BS PHYSICS-02

COMPUTATIONAL PHYSICS

ASSIGNMENT # 3

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Group Members:

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Observation:

In this projectile we have seen the maximum distance covered by the projectile. There are two projectiles plotted one with drag(air) and second without drag force. The output analytical data set suggests the maximum distance covered by the projectile is at an angle of 45° and is 50,00wherease as the drag force of air restricts the distance covered which is near to 22000 at an angle of 40°.

The graph for Drag force projectile and without drag force projectile clearly shows the difference that how projectile motion is affected by drag(air).

(Codes and output graphs are attached with file)

Plt file for Projectile without Drag(air):

```
########################
set term postscript landscape enhanced color "Text" 16
#set term postscript eps enhanced color solid "Text" 16
#set term postscript portrait enhanced color "Text" 16
#set size 6.0/7.0, 6.0/10.0
set output 'Trajectory.ps'

set zeroaxis
#set grid
set pointsize 1.0
#set mxtics 5
#set mytics 5

########################
set xlabel 'x(m)'
set ylabel 'y(m)'
set title 'Projectile without Drag(Air)'
#set logscale y 10.0
set key top right

set style line 1 lt 1 lw 1.9 pt 3 lc rgb "red"
set style line 2 lt 1 lw 1.4 pt 5 lc rgb "green"
set style line 3 lt 1 lw 1.3 pt 1 lc rgb "blue"
set style line 4 lt 1 lw 1.2 pt 6 lc rgb "black"
set style line 5 lt 1 lw 1.7 pt 7 lc rgb "magenta"
set style line 6 lt 1 lw 1.7 pt 1 lc rgb "brown"
```

```
set style line 7 lt 1 lw 1.7 pt 1 lc rgb "purple"

set key font ",10"
#set origin 0.0,0.5
plot [0:55000] [0:25000] 'trajectory(30).dat' u 1:2  t 'Angle = 30' w l ls 1,\
        'trajectory(30).dat' every 360 u 1:2 notitle w p ps 1,\
        'trajectory(35).dat' u 1:2  t 'Angle = 35' w l ls 2,\
        'trajectory(35).dat' every 360 u 1:2 notitle w p ps 1,\
        'trajectory(40).dat' u 1:2  t 'Angle = 40' w l ls 3,\
        'trajectory(40).dat' every 360 u 1:2 notitle w p ps 1,\
        'trajectory(45).dat' u 1:2  t 'Angle = 45' w l ls 4,\
        'trajectory(45).dat' every 360 u 1:2 notitle w p ps 1,\
         'trajectory(50).dat' u 1:2  t 'Angle = 50' w l ls 5,\
        'trajectory(50).dat' every 360 u 1:2 notitle w p ps 1,\
        'trajectory(55).dat' u 1:2  t 'Angle = 55' w l ls 6,\
        'trajectory(55).dat' every 360 u 1:2 notitle w p ps 1,\
        'trajectory(60).dat' u 1:2  t 'Angle = 60' w l ls 7,\
        'trajectory(60).dat' every 360 u 1:2 notitle w p ps 1,\

#set nologscale x
set nologscale y
#########################################################
quit
########################
########################
```

Plt file for Drag(air) Projectile:

```
########################
set term postscript landscape enhanced color "Text" 16
#set term postscript eps enhanced color solid "Text" 16
#set term postscript portrait enhanced color "Text" 16

#set size 6.0/7.0, 6.0/10.0

set output 'Drag Projectile.ps'
set zeroaxis
#set grid
set pointsize 1.0
#set mxtics 5
#set mytics 5
```

```
########################
set xlabel 'x(m)'
set ylabel 'y(m)'
set title 'Projectile with Drag(Air)'
#set logscale y 10.0

set key top right

set style line 1 lt 1 lw 1.9 pt 3 lc rgb "gold"
set style line 2 lt 1 lw 1.4 pt 5 lc rgb "cyan"
set style line 3 lt 1 lw 1.3 pt 1 lc rgb "plum"
set style line 4 lt 1 lw 1.2 pt 6 lc rgb "khaki"
set style line 5 lt 1 lw 1.7 pt 7 lc rgb "light-red"
set style line 6 lt 1 lw 1.7 pt 1 lc rgb "olive"
set style line 7 lt 1 lw 1.7 pt 1 lc rgb "grey"

set key font ",10"
#set origin 0.0,0.5
plot [0:25000] [0:14000] 'Dtrajectory(30).dat' u 1:2  t 'Angle = 30' w l ls 1,\
        'Dtrajectory(30).dat' every 360 u 1:2 notitle w p ps 1,\
        'Dtrajectory(35).dat' u 1:2  t 'Angle = 35' w l ls 2,\
        'Dtrajectory(35).dat' every 360 u 1:2 notitle w p ps 1,\
        'Dtrajectory(40).dat' u 1:2  t 'Angle = 40' w l ls 3,\
        'Dtrajectory(40).dat' every 360 u 1:2 notitle w p ps 1,\
        'Dtrajectory(45).dat' u 1:2  t 'Angle = 45' w l ls 4,\
        'Dtrajectory(45).dat' every 360 u 1:2 notitle w p ps 1,\
        'Dtrajectory(50).dat' u 1:2  t 'Angle = 50' w l ls 5,\
        'Dtrajectory(50).dat' every 360 u 1:2 notitle w p ps 1,\
        'Dtrajectory(55).dat' u 1:2  t 'Angle = 55' w l ls 6,\
        'Dtrajectory(55).dat' every 360 u 1:2 notitle w p ps 1,\
        'Dtrajectory(60).dat' u 1:2  t 'Angle = 60' w l ls 7,\
        'Dtrajectory(60).dat' every 360 u 1:2 notitle w p ps 1,\



#set nologscale x
set nologscale y
#########################################################
quit
########################
########################
```