Report for round 2

Task 1.1 animation of rolling disk:

In case of rolling distance travelled by centre of disk and some point on the rim of the disk is same.

Which is:

$$d = r\theta$$

Where d is distance travelled

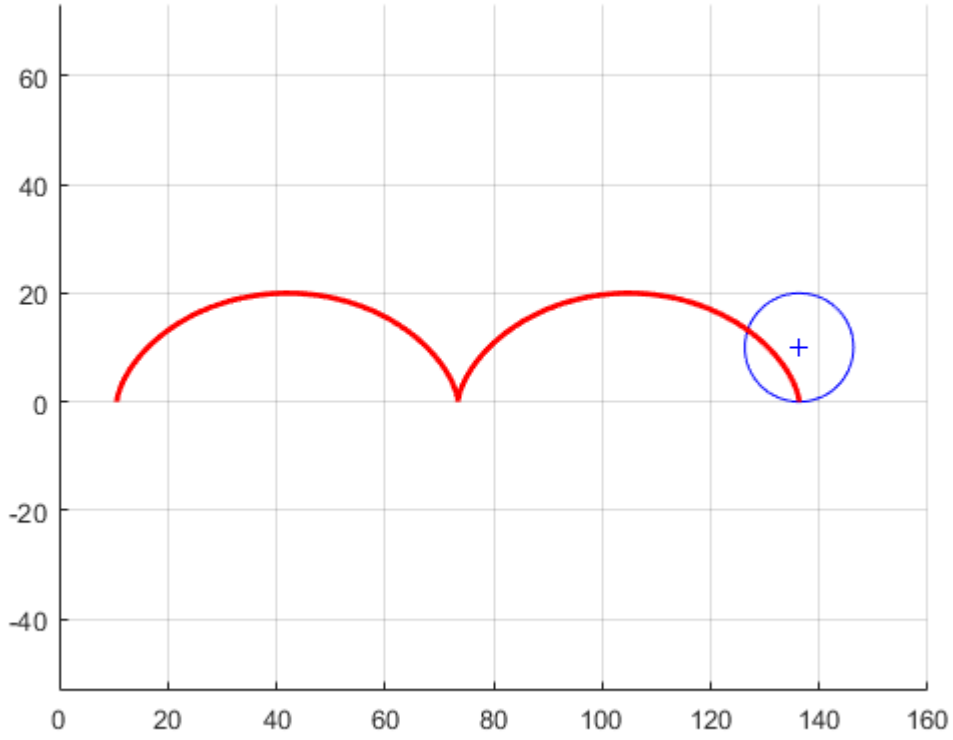
r is radius of disk

and Θ is angle made by radius to x axis which passes through selected point

Equation of circle:

