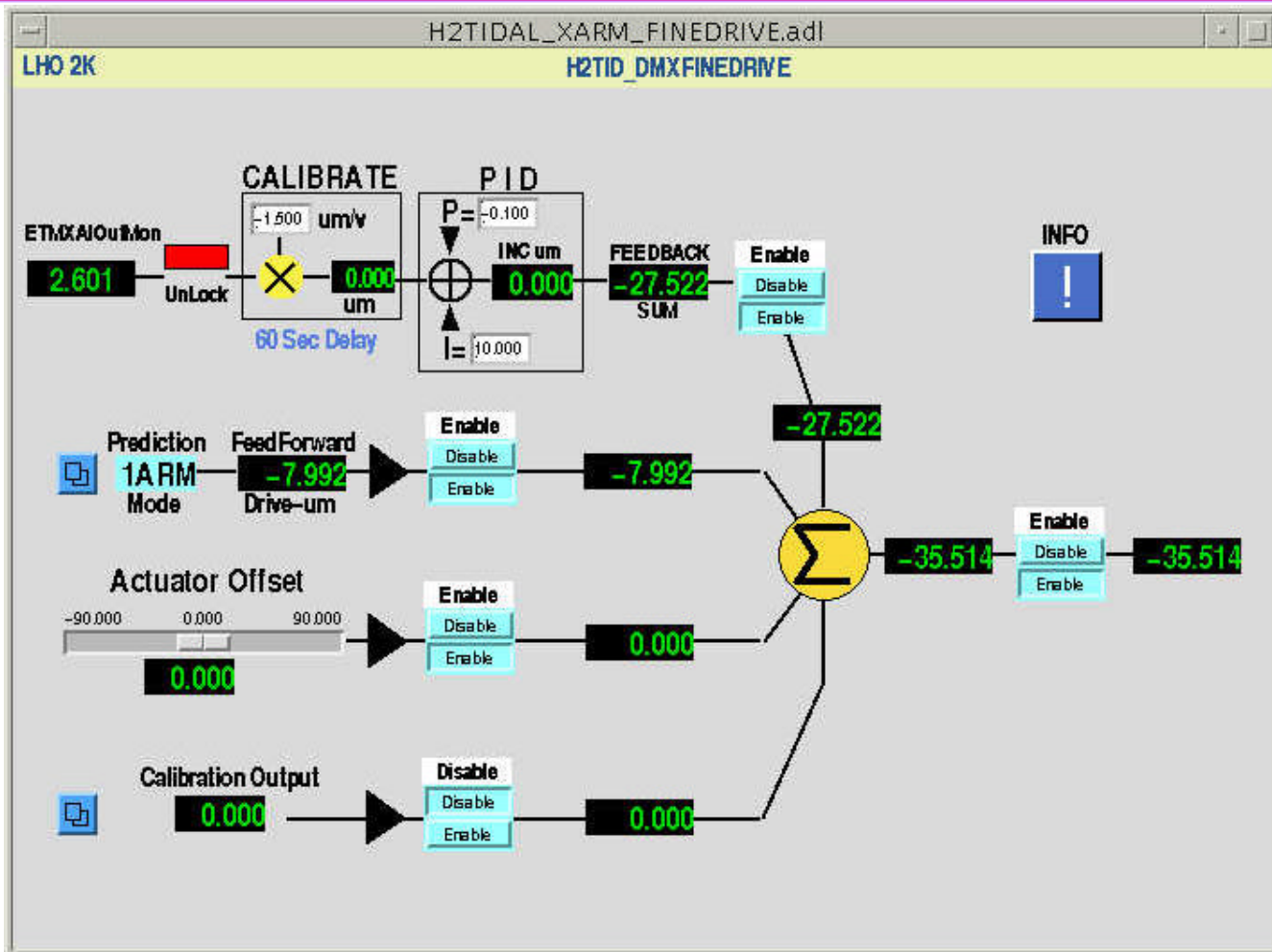


In Previous Work...

