

Assignment No 3
(Hand-in by 24/12/24)

Consider here again the two-satellite system as described in Assignment #2. It is desired to bring Sat#2 to a rendezvous with Sat#1, this time by using a combination of continuous thruster and pulse thruster. The thrust acceleration limit of the continuous thruster is 0.008m/sec^2 . The maneuver starts at the same point as in Assignment #2. Consider two cases:

- a. Straight-line constant velocity approach trajectory from the initial point to the target. The desired maneuver time is 2000 seconds.
Find the required thrust acceleration components, the initial and terminal pulses and the required approach velocity.
- b. A Cross-Product fixed-thrust control law (Chapter 5.6.4). Design the control law (i.e. the components of the thrust vector) such that Sat#2 arrives at Sat#1 at the same time as in part a. Assume that the terminal braking is performed by pulse thruster.

Design criteria:

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

For each case, provide the following plots:

- a) Relative trajectory (x - y - z).
- b) x , y and z vs. time.
- c) Thrust acceleration components and total thrust acceleration vs. time.
- d) Total ΔV .