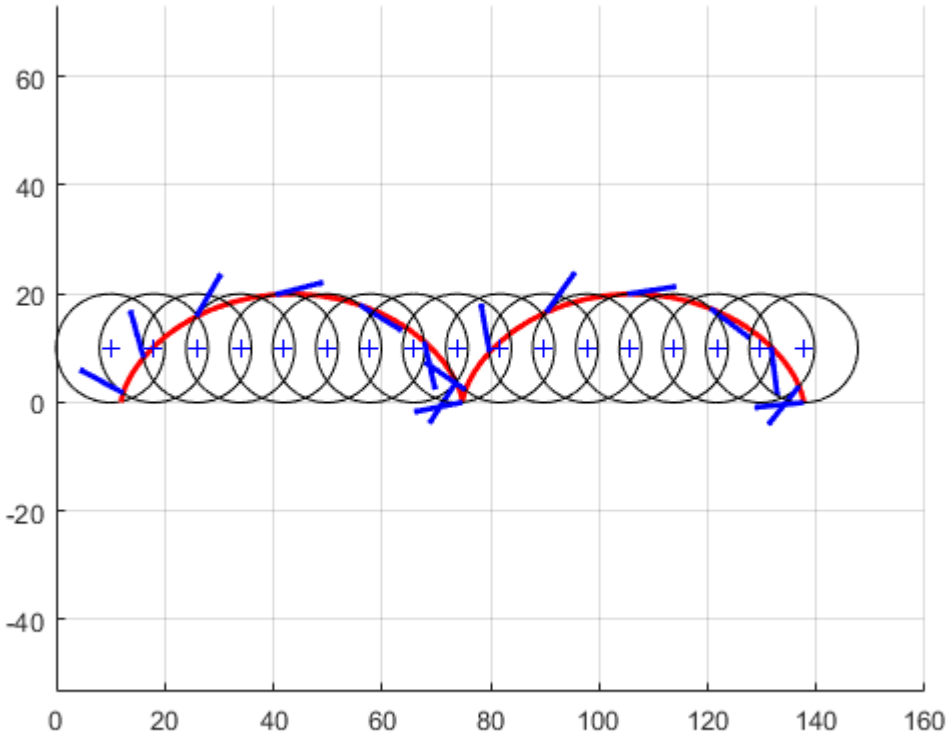
$$x = rcos\theta$$

$$y = rsin\theta$$



Task 1.2 Static plot for Rolling disk:

In this case we need to generate static plot for motion of rolling disk. So we will plot disk in some steps many times and show velocity vector using quiver command.



Task 2 Un-damped spring-mass system of n-degrees of freedom

We need to calculate 7th natural frequency for this system.

General equation of the system:

$$M\frac{dx}{dt} + Kx = 0$$

Where M=mass matrix for the system

x=displacement vector

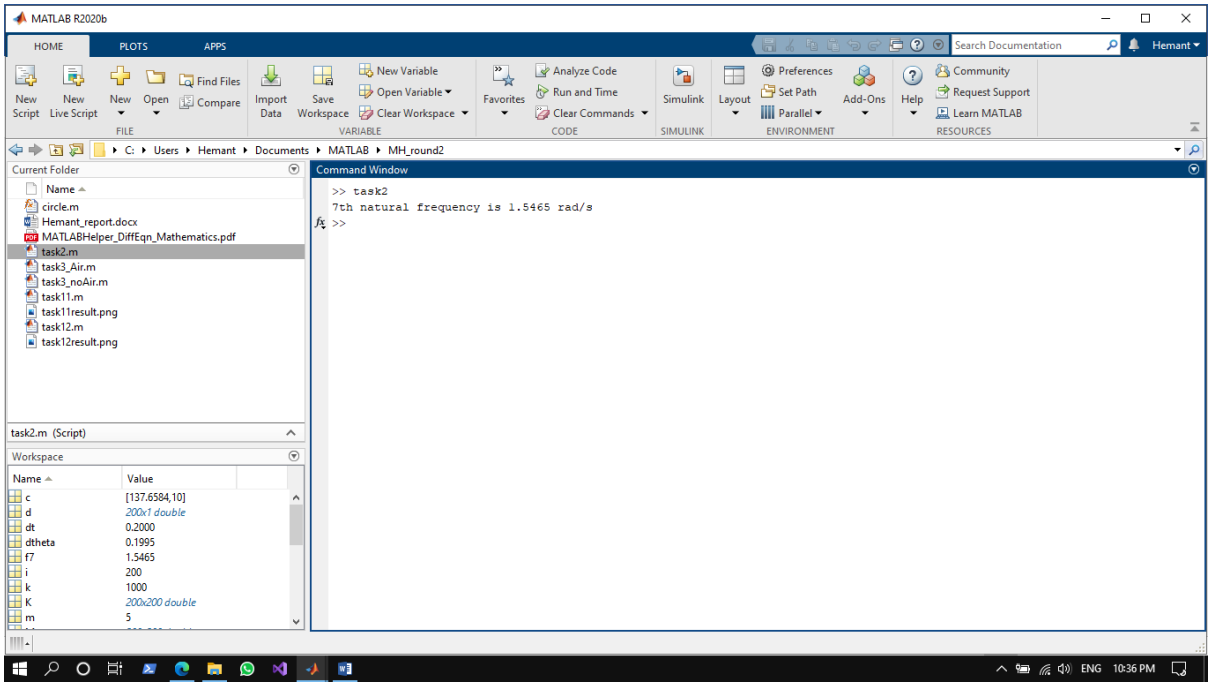
K=stiffness matrix

Then we need to calculate eigen values for this system

And so nth natural frequency is:

$$\omega_n = \sqrt{\epsilon_n}$$

Symbol in square root is nth eigen value



Task 3 Dropping of ball on inclined surface:

