TPN Problem(pg-174 NPTEL)

1 Parameters :

- V_{P0} = 400m/s
- V_{P0} = 0.6*400 = 240 m/s
- α_{T0} = 60deg
- θ_0 = 30deg
- R_0 = 7000 m;
- X_{T0}= R0*cos(θ_0)
- Y_{T0}= R0*sin(θ_0)
- X_{P0}= 0
- Y_{P0} = 0

2 Simulation settings:

- Ode Solver:ode45(RK4 with Variable time step)
- Maximum Allowed time step = 0.05Secs
- Termination condition: R<R_tolerance or time > Max_allowed_time

3 Tested Initial conditions:

Simulation was done for 4 test cases

1. Maneuvering Target with $\alpha_{p0} = 10deg$
2. Maneuvering Target with $\alpha_{p0} = 85deg$
3. Non-Maneuvering Target with $\alpha_{p0} = 10deg$
4. Non-Maneuvering Target with $\alpha_{p0} = 85deg$

4 Range variation with time

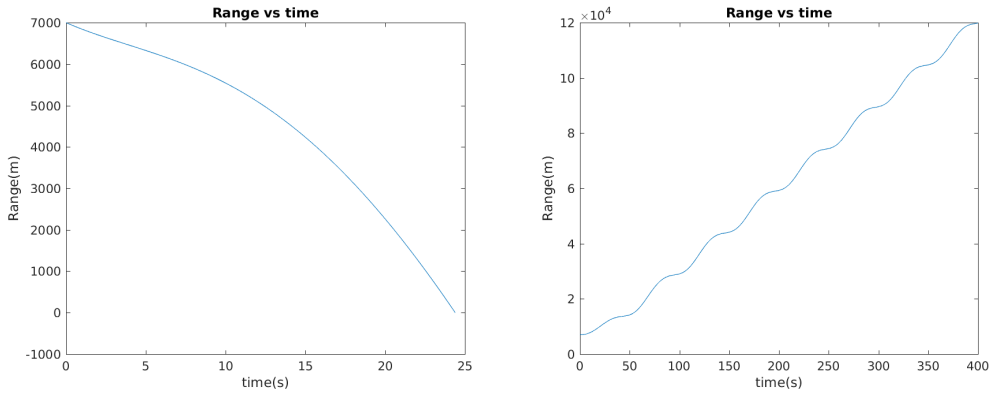

Figure 1: Maneuvering Target; $\alpha_{p0} = 10deg$(left);$\alpha_{p0} = 85deg$(right)

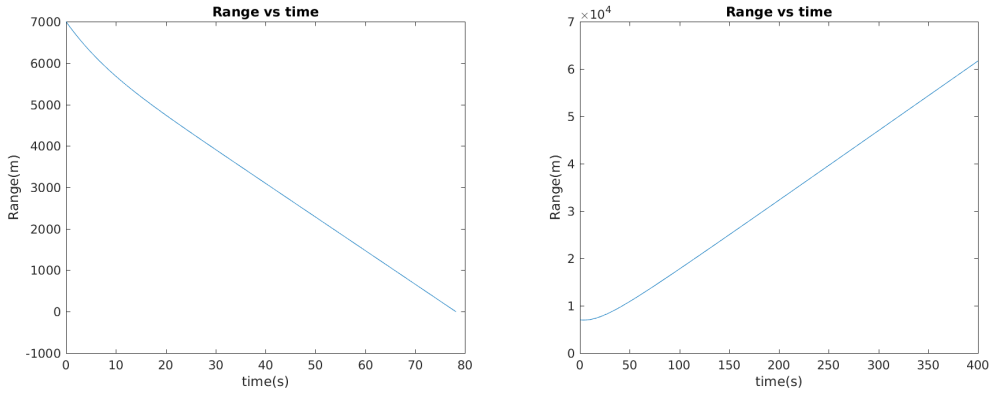

Figure 2: Non-Maneuvering Target; $\alpha_{p0} = 10deg$(left);$\alpha_{p0} = 85deg$(right)

