Magnetic field model

Gravity gradient

Pi make

Attitude determination via sun sensors. Photo diode Scarce information. Frequency and bandwidth can’t be taken from spec sheet. Light hitting diodes gives incidence angle. More than one orthogonal direction can build vector to the sun. based on upside bowl curves, what is the angular uncertainty in that vector. Current value prescribes an angle for that sensor. Build cosine matrix based on these three.

Sensor noise actuator. Possibly should rotate the vector to maintain unit vector. Not necessarily add noise on. In sim we get TRUE quaternion (attitude) from dynamics, we just add process noise.

Multiplicative Kalman filter. Attitude is multiplicative in terms of quaternions and dcms. Can be turned into a thesis.

Need to have a sort of “I did this”. Understood requirements, possibilities, design decision, write about it.

Cole and Will work together. Given inputs at various frequencies, estimate what response is. RW is actually openloop unstable. Transfer function model will be model for reaction wheel and controller controlling is. Validate model vs real wheels when they come in. estimate tf based on data. Validate that.

Code review: sim init needs to be run before anything else. Each library needs an init file that makes a sub-struct with name of library storing any constants needed. Want to get rid of all constants. If you need it on the SAT, it’s a flight software param. If not, it’s a sim param.

Go-to flags. Vectors need the coordinate frame its in and the units. CamelCase name. underscore frame and units. Don’t ask for the same thing twice.

Rate transitions. Continuous to discrete, need to choose fixed sampling rate. System as a whole runs on fastest sampling rate. Subsystem only needs to ask for a slower one. Rate transition blocks. Sensors and actuators need to not be faster than their actual sample rate. Inherit with -1. Step down then step back up when done?

Magnetic field model changed. Solar pressure and gravity gradient models are good models as examples.

Time problem: angular difference from nadir pointing vector?

Robust controller, check H infinity norm.

Initial angular rates are less than 6 degrees per second normally about each axis. Can fail if gyros saturate at level below worst angular rate.