I used basic equations of motion:

$$a = \frac{dv}{dt}$$

$$v = \frac{dx}{dt}$$

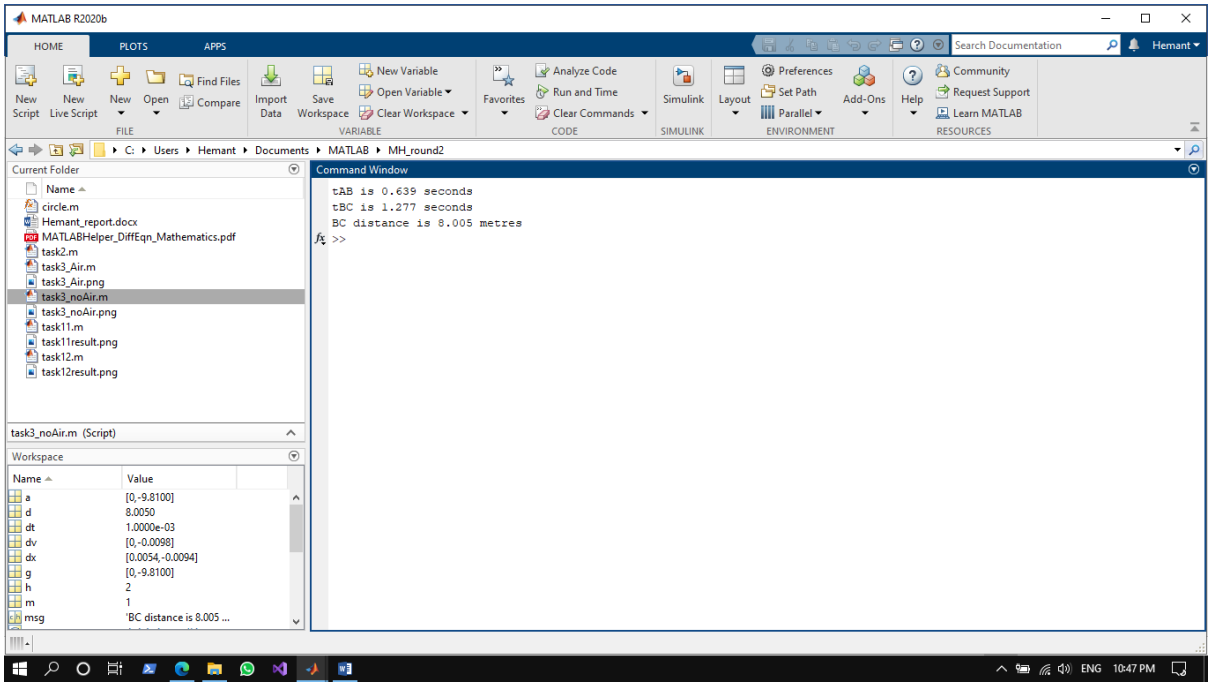
Assumption made:

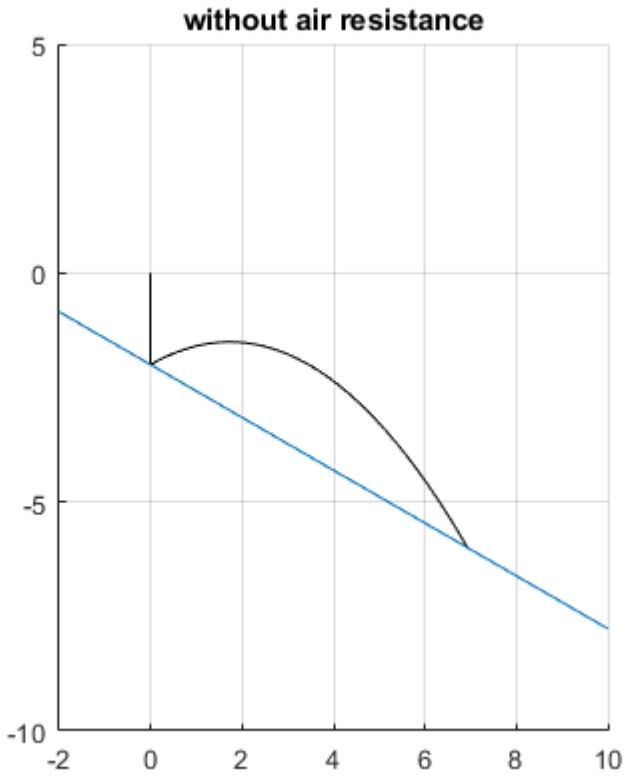
Mass of the ball is 1 kg

In first case acceleration is constant but in case of air resistance another acceleration due to drag which is not constant and acts in opposite of motion adds up.

