Orbit Simulator from TAKO

How can pre-existing code from TAKO can be used to design a detailed orbit simulator?

Orbit Simulator from TAKO

Orbit simulator:

- Orbit propagator
- Survey profiler
- Pointing profiler
- Slew profiler
- Events (SAA, Earth (Moon) occultation)

Orbit Simulator from TAKO

Tako can propagate the orbit by using several ephemeris format:

- NASA's Flight Dynamics Facility generated predictive ephemerides (FDF) ephemeris
- MOC generated Predictive GLAST ephemerides using SDK

Orbit Simulator from TAKO

Tako can also use

- NORAD Two Line Elements (TLE) with Simplified General Perturbation #4 (SGP4) model
  http://www.celestrak.com/NORAD/documentation/spacetrk.pdf

To propagate the orbit on the fly with any requested time accuracy

Orbit Simulator from TAKO

Tako has already code to profile Survey observations:

- Keeps track of spacecraft axes during survey
- Can profile yaw flip
- Profiles slew (more to come)
- Keeps tracks of events such as Earth or Moon occultation

Orbit Simulator from TAKO

For Pointed observation, Tako can tell where the spacecraft z-axis is pointing, while also keeping track of Occultation Events. However, at the moment Tako does not keep track where the x and y axis are pointing, although it can be implemented easily.

Orbit Simulator from TAKO

Slew Profiler

- Tako has code capable of calculating slew time using “great circle” approach.
- Although not yet implemented in Tako, code to profile the slew has already been developed.

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Tako uses lab maintained atFunction library to keep track of events such as

- SAA entry/exit
- Earth Occultation
- Moon Occultation

Orbit Simulator from TAKO

Conclusion:

most of code is already in place and it can be used with minimal modifications.