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Analysis and Simulation of Unmanned Aircraft Propeller Motor Using PSIM

Abstract- The study and simulation of a PI speed controller for small UAV or quadcopter motor is discussed in this research. The motor under consideration is MAXON 2260 215, which is a brushless DC motor that has permanent magnets on the rotating part and the stationary windings are connected so that the back electromotive force is trapezoidal. The motor utilizes a PI controller, which dominates the duty cycle of the PWM pulses applied on the switches of the inverter so that the motor can run at the required speed. A Chopper is used as a power converter and a proportional–integral as speed and current controller. The DC motor, which is being run individually, can be controlled on a wide range of operation up to the rated speed. The simulation is implemented and evaluated using PSIM software program under a wide range of speed, voltage and load torque inputs such as the rated speed and load torque, half the rated load torque and half speed since these tests are vital to test maneuver movement such as roll, pitch, yaw and throttle. The main objectives of this paper are; to understand the process of deriving the model for a propeller motor, to evaluate the stability and accuracy of the control loop for successful aviation, to apply a tuning plan on a closed loop system (PI) and to check the system procedure versus the given technical specifications.

Keywords- PSIM, quadcopter, Propeller, PWM, PI, Motor, simulation

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