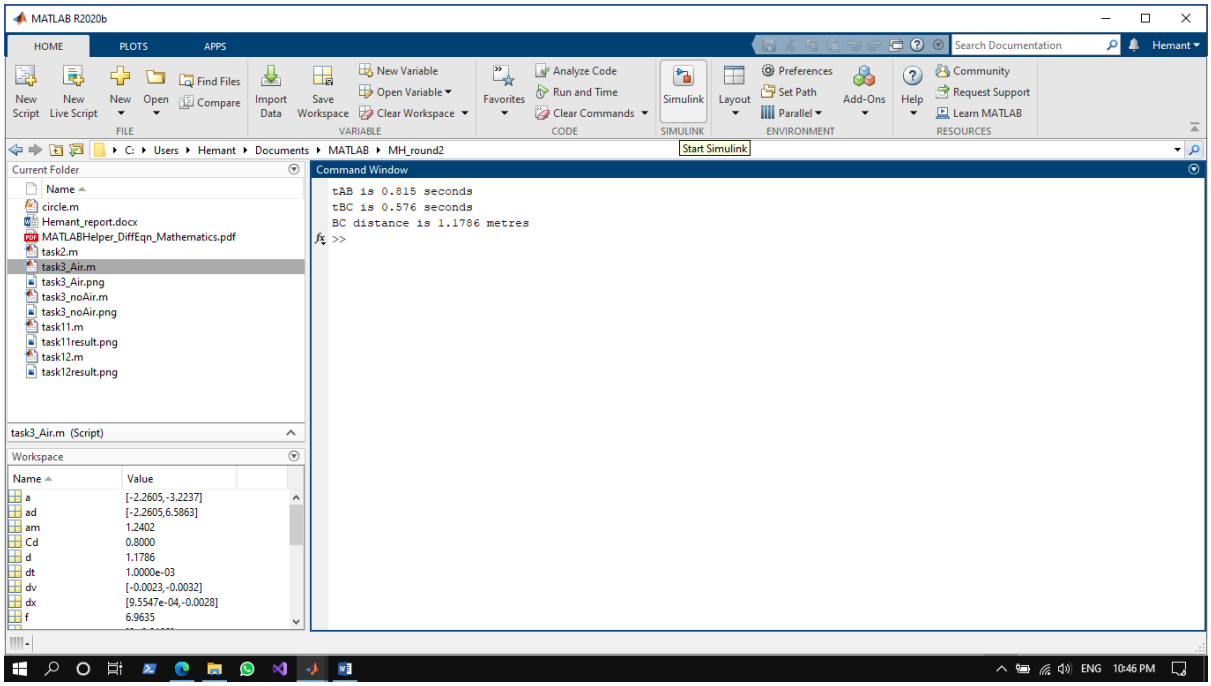
I solved equations using iterative method.

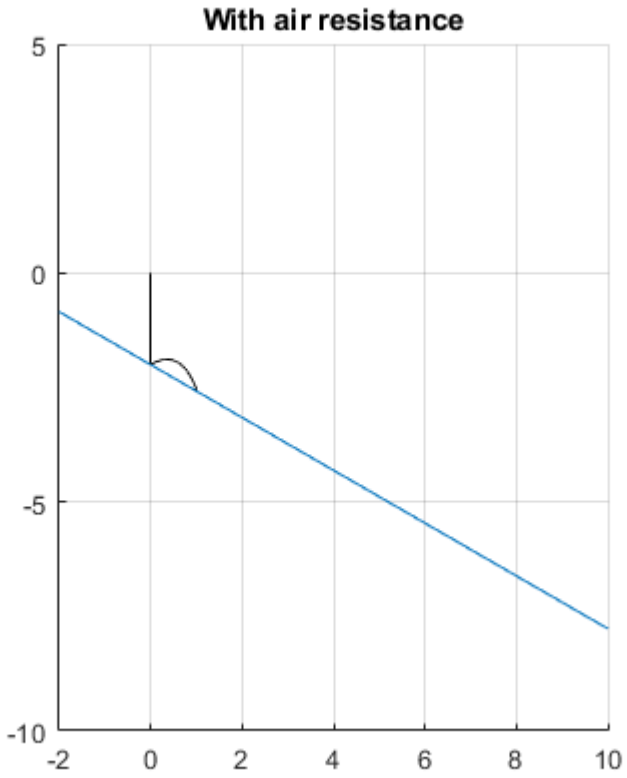
Without air resistance:





With air resistance:





Reference:

1. MATLAB documentation