- Paladin code by Eric Morganson found to predict tides to within 10-20% (E2)
- But temperatures drifts from PSL reference cavity were large and poorly characterized
- Savage and Schwinberg modified temperature monitor & controller to get into ballpark (1 mK = 2 microns in a 4K arm)
- Radkins got tidal feedforward fine acutation working (thanks to Josh, Richard McCarthy & Dave Barker)
- In final days before E7, Sigg & Radkins kludged feedback path to fine actuators to remove low-frequency drive to the ETMs



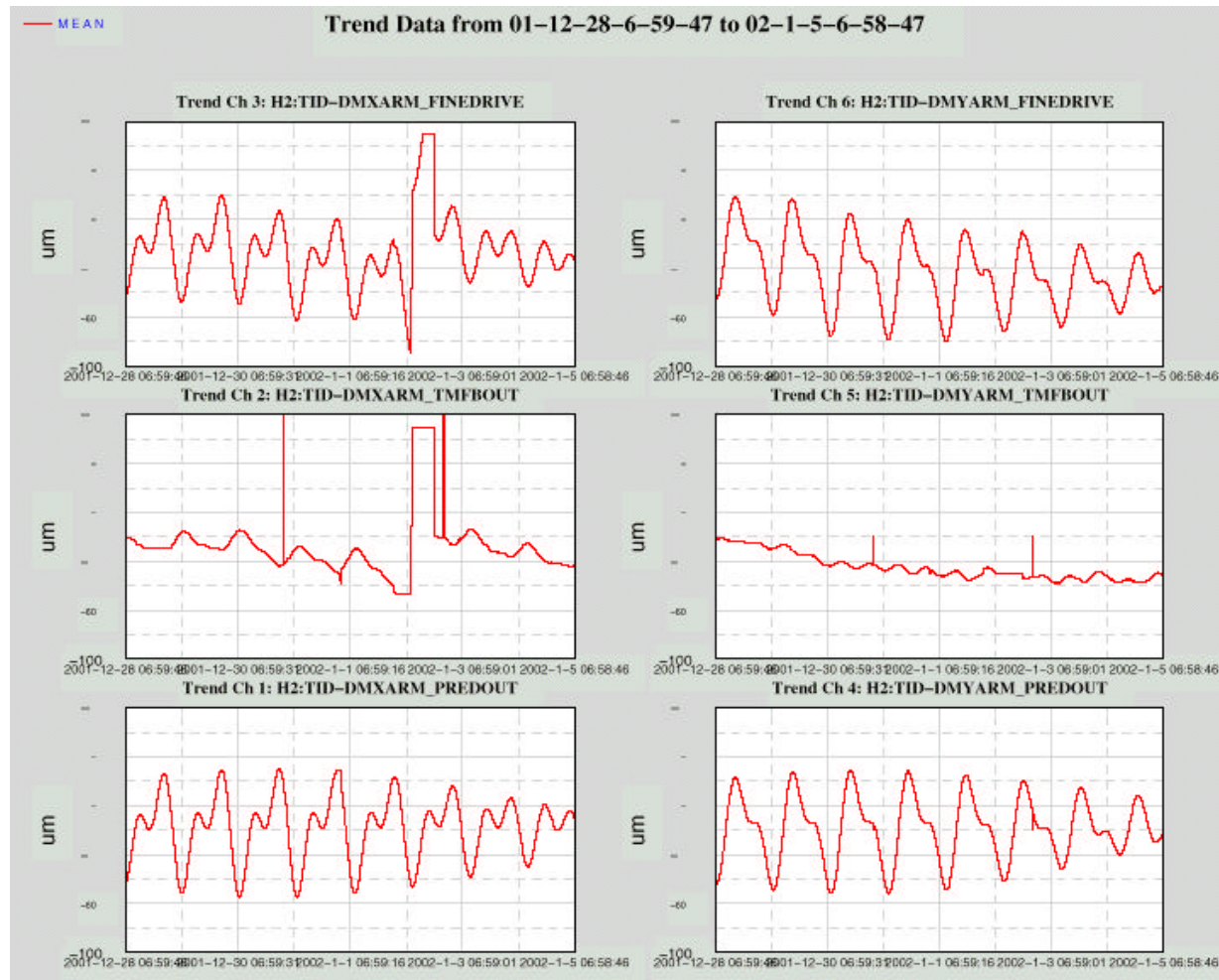
Tidal Compensation Using Fine Actuator for E7





