Previous Next

15.1.2 A New Model Problem: Projectile Motion with Uncertainty

MO2.13

As we explore the fundamentals of probability and statistics, we will use a simpler example than the Martian lander to reduce the computational expense required to demonstrate these concepts. Specifically, as shown in Figure 15.1, consider a projectile launched from the ground with an initial speed V_0 at an angle θ_0. g is the gravitational acceleration. The projectile impacts the ground at the location x_f.

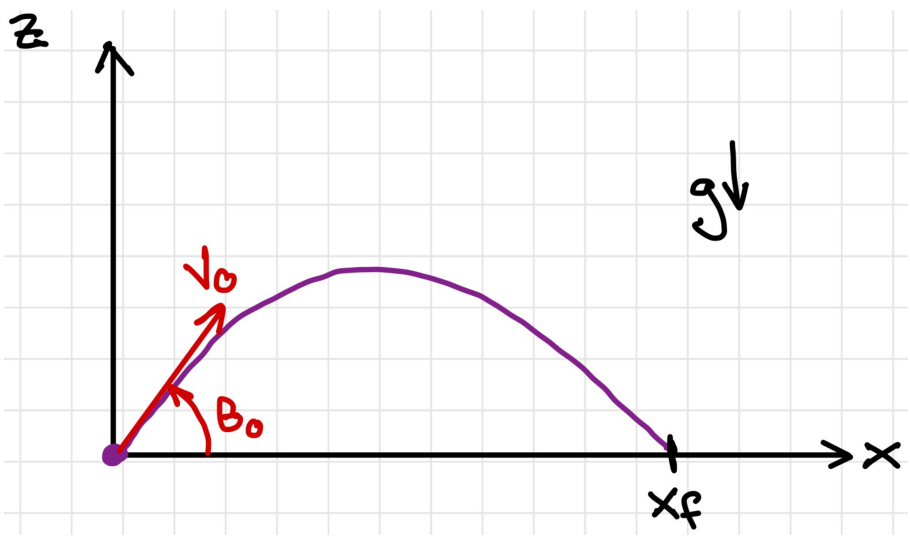

Figure 15.1: Projectile motion problem definition.

When only gravitational force is included (i.e. neglected aerodynamic drag), then the impact location can be found to be:

$$x_f = \frac{V_0^2}{g} \sin 2\theta_0 \tag{15.1}$$

We will consider the nominal case for the projectile motion to be $V_{0\,\mathrm{nom}} = 30$ m/s and $\theta_{0\,\mathrm{nom}} = 30°$. Assuming gravity is $g = 9.81\,\mathrm{m/s^2}$, then the impact location for these nominal conditions is $x_{f\,\mathrm{nom}} = 79.45$ m.

Previous Next

Discussions

All posts sorted by recent activity

edX

About
Affiliates
edX for Business
Open edX
Careers
News

Legal

Terms of Service & Honor Code
Privacy Policy
Accessibility Policy
Trademark Policy
Sitemap
Cookie Policy
Your Privacy Choices

Connect

Idea Hub
Contact Us
Help Center
Security
Media Kit