**2D Projectile:**

The differential equations of motion for a projectile in two dimensions are:

We apply Euler method:

We convert to numerical form:

Where and are the initial position in the x and y direction. and are the initial velocity in the and direction. Before getting the updated positions and , the velocities need to be calculated first using:

Where is the gravitation acceleration constant, and is the time step size.

**2D Projectile with Drag and Altitude effect:**

When drag is accounted for in projectile motion, drag terms are added to the velocity equations:

Where:

Where is the drag coefficient, is the medium density, and is the current velocity in the and direction, is the mass of the projectile, is pressure at sea level, and:

Where is the Lapse Rate, is the current height, is the temperature at sea level, and = 2.5.

**3D Projectile:**

The differential equations of motion for a projectile in three dimensions are:

We apply Euler method:

We convert to numerical form:

Before getting the updated positions, the velocities need to be calculated first using:

Where is the gravitation acceleration constant, and is the time step size.

**3D Projectile with Drag and Altitude effect:**

When drag is accounted for in projectile motion, drag terms are added to the velocity equations:

Where:

Where is the drag coefficient, is the medium density, , are the current velocity in the , , and direction, is the mass of the projectile, is pressure at sea level, and:

Where is the Lapse Rate, is the current height, is the temperature at sea level, and = 2.5.

**2D Initial Input:**

For two dimensions projectile, the user inputs an initial velocity with an angle , that is the angle from the x-axis, from which and are obtained using the following equations:

**3D Initial Input:**

For three dimensions projectile, the user inputs an initial velocity with an elevation angle , that is the angle up from xy-plane, and a bearing angle , that is the angle from the x-axis. From which the velocity equations are obtained: