Student Satellite Project
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Readme files for dynamics.py

Attitude Determination and Control Subsystem

x_dot_BO( )(sat,f,h)

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Input: Satellite object
Output : Derivative of error vector w.r.t. time

1. Obtain the total torque acting on satellite. There are two types of torques, control torque and disturbance torque. These are accessed from satellite object sat using methods getControl_b() and getDisturbance_b() respectively. The torque vector is expressed in body frame.
2. Obtain qBO and angular velocity of body frame w.r.t. orbit frame expressed in body frame.
3. $\dot{q}_{BO} = \frac{1}{2}\begin{bmatrix} -\vec{v}^T\omega_{BOB} \\ s\omega_{BOB} + \vec{v} \times \omega_{BOB} \end{bmatrix}$
   where ω_{BOB} is the angular velocity of body wrt orbit frame, $\vec{v}$ is vector part of q_{BO}, s is scalar part of q_{BO}.
4. $J\dot{\omega}_{BOB} = -\omega \times J\omega + \tau - J[R(\omega_{BOB} \times \omega_d + \dot{\omega}_d)]))$
   where J is moment of inertia and τ is total torque. ω is the angular velocity of body wrt ECI frame, ω_d is the angular velocity of orbit wrt inertial frame. R is the rotation matrix corresponding to q_{BO}.