

ABSTRACT

In this era, Unmanned Air Vehicle (UAV) is growing. However, there are still weaknesses in using UAVs to carry out certain missions. One of the major problems is the energy and power required to use the UAV. This problem impacts the range, speed, and most importantly, the endurance or flight time the UAV can hover.

This thesis focuses on calculating the endurance of a UAV quadcopter named Marsha Noir Quadcopter UAV. This study aims to estimate the longest endurance or flight time that can be achieved in hovering conditions through propeller. Start by calculating the thrust generated by four types of propellers using Blade Element Theory (BET) [14] and ends by calculating endurance [12]. In addition, the author also tries to find which configuration will produce optimal endurance with two approaches by changing the propeller parameter, which is the twist angle and the Li-Po battery cells. The first approach is to find the new twist angle. The second approach is grouping based on the best battery cells which can produce the longest endurance.

The first approach shows that the APC 1238 Propeller with 9.70748 degrees of twist angle combined with battery 6S can produce the longest endurance compared to other propellers tested in this thesis. The quadcopter can fly for approximately 7 minutes 28 seconds in hovering flight conditions. The second approach shows that APC 1147, combined with battery 6S, the drone can hover for 7 minutes 56 seconds.

Keyword: Blade Element Theory, Twist Angle Variation, Thrust Calculation, Endurance Calculation, UAV Propeller, Hovering Flight.