5 Trajectories

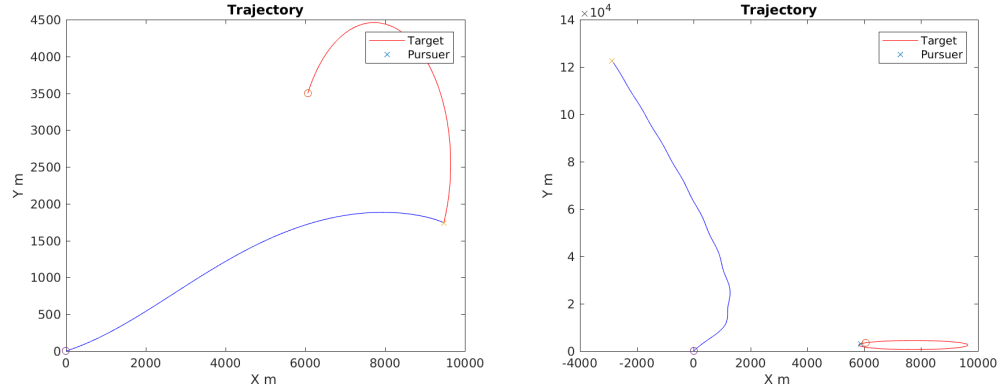

Figure 3: Maneuvering Target; $\alpha_{p0} = 10deg$(left);$\alpha_{p0} = 85deg$(right)

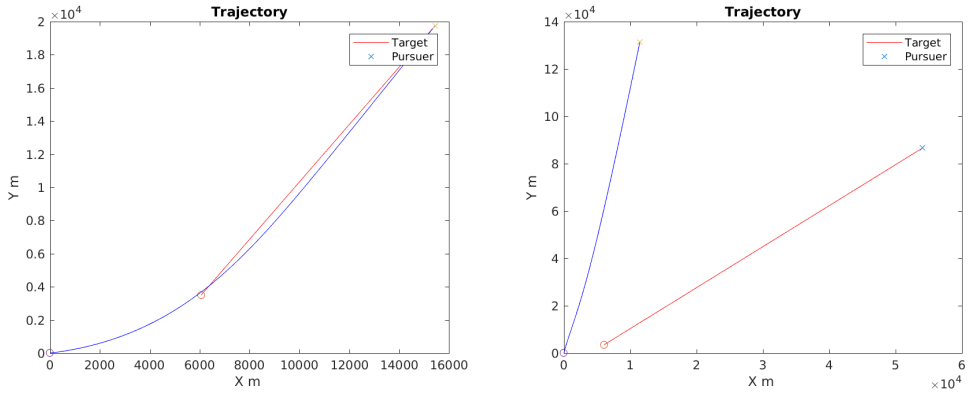

Figure 4: Non-Maneuvering Target; $\alpha_{p0} = 10deg$(left);$\alpha_{p0} = 85deg$(right)

6 Acceleration Required versus time

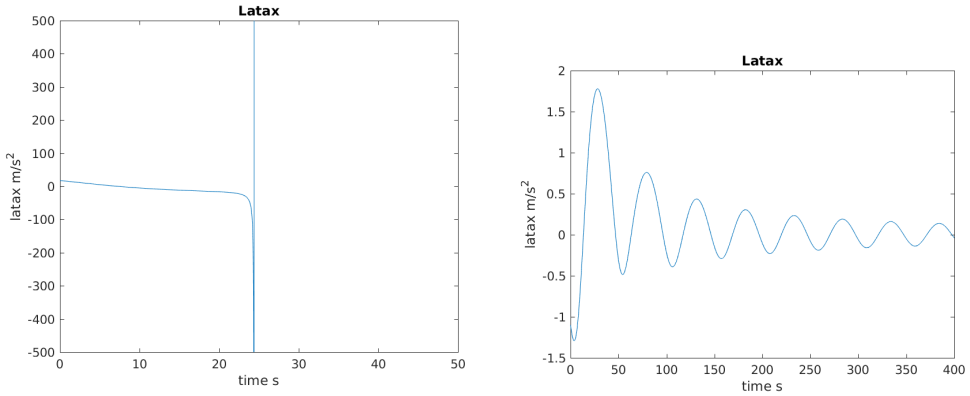

Figure 5: Maneuvering Target; $\alpha_{p0} = 10deg$(left);$\alpha_{p0} = 85deg$(right)

