Waypoint Guidance Logic for Cessna 172

Design Method

I used the L1 Guidance algorithm to provide smooth and stable navigation along a fixed path. The desired heading was computed based on a lookahead point, or L1 Distance, ahead of the aircraft along the flight path.

By using the L1 Distance, I was able to project a lookahead circle centered on the current position with radius L1, find the intersection between this circle and the path segment, and then command a heading to guide the aircraft to orbit towards that lookahead point.

Below, I have the waypoints I used to guide the aircraft to and an image of the simulation of the flight trajectory. Please also see the the 6DoF model I made in Simulink to produce position, velocity, and heading outputs for this simulation.

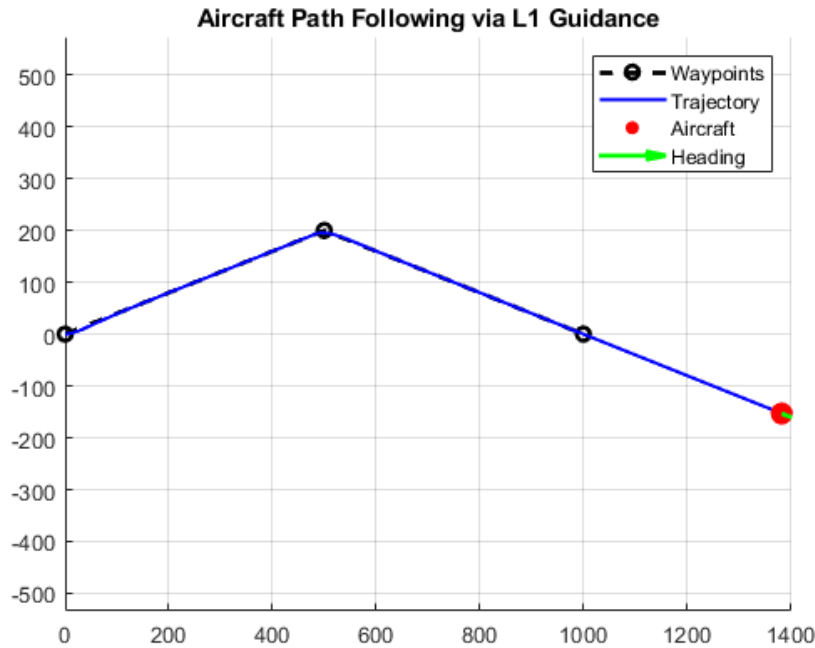$$Waypoints = \begin{bmatrix} 0 & 0 \\ 500 & 200 \\ 1000 & 0 \end{bmatrix}$$
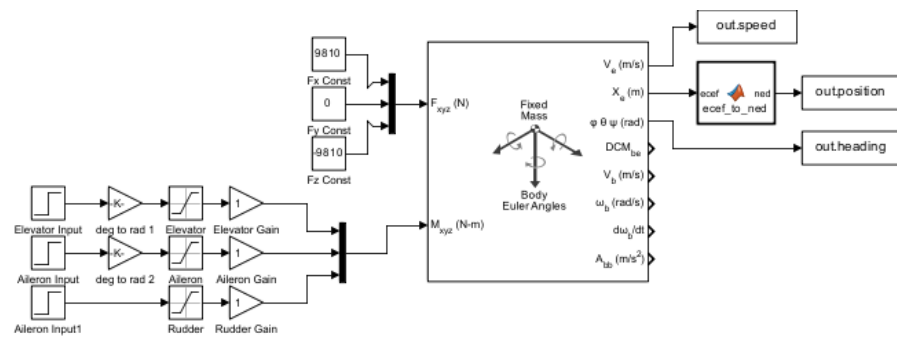

Figure 1: Visualization of simulated flight trajectory path.

Figure 2: Final 6DoF Simulink Model.