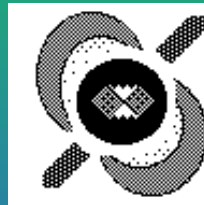




# LAL Independent Detector Response Test

## Update: LSC Aug 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`.



## Details...

- Current code works for one special case. However, **Memory leaks** and other commitments have **prevented further progress.** **Warning!**
- Code uses LAL routines to convert GPS to sidereal Time. Will replace with an independent routine from Jolien Creighton.
- Uses **lalCachedDetectors**. Make independent?
- Malik R. and I will expand the unit tests run during LAL "make check" and add comprehensive independent tests for all detectors, sky octants, years, and seasons that can be run from the command line.
- How to run the code will be included with the LAL documentation.



# Example Test

Source defined in LAL like this:

```
LALSource pulsar;
```

```
LALDetector detector =
```

```
lalCachedDetectors[LALDetectorIndexLHODIFF];
```

```
strcpy(pulsar.name, "TEST PULSAR");
```

```
pulsar.equatorialCoords.longitude = 83.63*LAL_PI_180; /* RA */
```

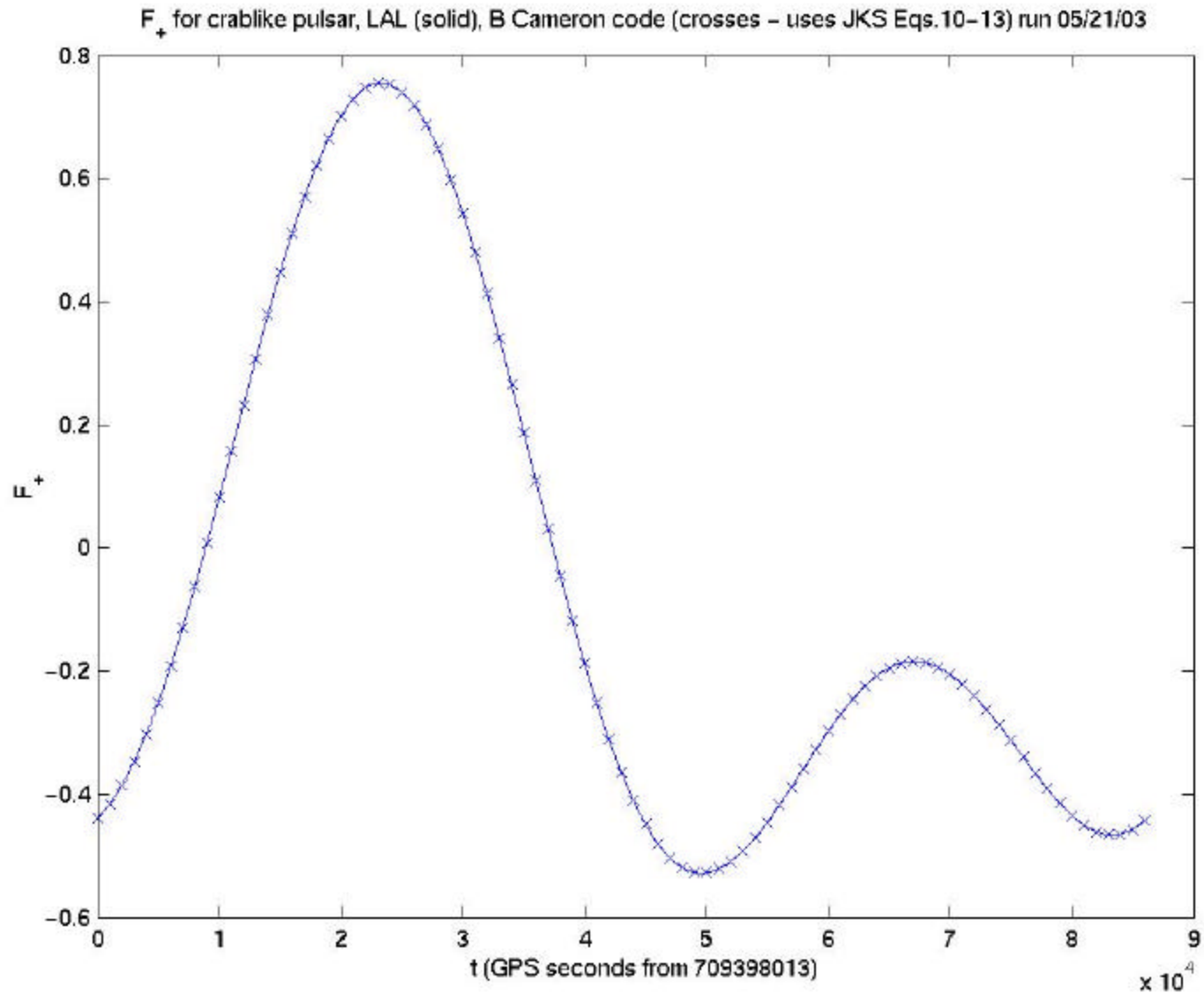
```
pulsar.equatorialCoords.latitude = 22.014*LAL_PI_180; /* Dec */
```

```
pulsar.equatorialCoords.system =  
COORDINATESYSTEM_EQUATORIAL;
```

```
pulsar.orientation = 22.5*LAL_PI_180;
```

