AE3524 Assignment

Orbit Simulator for Formation Flying

Grgur Dujmović

# Introduction

To start the assignment, we have to observe which values are available to use. We have two satellites that we have to create an orbital simulation for. The following are the given/calculated specifications for each:

**Satellite 1:**

* Size:
  + x – 300mm – 0.3m
  + y – 300mm – 0.3m
  + z – 300mm – 0.3m
* Mass – 30kg
* Orbit height – 500km
* Orbit circular and sun-synchronous, hence inclination ≈ 98o and orbit eccentricity = 0
* **Velocity** ≈ 7.61268km/s
* **Orbital radius (**semi-major axis**)** ≈ 6878km
* **Orbital period** ≈ 1h34m37s

**Satellite 2:**

* Size:
  + x – 300mm – 0.3m
  + y – 300mm – 0.3m
  + z – 300mm – 0.3m
* Mass – 30kg
* **Velocity ≈** 7.61368km/s
* **Orbit height ≈** 498.19km
* Orbit circular and sun-synchronous, hence inclination≈ 98o and orbit eccentricity = 0
* **Orbital radius (**semi-major axis**)** ≈ 6876km
* **Orbital period** ≈ 1h34m35s

# Task 1. Two satellite decaying orbit simulation

To perform this task, a python script was developed to simulate the decaying orbits of the satellites. The changes for the orbit height, and mean anomaly are show in Fig1234. The height decay graphs show a change of approximately 1.144m and 1.197m for satellite 1 and 2 respectively over a period of 1 week. The decay happens because of air resistance (drag) that affects the satellite. According to these values, satellite 1 would re-enter in approximately 425 years, and satellite 2 would re-enter in approximately 400 years.

**EXPLAIN CALCULATION**

On figures **MEAN ANOMALY** **FIGURES** we can’t see over the span of a week, but reducing the time frame on **FIGURE LOW BOUND** the orbital period can be read out.