Projectile Motion

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Abstract

Projectile motion is the motion of an object as it is thrown into the air, with the influence of gravity. This paper explores the principles of projectile motion through an analysis and a live, interactive simulation. The mathematical equations that give the trajectory of a projectile are derived and explained. Additionally, to reinforce understanding, a web-based projectile motion simulator is presented, allowing users to adjust initial parameters like angle, velocity, and height to visualize the resulting projectile motion. By combining conceptual explanations with an interactive simulation, this paper aims to provide a comprehensive introduction to projectile motion.

1. Introduction

Projectile motion is a fundamental concept in physics, with applications in various fields, such as engineering, sports, and physics. You use projectile motion every time you kick a soccer ball, watch fireworks, or throw a pen for a friend to use.

Yet, despite its importance, projectile motion can be challenging to comprehend without visualization, especially for first-time students. The effects of initial velocity, constant acceleration, and so many other variables can be difficult to grasp with just static diagrams and equations.

To address this learning curve, this project creates an easy way for students to visualize and compare how different variables affect the curves of objects in projectile motion.

2. Computation and Math

tech used

    equations and their parts in code

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3. Demo

You can view a live demo of the app at `https://apcalc.jyao.dev/`.

Play around, edit variables, and have fun!

You can watch a video of the demo working here: `todo`.

If you're interested, you can view the code as a GitHub Repository here: `todo`.

4. Conclusion

Going into this project with no knowledge of projectile physics, learning the physics and math, and finally developing a simulation app was a really interesting journey that I would not have taken outside of this project. I learned a lot, and I was able to create a fully functional project while having fun.