

Stability Analysis of Multirotor Drone with Water Jet Payload

N.M.Azrin^{1,3}, D.Nafiz^{1,4}, S.A.C.Ghani¹, A.F.Yusop¹, M.A.Hamidi¹ and M.A.H.Rasid²

¹Faculty of Mechanical & Automotive Engineering Technology, Universiti Malaysia Pahang, 26600 Pekan, Pahang,

²Faculty of Manufacturing & Mechatronic Engineering Technology, Universiti Malaysia Pahang, 26600 Pekan, Pahang,

*Corresponding author: ¹nik.azrin496@gmail.com, ²daingnafiz@ump.edu.my

Abstract

Multirotor stability is achieved when all rotors generate equal thrust to stay hovering and throttle mode. It's required the control system algorithm for propulsion speed adjustment, which is related to translational vector and rotation angle. Even with external disturbance, control system algorithm can adjust tilting angle to stabilize quadcopter. Therefore, this study focuses on developing quadcopter with waterjet system and datalogging to analyse the flight stability. It is developed with quadcopter configuration and integrating waterjet nozzle as a payload. The process includes frame development, propulsion sizing, speed calibration for each rotor, trim calibration, and a proportional integral derivative (PID) control tuning. For data collecting, copter is equipped with data storage to store flight log in form off log file. Quadcopter is test flight outdoor to embraced wind factor. The data logger shows quadcopter tilting at certain angle cause by external forces created by waterjet.

Keywords: Stability analysis; Attitude tracking; External disturbance.