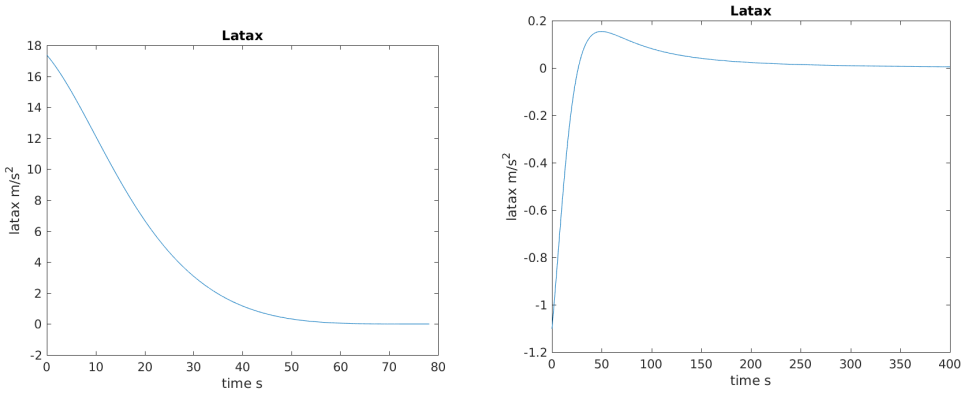

Figure 6: Non-Maneuvering Target; $\alpha_{p0} = 10deg$(left);$\alpha_{p0} = 85deg$(right)

7 V_R vs V_θ

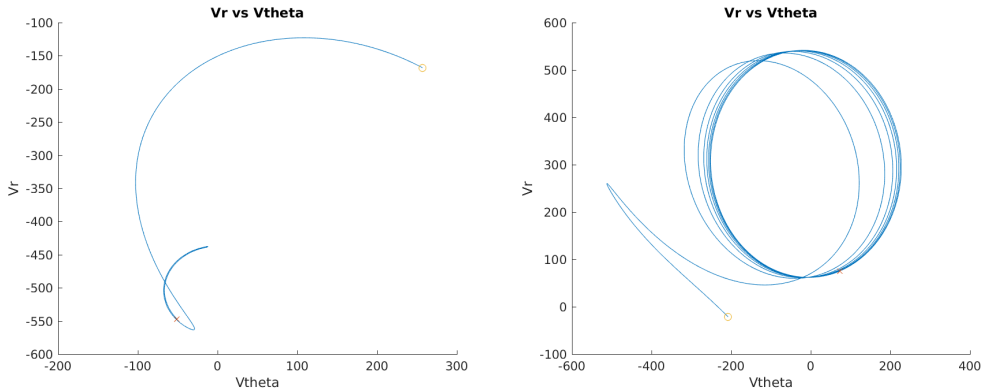

Figure 7: Maneuvering Target; $\alpha_{p0} = 10deg$(left);$\alpha_{p0} = 85deg$(right)

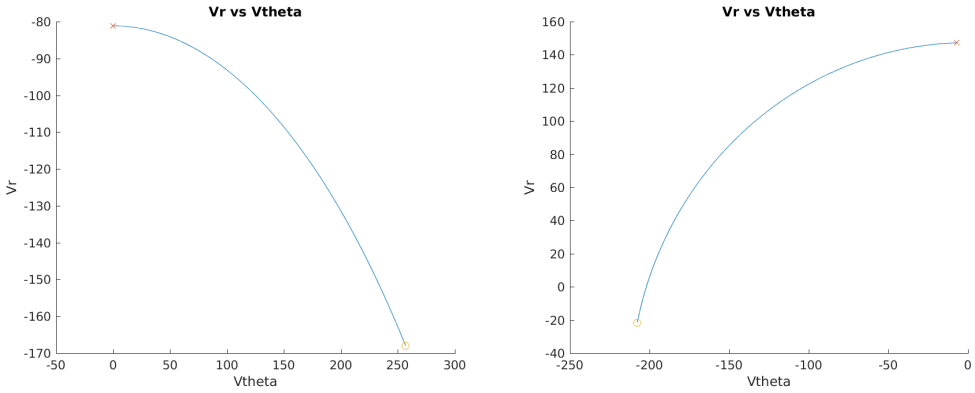

Figure 8: Non-Maneuvering Target; $\alpha_{p0} = 10deg$(left);$\alpha_{p0} = 85deg$(right)