

DOC 221 Dinámica orbital y control de actitud

Problems Lecture ADCS - IV

Problem 1:

Assume a solar sail at the Earth distance with a perfectly reflecting aluminized sheet with a sail area of 10^4 m^2 and a mass of 1000 kg. Take into account only the solar radiation pressure and ignore all gravitational effects. Assume that the solar constant and the acceleration remain constant. How long does the solar sail take to reach the Moon ($4 \cdot 10^8 \text{ m}$)? What design changes are needed to have a larger acceleration? What do you think is the main problem in solar sail design?

Problem 2:

Which passive and active attitude control techniques do you know?

Problem 3:

Can you tell what type of attitude control concepts are used by the Hubble space telescope and by the UPM-Sat2? Please specify what type of sensors and actuators are used?

Problem 4:

Consider a symmetrical rigid body rotating freely about its center of mass. A frictional torque ($T_f = -b\omega$) acts to slow down the rotation. Find the component of the angular velocity along the symmetry axis as a function of time.