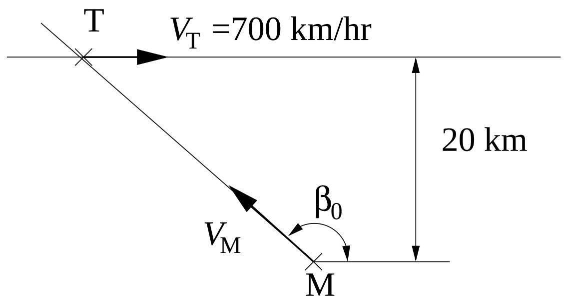
AE 457/641 – Navigation and Guidance

Tutorial 5, October 18, 2007

1. A missile uses pursuit guidance to intercept a target moving at a constant speed along a straight line. The figure below shows the geometry at the start of the engagement.

   Assuming $\gamma = 1.8$, use MATLAB to plot trajectories of the missile in the x-y plane upto intercept for $\beta_0 = 150°, 120°, 90°, 60°$ and $30°$. Plot the LATAX as a function of time for each value of β_0. Plot the intercept time as a function of β_0. (**Talvinder Singh (04D01002)** + partner)

2. For the missile engagement describe above, assume $\beta_0 = 150°$, and use MATLAB to plot trajectories of the missile in the x-y plane upto intercept for $\gamma = 1.2, 1.4, 1.6, 1.8$. Plot the LATAX as a function of time for each value of γ. Plot the intercept time as a function of γ. (**Nirmala Uppu (04001012)**+ partner)

3. Show that a missile pursuing a straight moving target along an ideal pursuit trajectory with $\gamma \in (1, 2)$ experiences the maximum LATAX either at the intial time or at the time at which the closing velocity equals half the missile velocity. Find the maximum value of LATAX required in terms of the initial range, LOS angle, and γ. (**Abhinav Dudi (04001007)**+partner)

4. For the engagement described in problem 1 above, calculate the maximum LATAX required if $\gamma = 1.4$ and $\beta_0 = 150°$. Use MATLAB to plot the trajectory of the missile that results if the maximum LATAX that the missile can generate is only 70% of the maximum required. For the sake of comparison, on the same figure plot the ideal pursuit trajectory for the same initial conditions. (**Tanu Priya (04D01018)** + partner)