

ABSTRACT

With the exponential growth rate of Unmanned Aerial Vehicles (UAVs) for civilian uses, air navigation and safety topics are brought up. In the analysis of air navigation and safety in terms of internal and external factors, a trajectory analysis must be conducted. Trajectory analysis is carried out by running numerical simulations of a vehicle's flight, considering all the vehicle's properties, the external environment, and relevant physical forces.

This research focuses on analyzing the trajectory perturbation caused by internal and external factors of a Quadcopter UAV using a Software-in-the-Loop (SITL) simulation. This research uses ArduCopter as the autopilot simulation, MAVLink as the primary Ground Control System (GCS) and QGroundControl as the secondary (GCS). This study aims to find the most significant parameters that would change a Quadcopter's trajectory in successfully maneuvering the figure-8 flight pattern. The parameters that this research analyzes consist of the changes in airspeed, wind speed and wind heading.

In summary, the calculated distance error increases significantly to the airspeed and wind speed changes. On the other hand, the changes of the wind heading parameter shows less significance to the flight trajectory perturbation.

Keyword: Unmanned Air Vehicle, Trajectory Analysis, Software in the Loop (SITL), Simulation.