

**Assignment No 4**

(Hand-in by 31/12/24)

Consider here again the two-satellite formation as defined in Assignments 2 and 3. It is desired to bring Sat#2 to a rendezvous with Sat#1, this time by using continuous thruster with a linear feedback control law (Chapter 6). The maneuver starts at the same point as in the previous assignments. The maximum available thrust acceleration is  $0.04 \text{ m/sec}^2$ . The desired convergence time is 2000 seconds.

Design a linear feedback control law. Use the pole placement method.

Design criteria:

- The thrust should not exceed the maximum available (an intermittent thrust saturation is allowed).
  - Convergence criteria: The miss-distance at the given desired time should be less than 1m, and the velocity should be less than 1cm/sec.
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- a. Choose the desired poles, justify your choice, and provide the gains.
  - b. Calculate the total  $\Delta V$ .
  - c. Due to malfunction, the z feedback channel was disconnected at  $t=500 \text{ sec}$ . Discuss what happens.

Provide the following plots:

- i. Relative trajectory (x-y-z).
- ii. x, y, z vs. time.
- iii. Thrust acceleration vs. time.