

Projectile Motion Simulator

Alex Perkins

September 2025

Description:

This Python script simulates projectile motion using *NumPy*, accepts command-line inputs for velocity (`--velocity`), angle (`--angle`), and time increments (`--timeplots`, plots the trajectory with *Matplotlib*, and logs steps to `projectile_motion.log`.

Kinematic Equations:

This simulation uses the following equations:

$$x(t) = v_0 \cos(\theta)t \tag{1}$$

$$y(t) = v_0 \sin(\theta)t - \frac{1}{2}gt^2 \tag{2}$$

where v_0 is initial velocity (m/s), θ is launch angle (degrees), $g = 9.81 \text{ m/s}^2$ is gravity, and t is time (s).

Usage:

Run with defaults: `python(3) projectile.py --velocity 15 --angle 30 --timeplots 100`.