A Look at Eight Days of E7 Data

All plots use same vertical scale (40 μm /large division)



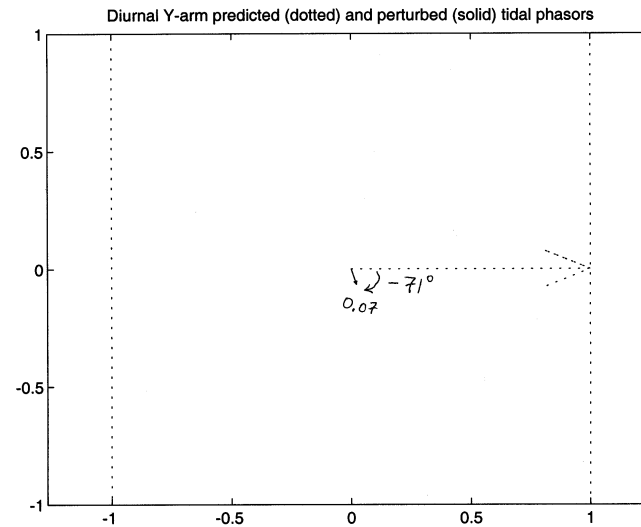
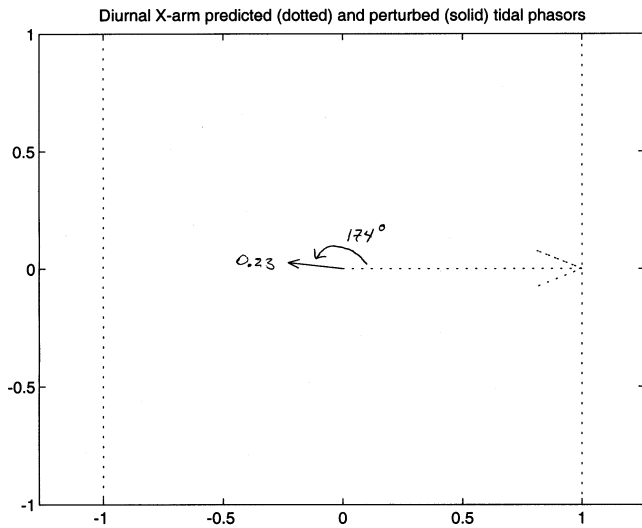
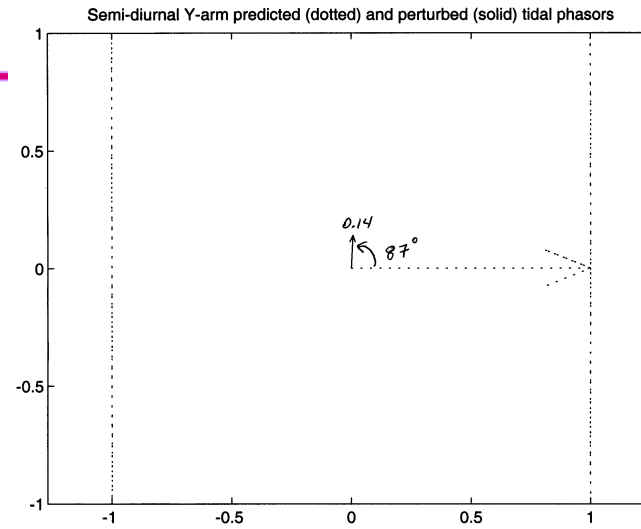
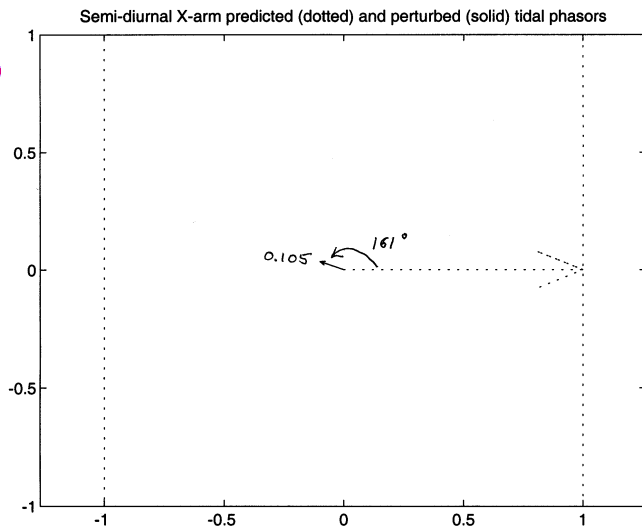