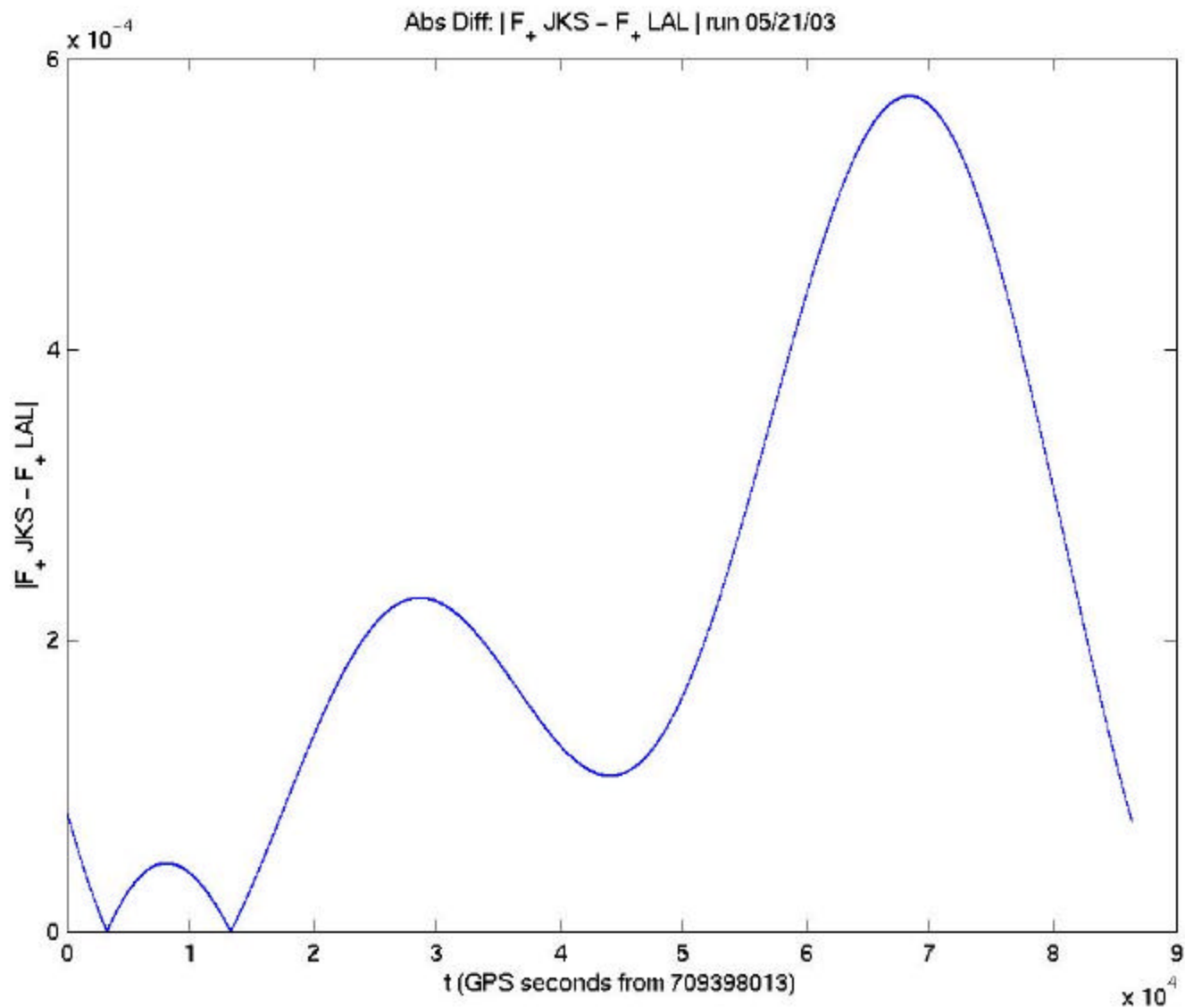


# Example Test



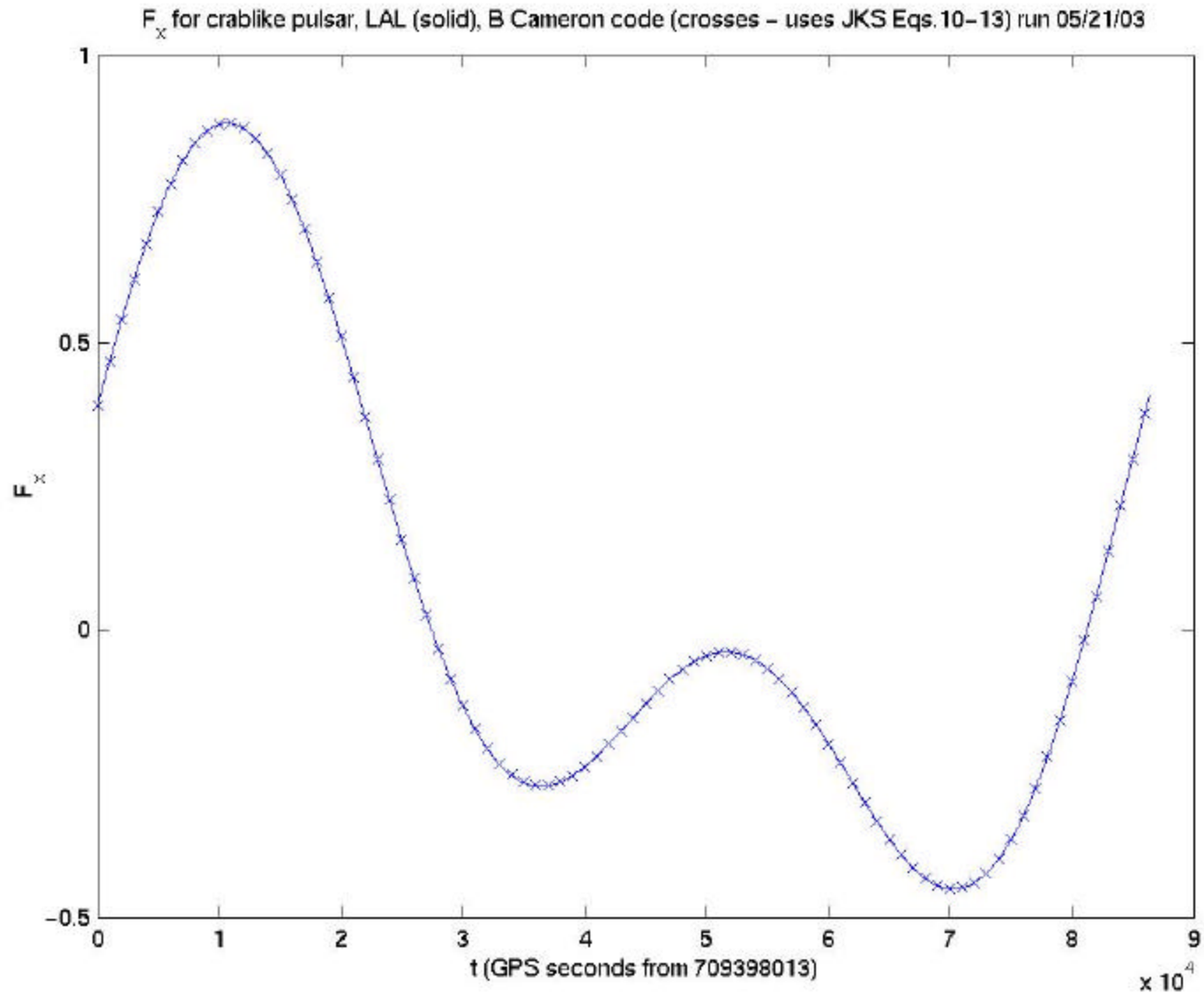


# Difference



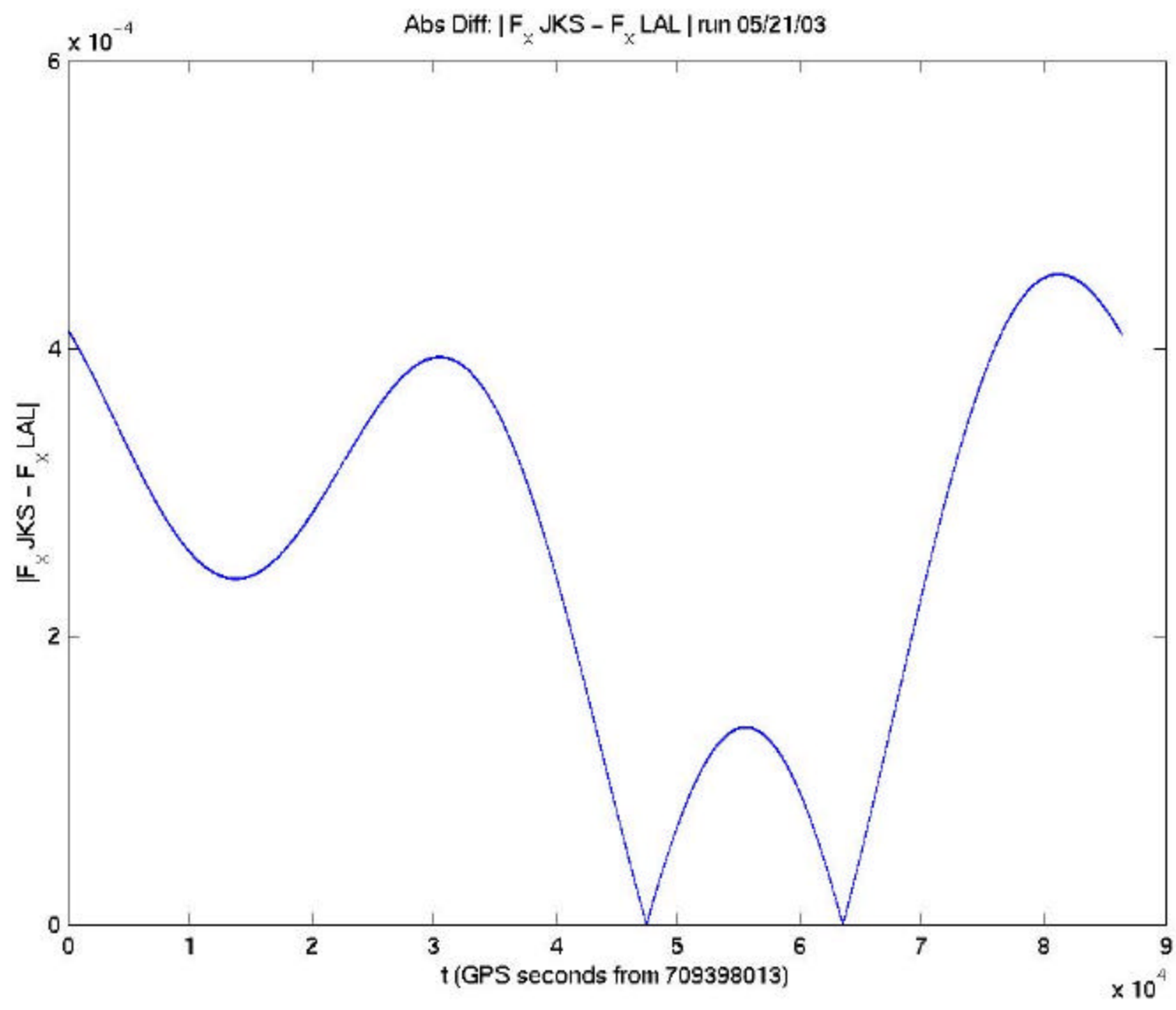


# Example Test





# Difference







## Conclusions

**The maximum differences are:**

$$\max | F_{+} \text{ JKS} - F_{+} \text{ LAL} | = 5.7505e-04$$

$$\max | F_{\times} \text{ JKS} - F_{\times} \text{ LAL} | = 4.5226e-04$$

**The differences are systematic, but very small.**

**The JKS model would seem to be good enough to check the LAL code.**