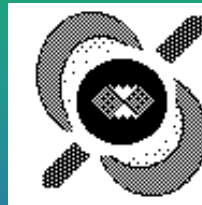




LAL Independent Detector Response Test

Update: LSC November 2003



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Independent validation of the LAL code that produces F_+ and F_\times .

- `LALIndependentTestDetResponse.c` is in LAL cvs under the `lal/packages/tools/test` directory.
- The code is based on that written by Brian Cameron (SURF 2002). It is a straight-forward implementation of the model given in Jaranowski, Krolak, and Schutz (gr-qc/9804014) for a circular Earth orbit and spherical Earth, with the detector in a plane tangent to the Earth's surface.
- Provides an independent check to compliment the extensive testing already done by Dave Chin's test code: `LALTestDetResponse0.c`.



UPDATE

- **All memory leaks been fixed!**
- To run:

```
cd lal/packages/tools/test  
./ LALIndependentTestDetResponse.c -c file.cfg
```
- Code will print error message if test fails and returns 1; otherwise returns 0.
- Code can write to file the values of F_x and F_+ for JKS, LAL, and the difference between these, based on configuration file.

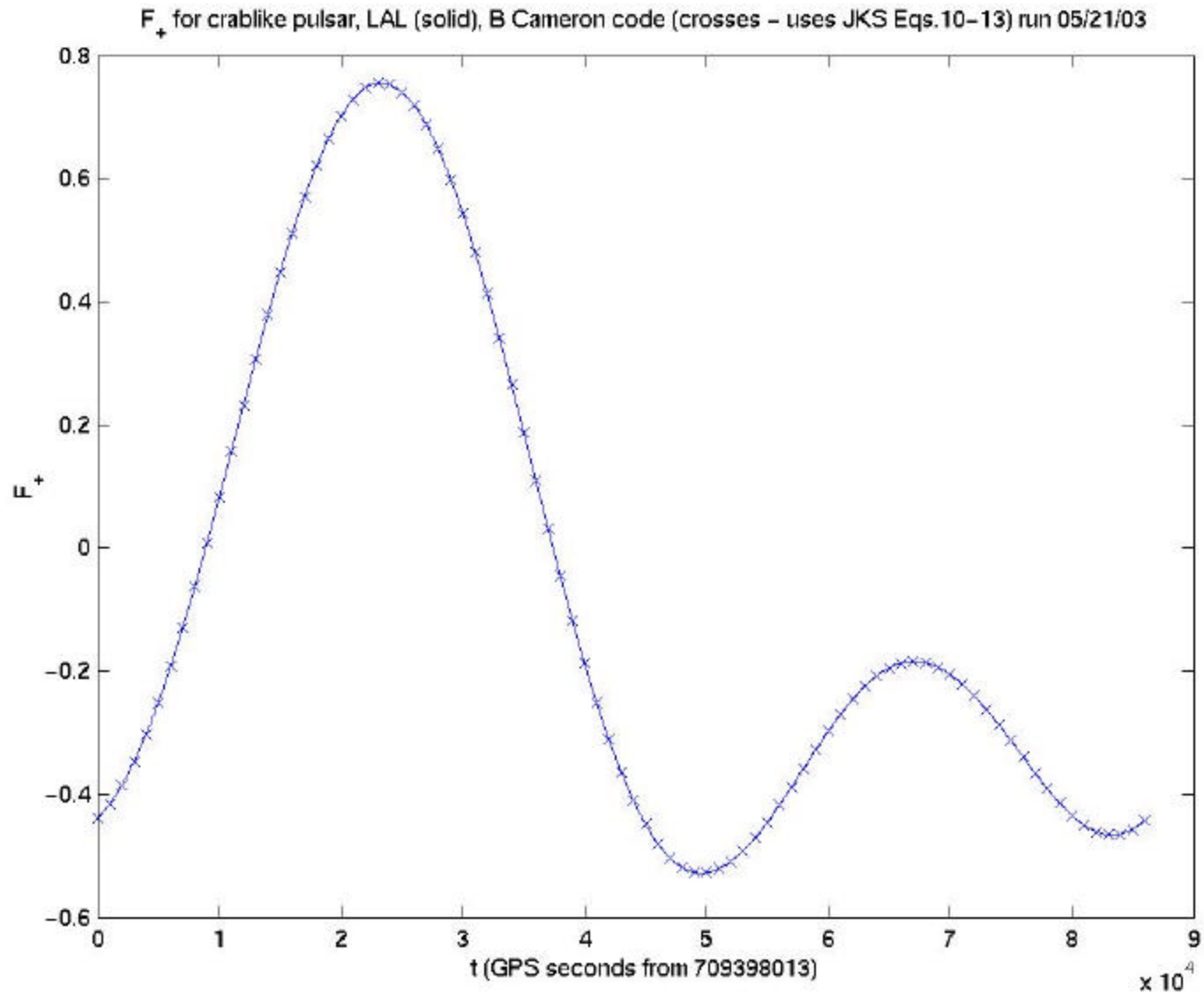


New Configuration File Format

```
262.0166667      #R.A. of the Source (degrees)
-28.92           #Declination of the Source (degrees)
-0.12345        #Orientation angle of the Source
751651211       #GPS time of Observation Start
0.001           #Sample Rate (Hz)
6480000         #Duration (sec)
H               #Detector Site H = Hanford, L = Livingston
1.0e-3          #Max allowed absolute difference
1              #Output Independent F_+, F_x? (1=yes,0=no)
fPlusS3LHOTOJAN14.out #File for Independent F_+
fCrossS3LHOTOJAN14.out #File for Independent F_x
1              #Output LAL F_+, F_x? (1=yes,0=no)
fPlusLALS3LHOTOJAN14.out #File for LAL F_+
fCrossLALS3LHOTOJAN14.out #File for LAL F_x
1              #Output differences? (1=yes,0=no)
fPlusDiffs3LHOTOJ14.out #File for LAL F_+ - Independent F_+
fCrossDiffs3LHOTOJ14.out #File for LAL F_x - Independent F_x
```

