

# Home Work #3

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## 1 Question 1

This homework used the below equation to simulate the position and velocity of the Hubble space telescope.

$$\begin{aligned}\ddot{x} - 2n\dot{y} - 3n^2x &= f_x \\ \ddot{y} + 2n\dot{x} &= f_y \\ \ddot{z} + n^2z &= f_z\end{aligned}$$

assumed that:

$$\begin{aligned}f_x &= 0 \\ f_y &= 0 \\ f_z &= 0\end{aligned}$$

where:

$$n = \sqrt{\frac{\mu}{r^3}}, \quad \mu = 398600.4418 \text{ km}^3 \text{ s}^{-2}, \quad r = r_{altitude} + r_{earth} = 590 + 6378 = 6968_{km}$$

and initial conditions:

$$r_{relative} = [0 \quad 0 \quad 0], \quad v_{relative} = [-0.1 \quad -0.04 \quad -0.02]_{m/s}$$

Figure 1: position of the Hubble space telescope

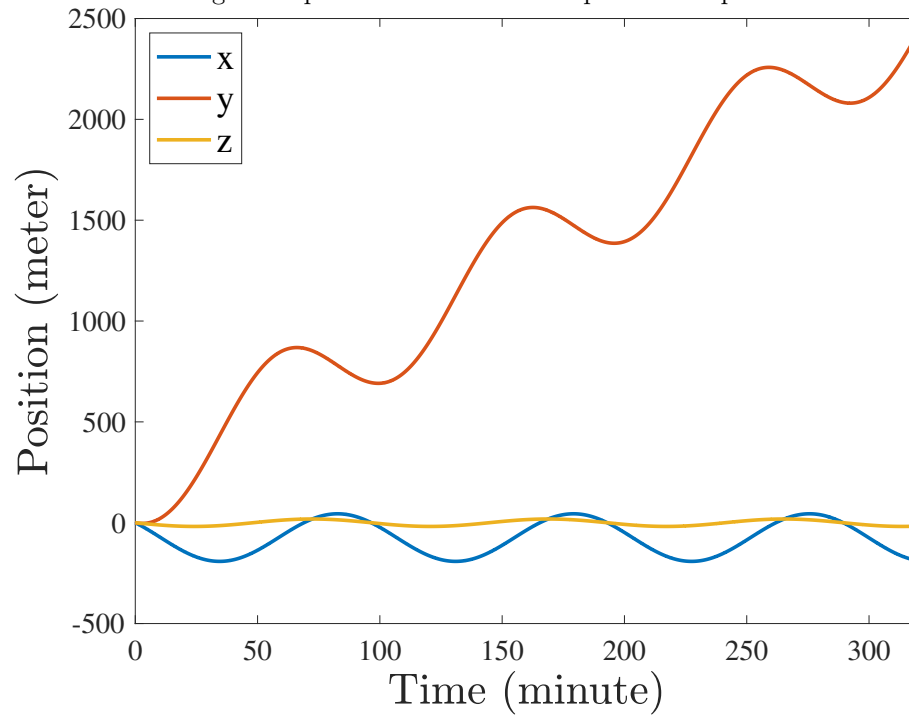
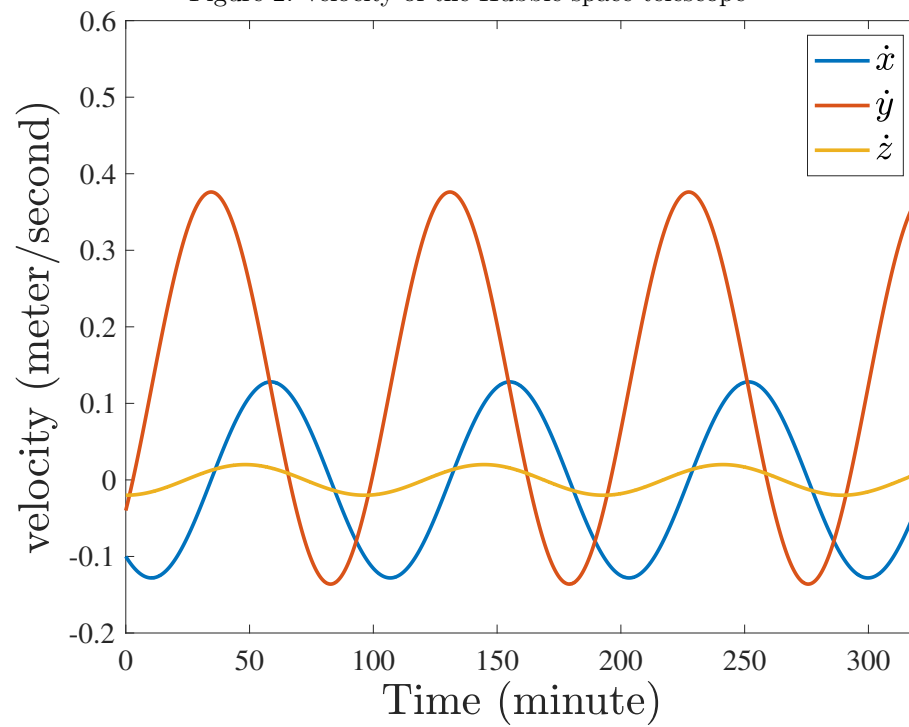


Figure 2: velocity of the Hubble space telescope



## 2 Question 2

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