Assignment 5

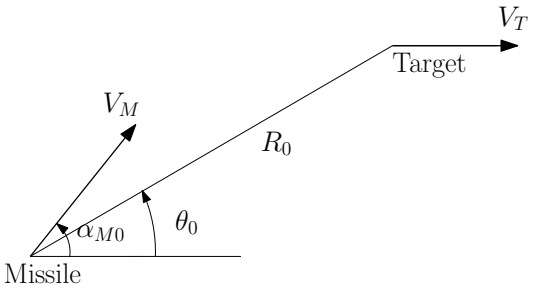
AE 271: Guidance Theory and Applications, Jan-April 2020

Due: April 19, 2020

Problem 1: Consider a missile intercepting a non-maneuvering target with an initial engagement geometry as shown in Fig. 1. Use PPN guidance law with $N = 3,\ 5,\ 10$ and simulate engagements for $\alpha_{m0} = 0^\circ$ and $\alpha_{\mathrm{m0}} = 60^\circ$. Plot the following quantities

1. Trajectories with LOS shots
2. Lateral acceleration profile a_M
3. $V_\theta - V_R$ trajectories
4. R, α_m, θ and $\dot{\theta}$ variation

and note the miss-distance values.



$R_0 = 10000$ m, $\theta_0 = 60^\circ, \alpha_{T0} = 0^\circ,\ V_T = 300$ m/s, $V_M = 500$ m/s

Figure 1: Initial Engagement Geometry: Problem 1

Problem 2: Consider the engagement geometry as shown in Fig. 2 wherein the missile uses PPN guidance law against the stationary target. Simulate engagements for $N = 1,\ 2\ , 3$ and plot

1. Trajectories
2. Lateral acceleration profile a_M
3. $\alpha_m,\ \theta,\ \dot{\theta},\ \sigma,\ R$ variation

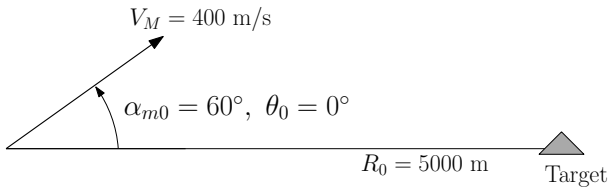


Figure 2: Initial Engagement Geometry: Problem 2

Note down miss-distance and impact angles. Give comparative remarks.

Problem 3: Simulate Case 1 and Case 2 from the title"Impact Angle Constrained Interception of Stationary Targets". Ignore the comparative results given in the paper.

Problem 4: Simulate Case 1 and Case 2 from the paper titled "Nonswitching Guidance Law for Trajectory Shaping Control".

Problem 5: Repeat Problems 3 and 4 for realistic missile model.