

Satellite Orbit Control

HW9

Almog Dobrescu

ID 214254252

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1 Given

A communication satellite is placed in a geostationary orbit above longitude 30°E.

$$T = 8.6164 \cdot 10^4 [\text{sec}] \rightarrow a = 4.2164 \cdot 10^4 [\text{km}] \quad \theta = 30^\circ \quad e = 0 \quad i = 0 \quad (1)$$

The longitude tolerance is $\pm 0.05^\circ$ ($\Delta L = 36.7952 [\text{m}]$)

1.1 Desired

1.2 Limitations

The thrust is only at the $\pm y$ direction and:

$$a_{\max} = 1 \cdot 10^{-7} \left[\frac{\text{km}}{\text{sec}^2} \right] \quad (2)$$

2 Control

2.1 East-West Control

2.1.1 Drift Duo to axial asymmetry

The gravity component normal to the radius changes the orbit period so the satellite moves toward the closest equilibrium point.



3 The Results

3.1 Part A

3.2 Part B

3.3 Part C