

Papers referenced are found on SmartSite: Resources/Reading Assignments/Week 8

- 1) Consider a spacecraft in a circular LEO at altitude of 200km. Design a system diagram and estimate the mass and volume of a propulsion system to transfer to a circular orbit of altitude 350km. Consider your valving to protect for jet fail on/jet fail cases, as appropriate. Include propellant and N₂ pressurant tanks, plumbing, valves, and a single engine for:
 - a. Monopropellant (hydrazine)
 - b. Bi-propellant (your choice)

- 2) Read “Mission Analysis for a Micro RF Ion Thruster for CubeSat Orbital Maneuvers”
 - a. Which propulsion system included in the paper would you choose for a maximum orbit change given mass and volume constraints?
 - b. What is the chemical name and estimated ISP for the propellant of the system chosen in a)?
 - c. If you wanted to minimize propellant usage for the circularization burn of a Hohmann transfer, where on the orbit would you burn?
 - d. For use on a 3U CubeSat, what is the total mass and volume of the thruster, propellant, and tank chosen in a)?
 - e. What is the nominal thrust level and input power required? Why is input power required at all?
 - f. Why is the propellant you have chosen any better than hydrazine?
 - g. What is the main reason that you cannot instead use the Aerojet/Rocketdyne MPS-110 Cold-Gas Thruster system for CubeSats?

- 3) Read “Using Additive Manufacturing to Print a CubeSat Propulsion System”
 - a. One problem encountered was arcing between a ground wire and the thruster sheath, and of course you worry about thermal containment with a spark-powered thruster in a plastic spacecraft. What would be your recommendation of a less challenging thruster system to study for incorporation into a 3-D printed CubeSat bus? Pros and cons?