Preliminary Fit to Feedforward and Feedback Corrections

	X arm		Y arm	
	feedforward	feedback	feedforward	feedback
amp	25.96	2.72	18.8	2.71
period	740	740	740	740
phase	0.14	2.95	-1.09	0.43
amp	33.1	7.58	38.3	0.26
period	1481	1481	1481	1481
phase	-1.27	1.76	-0.67	-1.91



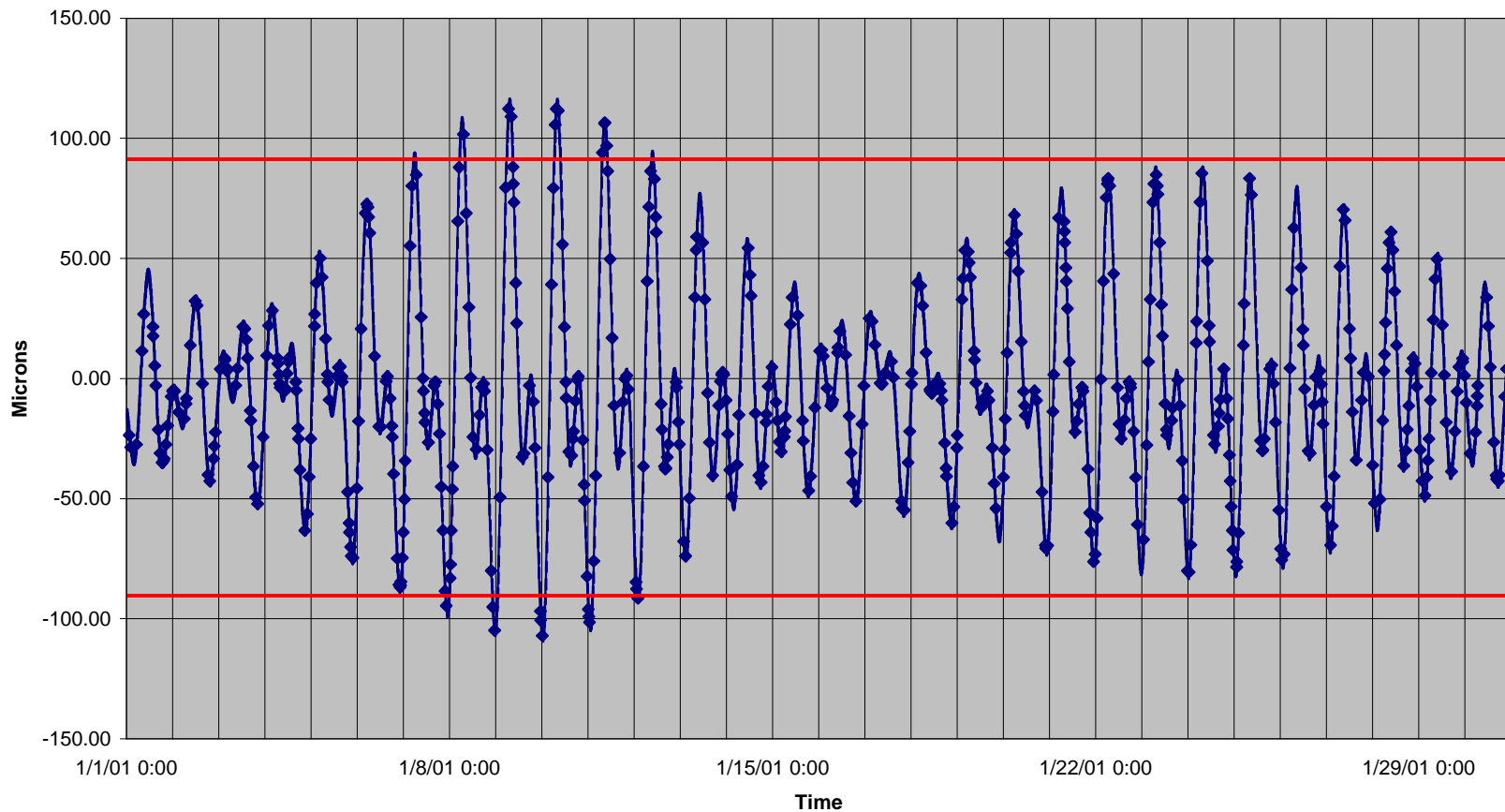
Preliminary Fit to Tidal Perturbation Phasors at Hanford from E7 Data, Compared to Simple Earth Model Prediction





