

Astro Engr 423 – Homework 06

Name:

Due: Lesson 11

You may receive help from any person; however, you are required to turn in your own homework. This assignment must be documented in accordance with the policies explained in the DFAS Policy Letter and course handbook. Show all work – just writing the answer is not sufficient. If you use Matlab or some other software, provide a copy of your code. Submit your homework with this coversheet and per the homework format guidance in the course handbook.

Documentation:

Exercise 1 (40 pts)

A chase spacecraft is approaching a target satellite stationed at 150E longitude in GEO on 25 Jan 2023 at 0900Z. The chase's current relative position and velocity in the RIC frame is given by

$$\vec{\rho} = \begin{bmatrix} -14.142 \\ 28.284 \\ 10 \end{bmatrix} km, \quad \dot{\vec{\rho}} = \begin{bmatrix} .0010313 \\ .0020625 \\ 0 \end{bmatrix} km/s$$

- a) (10 pts) Sketch a mission planning sun clock and estimate the current CATS
- b) (10 pts) Calculate the current CATS
- c) (10 pts) Using your sun clock, where should the spacecraft maneuver in the x-y plane to achieve a favorable CATS (i.e., close to 0°) at 2000 Zulu? You do not need to calculate a location where CATS is exactly 0°. Instead, use your sun clock to determine an approximate region where CATS will be favorable (e.g, on the y-axis, ½ way between +x and -y, etc)
- d) (10 pts) Calculate the maneuvers required to obtain and stay at this desired position such that the magnitude of $\rho = 25 km$. You may use the HCW targeting method and the provided Matlab scripts to calculate ΔV s.