The Technion – Israel Institute of Technology **Faculty of Aerospace Engineering**

Satellite Orbit Control 86290

Winter semester 2024-25

Assignment No 5

(Hand-in by 7/1/25)

Consider here again the two-satellite formation as defined in Assignments 2-4. It is desired to bring Sat#2 to a rendezvous with Sat#1, by using continuous thruster with a linear feedback control law (Chapter 6), with the additional requirement that the terminal approach will be along the *z* axis, from the positive *z* direction. It is required that at least the final 10 m will be within 1m from this straight line with velocity of 3 cm/sec. As before, the maneuver starts when Sat#2 is at the same point as defined in the previous assignments. The maximum available thrust acceleration is 0.04 m/sec^2. The desired rendezvous time is 2000 sec.

Design the control law for this problem (feedforward controller and feedback gains).

Design criteria:

- The thrust should not exceed the maximum available (an intermittent thrust saturation is allowed).
- The miss-distance at the desired final time should be less than 1m.

a. Provide the reference trajectory.
b. Choose the desired poles, justify your choice, and provide the gains.
c. Calculate the total ΔV.

Provide the following plots:

i. Relative trajectory (*x*-*y*-*z*) of the satellite and of the reference orbit.
ii. *x, y, z* vs. time (satellite and reference orbit).
iii. Thrust acceleration vs. time.