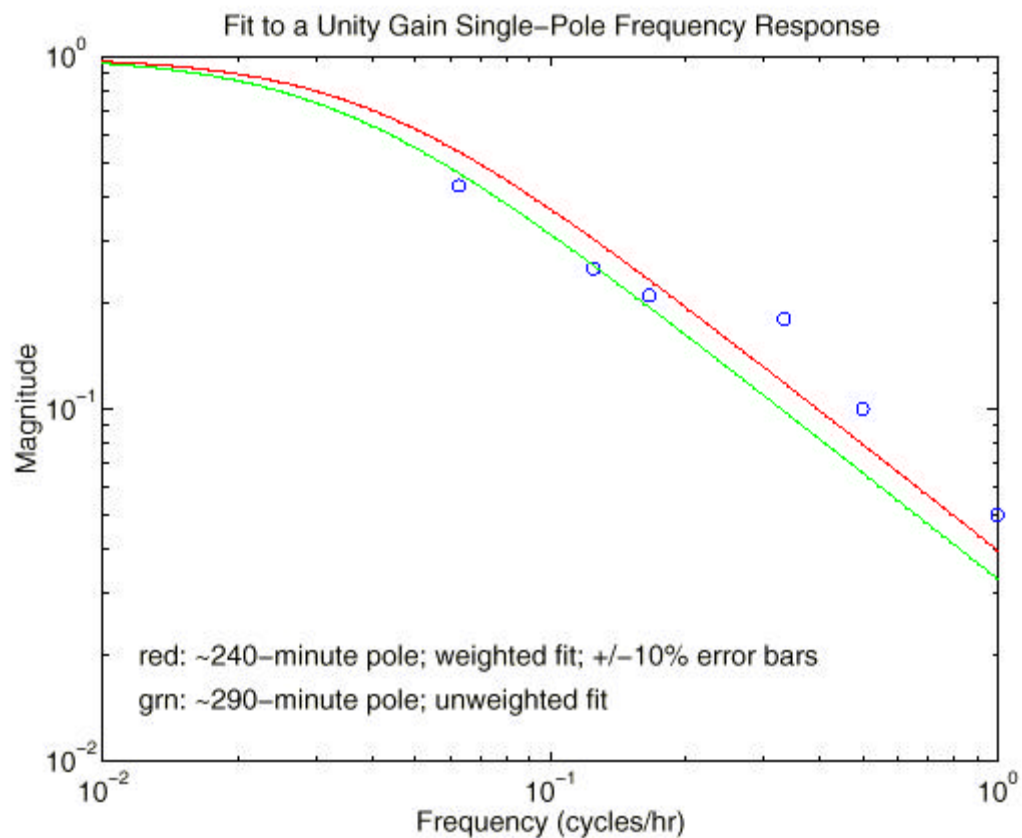
Need Common-Mode Tidal Actuation for 4K IFOs

WA4K Arm1 displacement





Measured Frequency Response of 2K PSL Tidal Actuator Over Xmas





What Works & What Needs Work

- Tides no longer cause lock to break on 2K IFO
- The 4K IFOs will hit the +/- 90 micron rails on the fine actuators unless common mode tide is fed forward to the PSL tidal actuator
- An earlier attempt to use PSL tidal actuator helped a little; frequency response measurements imply we may have used wrong pole in filter for actuator.
- Should test again with better identification of pole
- A redesign of PSL tidal actuator would help (SURF project this summer)