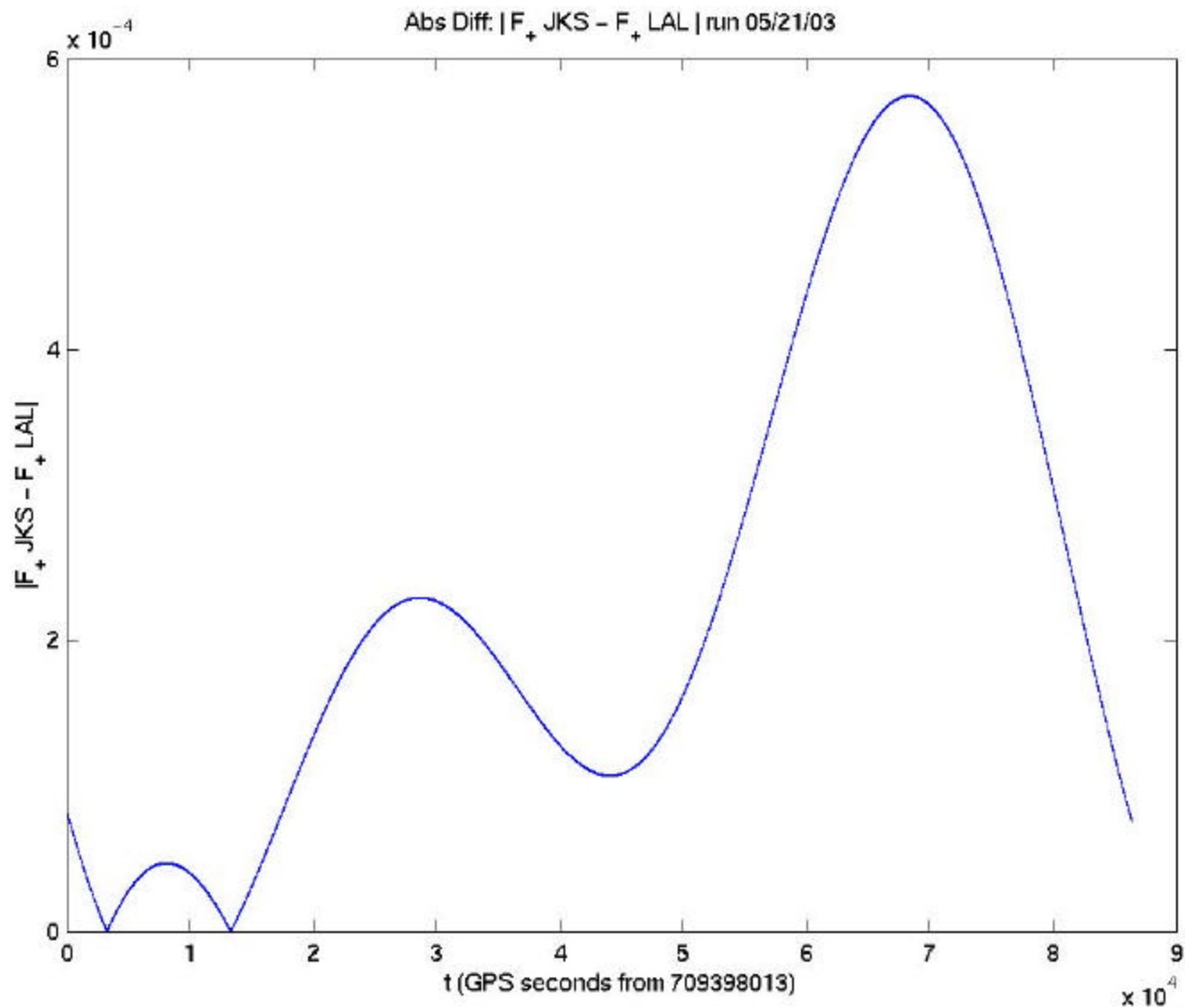


Example Test



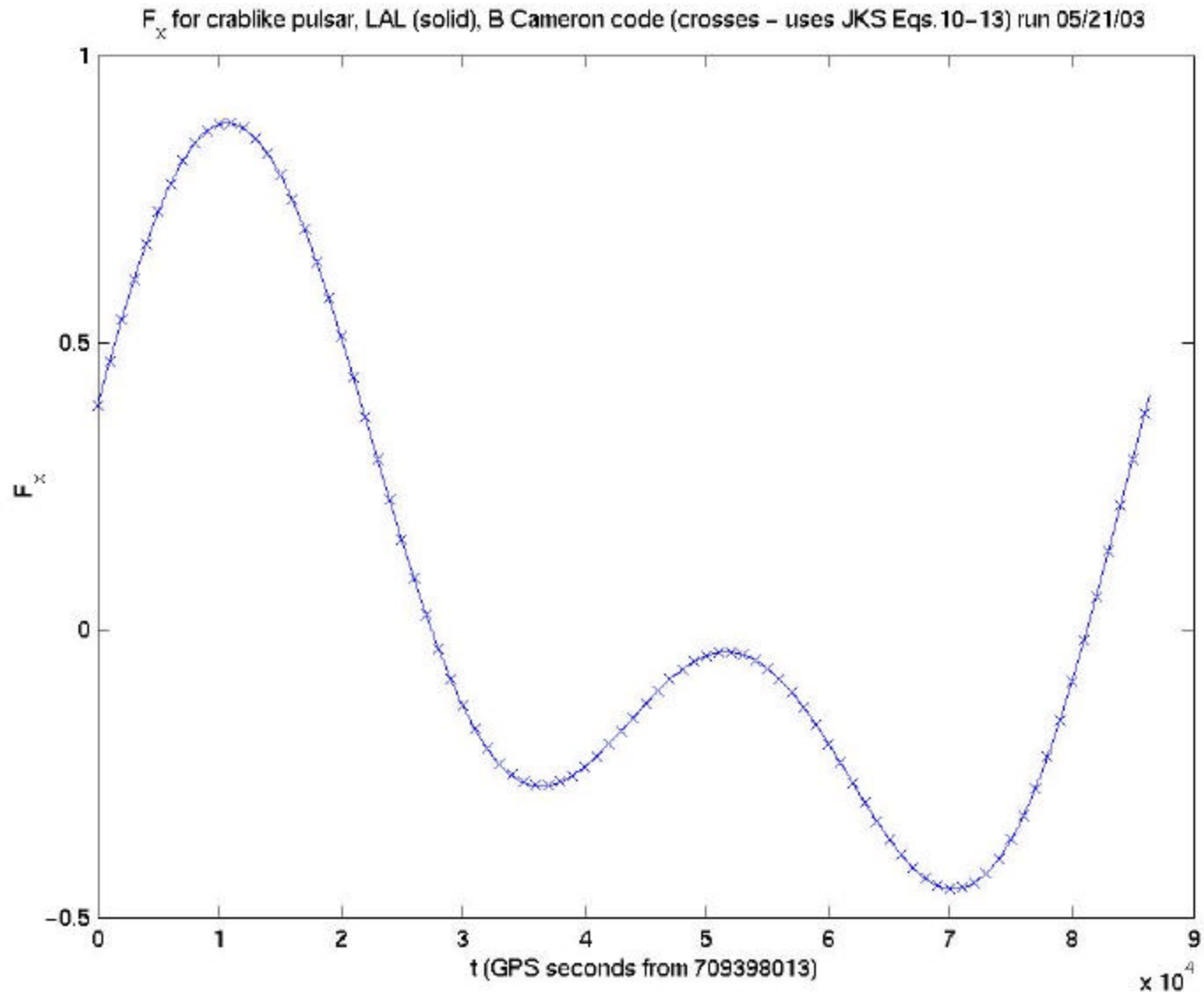


Difference



