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Readme file for detumbling_con.py

Attitude Determination and Control Subsystem

magMoment(sat)

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This function gives required magnetic moment according to B-dot controller.
Input: Object of satellite class.
Output: Required magnetic moment in body frame.
Required magnetic moment according to B-dot law is given by: [1]

$$\mathbf{m} = \frac{k}{||\mathbf{B}||}\dot{B} \tag{1}$$

where $\dot{B}$ is derivative of magnetic field vector (obtained from sensors) in body frame and $||\mathbf{B}||$ is magnitude of the magnetic field vector. k is given by:

$$k = \frac{4\pi}{T_{orb}}(1 + sin\xi_m)J_{min} \tag{2}$$

where T_{orb} is the orbital period in seconds, ξ_m is the inclination of the spacecraft orbit relative to the geomagnetic equatorial plane and J_{min} is the minimum principal moment of inertia.

To find $\dot{B}$ in code, we are taking difference of two consecutive magnetic field measurements and dividing it by the time interval between these two measurements.

References

[1] F Landis Markley and John L Crassidis. *Fundamentals of spacecraft attitude determination and control*. Vol. 33. Springer, 2014.