

Elementary Physics Visualization App

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Overview

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 - Projectile Motion
 - Cyclotron Motion
 - Particles in a Box
 - Schrodinger's Barrier

Abstract

The aim of the project is to simulate interactively basic elementary physics problems using a GUI to show animations according to the inputs received.

List of problems simulated

After consideration from the previous round of scrutiny, we've decided and simulated the following problems to be shown on the GUI according to the inputs of the user.

- Projectile Motion
- Cyclotron motion
- Particles in a box under gravity.
- Schrodinger's barrier break problem

Brief Description

- Projectile Motion

User inputs are initial velocity, angle of projection with the horizontal, acceleration due to gravity which is set to a default value of 9.81, number of time step divisions which is set to a default of 1000.

The output of this will be an animation displayed on the User Interface showing the evolution of path of the particle until it hits the horizontal level.

Brief Description

- Cyclotron Motion

User inputs are time step length , time of the simulation, charge of the particle set to default of 5, mass set to default of 10, Electric field in the x-y plane set to default of 0 in both directions, Initial magnetic field at the initial point in z-direction set to default of 1, initial position set to default at origin, initial velocity 10^4 in x-direction and ∇B in both x and y directions of the z-component of the magnetic field. The constraints are imposed as we are doing the simulation only in two dimensions.

The output will be an animation displayed on the user interface showing the path of the particle for the specified time given.

Brief Description

- Particles in a Box

User inputs are number of particles, each particle's initial position inside the box, each particle's initial velocity.

The output will be an animation displayed on the user interface showing the path of the particles which move under gravity and collide with each other elastically.

Brief Description

- Schrodinger's Barrier

Here, there is not much of a user input but the inputs that can be varied by the user are the barrier height, input wave function. The output is the animation showing the variation in position-space wave function and momentum-space wave function.