Simulation of Projectile Motion using Simulink

February 9, 2019

1 Introduction

This paper consists a simulation of a cricket ball undergoing projectile motion. It is given some initial velocity v at an angle θ where the initial coordinates are $(x, y) = (0, 0)$. Only the gravitational force acts on the body.

2 Equations

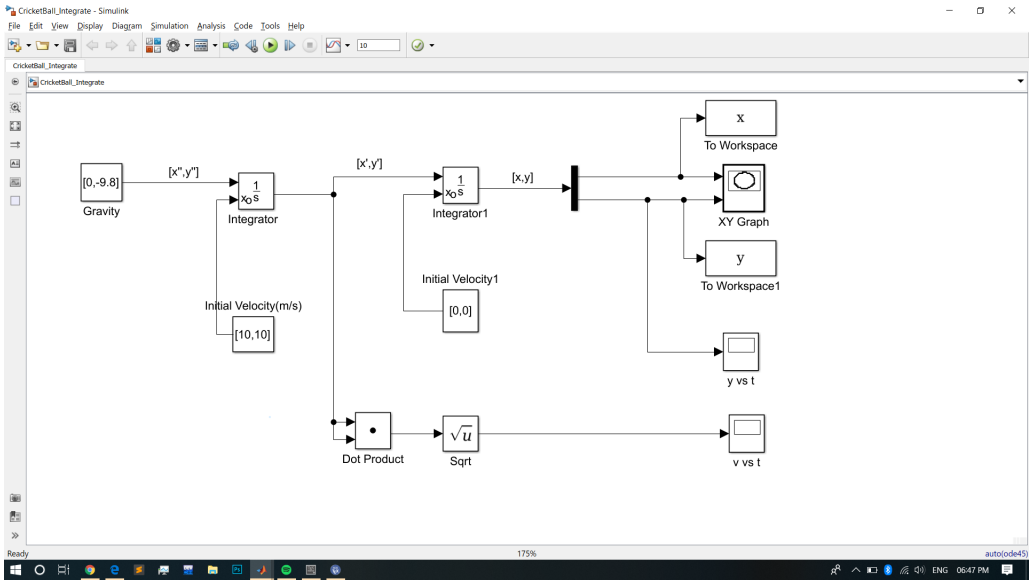
Since there is no force acting in x direction so by Newton's Equations of motion

$$M\frac{d^2x}{dt^2} = 0 \qquad ...(1)$$

There exists a gravitational force in negative y direction of magnitude Mg, by Newton's Equations of motion

$$M\frac{d^2y}{dt^2} = -Mg \qquad ...(2)$$

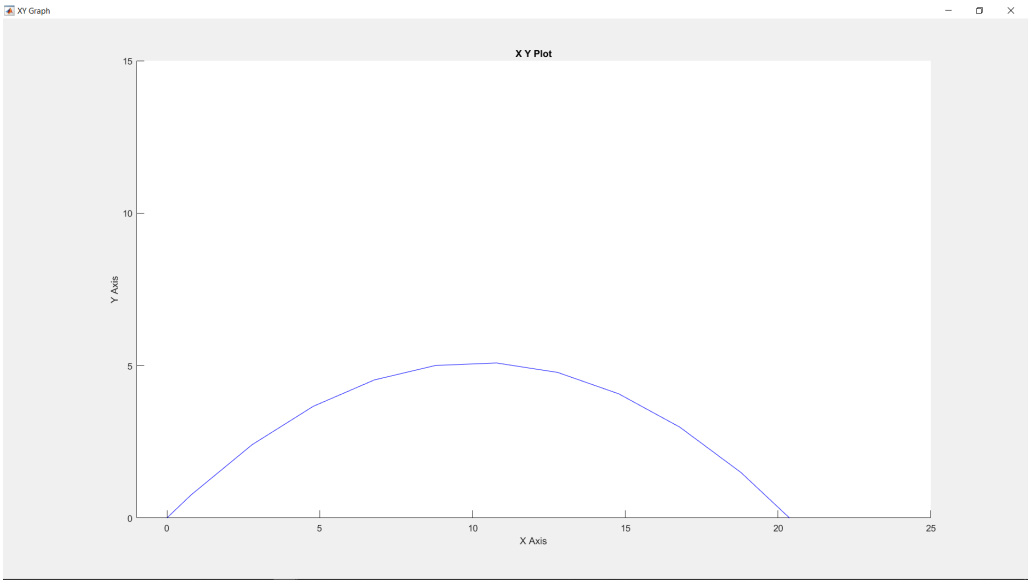
3 Simulink Diagram



3.1 Initial Conditions

Initial velocity $v = 10\sqrt{2} m/s$
Angle of Projection $\theta = 45°$
Initial Coordinates $x = 0, \quad y = 0$

4 Integration Results



From Equations (1) and (2) we get,

$$x = u_x t$$

$$y = u_y t - \frac{1}{2} g t^2$$

where, u_x and u_y are horizontal and vertical component of Initial velocity u respectively.

5 Trajectory Figure