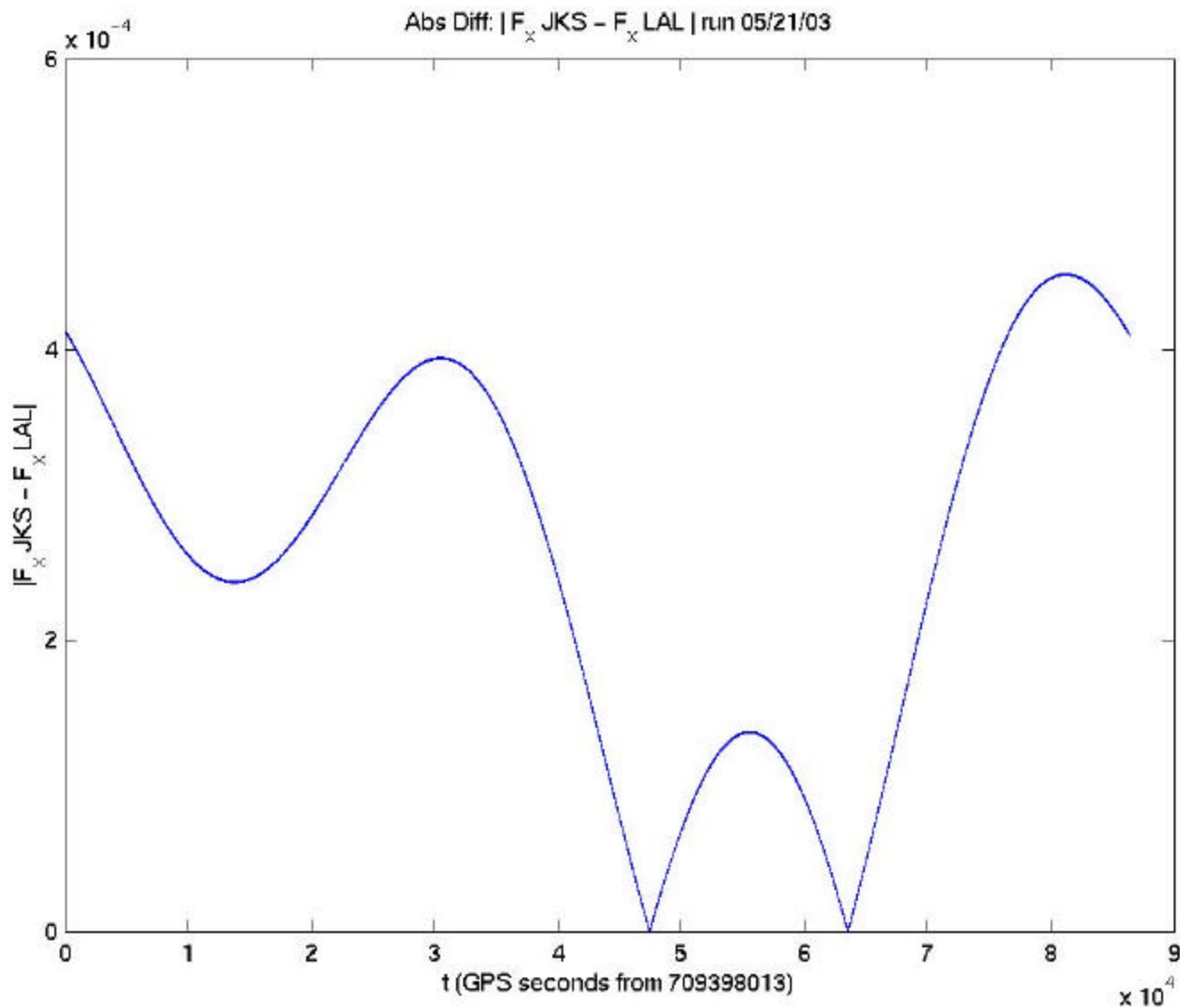


Example Test



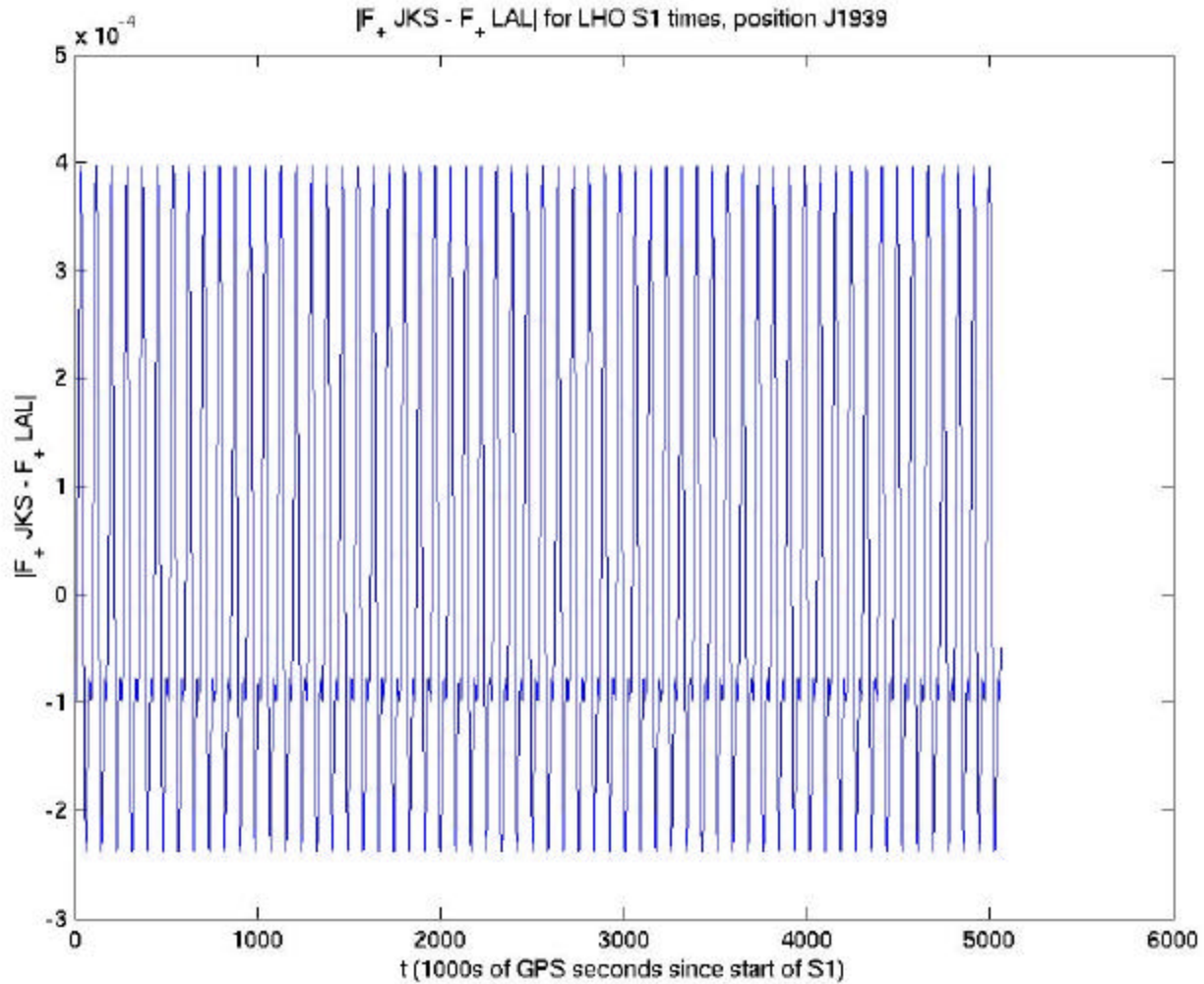


Difference



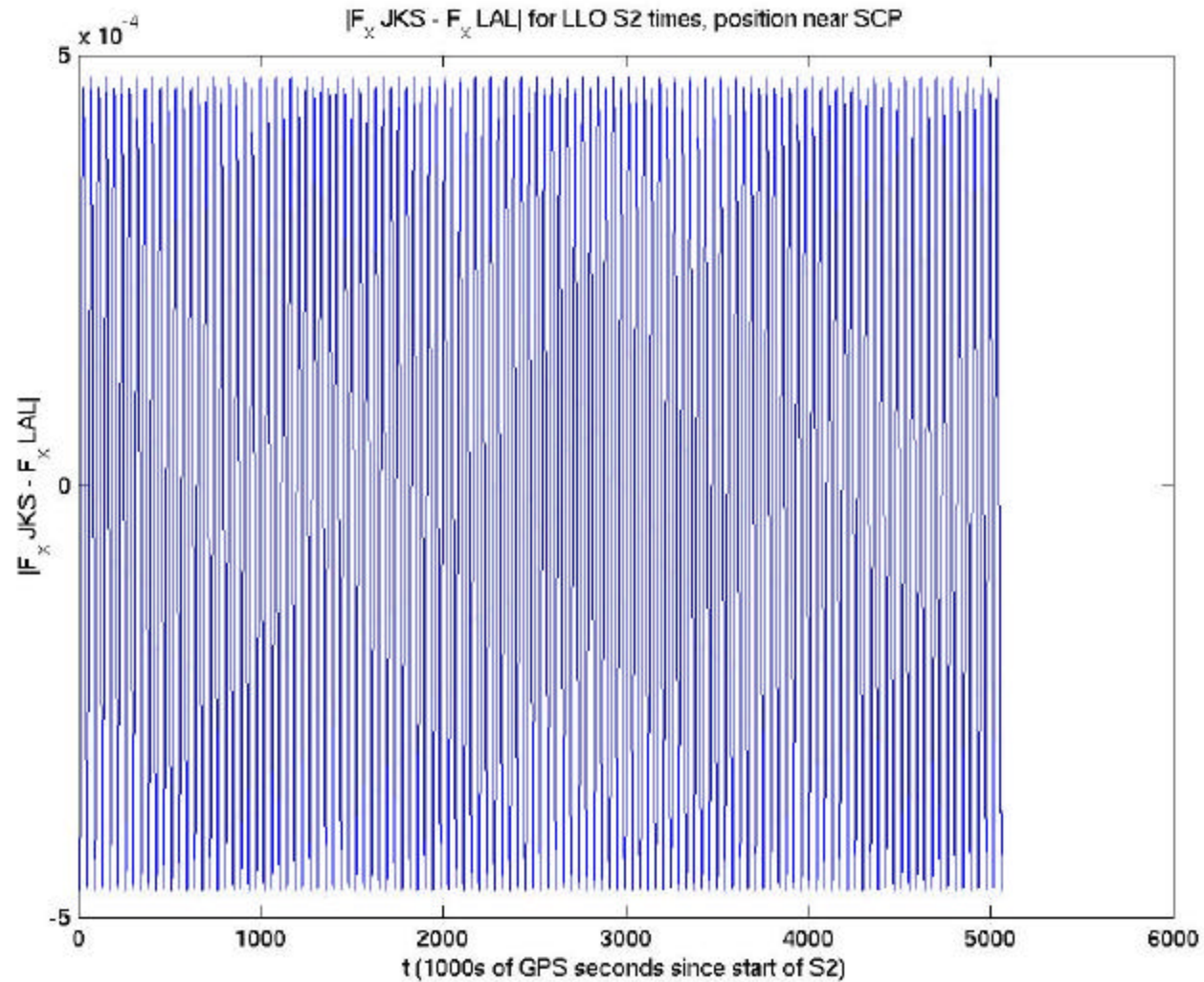


Difference All S1 Times



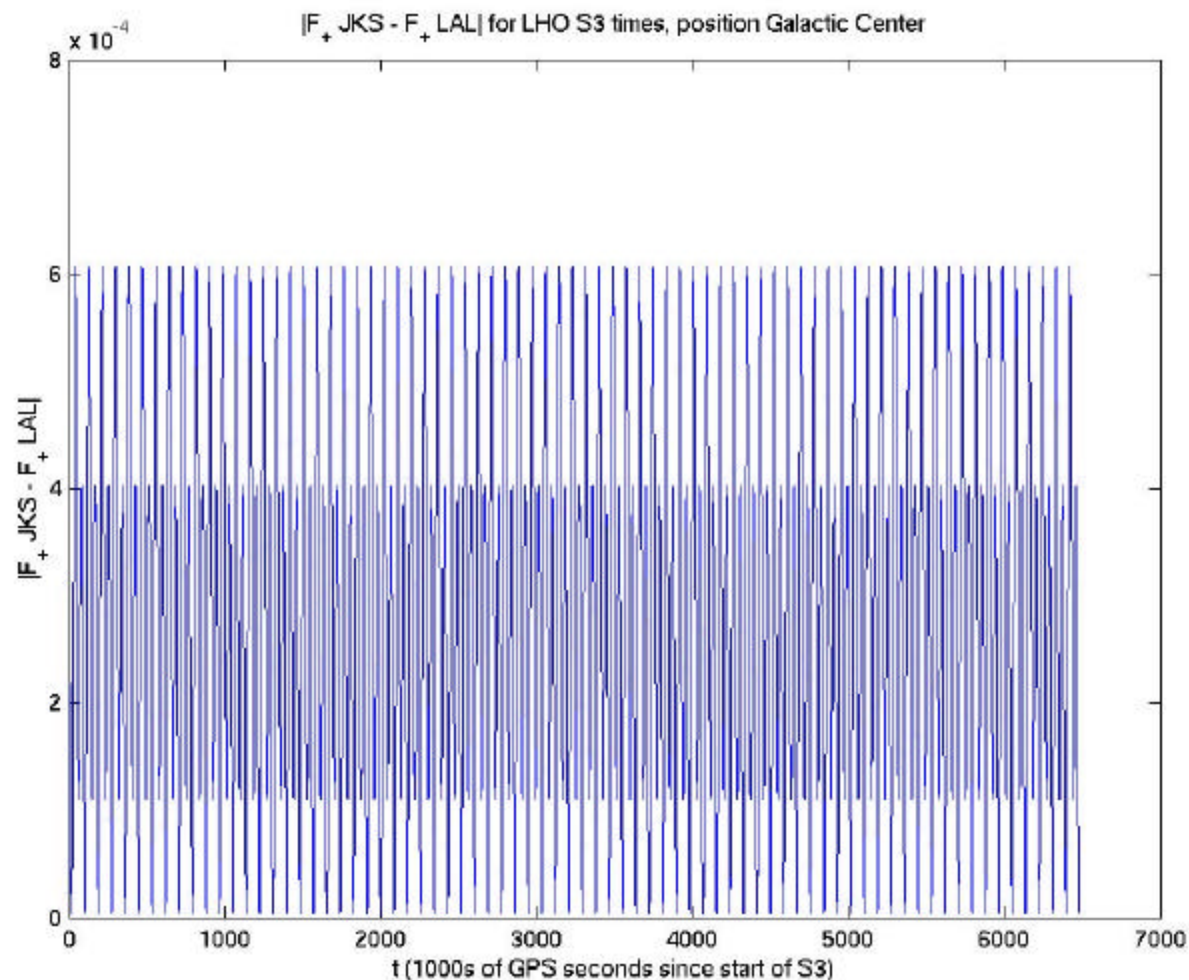


Difference All S2 Times





Differences from beginning S3 to Jan14 2004



LIGO-G030598-00-W



Conclusions

- Maximum differences less than $1.0e-03$
- Need to verify these are expected based on JSK vs LAL algorithms and why loss of precision when F_x and F_+ less than $1.0e-03$?
- Need to make more LAL Independent.
- Easy to write shell script that loops over many config files for a comprehensive test.