Modeling and Simulation of the Physical World: Project Check-In

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Equations

$$\begin{aligned} \Sigma F &= ma \\ \vec{F}_{thrust} + \vec{F}_{lift} + \vec{F}_{drag} + m\vec{g} &= m\vec{a} \\ m\frac{d\vec{v}}{dt} &= \vec{F}_{thrust} + \frac{1}{2}C_l\rho A v^2 \hat{s} - \frac{1}{2}C_D\rho A v^2 \hat{v} - mg\hat{j} \\ \frac{d\vec{p}}{dt} &= \vec{v} \end{aligned}$$

Graph

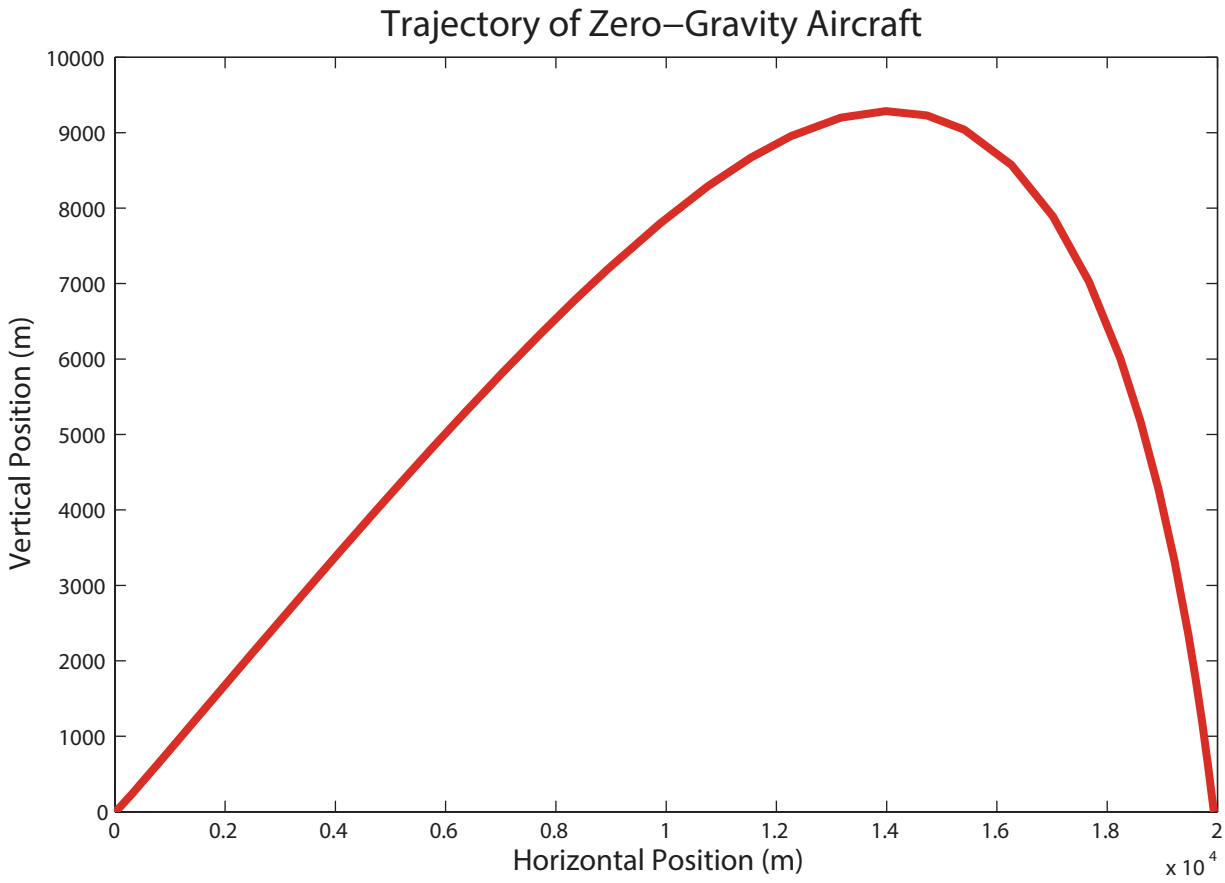

Figure 1: Trajectory of a typical zero-gravity aircraft

Iterations

This model is our first iteration. Most zero-gravity aircrafts travel for greater than 15 parabolic free-falls. We have modeled only one free-falll so far. We will also be operating in a third dimension in order to vary the flight path. The flight path will be elliptical when taken from a bird's eye view. The eccentricity of this ellipse will change between 0 and 1 in order to determine most efficient flight path, within terms of fuel or distance.