

----- MAE 180B - HOMEWORK # 2 -----

PROBLEM 1 (Sec. 8.1):

A satellite at 300-km altitude is continuously exposed to minimum F10.7 solar radio flux for 400 days.

Calculate the % erosion in a 2-millimeter thick Kapton insulator due to the presence of atomic oxygen (see Section 8.1.3).

PROBLEM 2 (Sec. 6.3):

Calculate the total ΔV and the time required for a Hohmann transfer from a circular Mercury orbit of radius 5,000 km to a circular Mercury orbit of radius 12,000 km. The gravitational constant for Mercury is $22,032 \text{ km}^3/\text{s}^2$.

PROBLEM 3 (Sec. 7.3):

The specific impulse of a spacecraft is 350 seconds. The ΔV required for transfer from the parking orbit to the mission orbit is 1.2 km/s. The initial mass of the spacecraft is 980 kg.

Calculate the propellant mass required for this phase of the mission.

NOTE: The relationship between the three masses shown *above* Equation 7.14 in the book must be corrected to: $m_f = m_0 - m_p$ where m_f is the spacecraft final mass, m_0 is the spacecraft initial mass, and m_p is the propellant mass.