AA279C Homework 4

Due Friday, May 25, 2018

1 Actuator Specifications

Give detailed specifications for the actuators onboard your spacecraft. If you cannot find information specific to your chosen spacecraft, use specifications for similar actuators that you can find documentation for. At minimum, you must specify:

1. Maximum force/torque and maximum angular momentum
2. Actuator positions and orientations in the spacecraft body frame
3. Jacobian matrices mapping actuator commands into body-frame torque and momentum

2 Environmental Torques

To increase the realism of your spacecraft dynamics model, add gravity gradient torque and either atmospheric drag or solar radiation pressure to your model. You should justify your choice (of drag or solar pressure) based on the orbit of your spacecraft. Simulate your spacecraft over several orbits with and without each of these perturbations and describe their effects on the behavior of the satellite. Some questions you should address are:

1. What is the maximum magnitude of each torque on your spacecraft?
2. What do these torques look like averaged over an orbit? What is the maximum accumulated change in angular momentum you expect over a full day?
3. Based on 1 and 2, what implications do these environmental effects have for your actuators and overall attitude control system? For example, how often will you expect to need to perform momentum dumping?