

ABSTRAK

Pemanfaatan energi angin merupakan pemanfaatan energi terbarukan yang paling berkembang belakangan ini, seperti turbin angin sumbu *horizontal* tipe tiga bilah spiral. Turbin angin sumbu *horizontal* tipe tiga bilah spiral menggunakan gaya *lift* dan *drag* untuk menggerakkan bilah turbin dengan memanfaatkan energi kinetik angin. Tujuan dari penelitian ini antara lain dapat mengetahui kinerja TASH model tiga bilah spiral, melalui *wind tunnel* dengan menilai parameter terukur yaitu kecepatan putaran poros (rpm), tegangan (Volt), arus (Amp), nilai torsi (Nm), serta mengkaji hasil uji TASH terhadap nilai parameter tidak terukur yaitu koefisien daya C_p , koefisien torsi C_t dan *Tip Speed Ratio* (TSR). Metode dilakukan dengan uji eksperimen menggunakan *wind tunnel* pada variasi kecepatan angin antara 1 sampai 10 m/s di fasilitas laboratorium Universitas Mercu Buana. Material yang digunakan untuk turbin adalah plat alumunium dengan ketebalan 0,5 mm, dengan panjang turbin 120 mm, dan diameter 2,750 mm. Hasil penelitian menunjukkan: Model TASH dapat beroperasi pada kecepatan angin rendah $TSR < 2.0$ m/s. Model TASH menunjukan nilai koefisiensi torsi, $C_t = 0,61$ pada kecepatan angin rendah 2 m/s $C_t = 0,25$ pada kecepatan 10 m/s artinya TASH model ini memiliki *self torque capability* yang cukup bagus. Model TASH menunjukan nilai daya, $C_p = 0,128$ pada kecepatan angin rendah 3 m/s, $TSR = 0,224$

Kata kunci : Turbin Angin Sumbu *Horizontal*; Uji eksperimen; *Wind Tunnel* koefisien daya (C_p); koefisien torsi (C_t); *Tip Speed Ration* (TSR).



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EXPERIMENTAL STUDY ON THE PERFORMANCE OF A THREE-BLADE SPIRAL TYPE HORIZONTAL WIND TURBINE

ABSTRACT

Utilization of wind energy is the most developed use of renewable energy recently, such as a three-blade spiral horizontal axis wind turbine. The three blade spiral horizontal axis wind turbine uses lift and drag forces to move the turbine blades by harnessing the kinetic energy of the wind. The purpose of this study, among other things, is to find out the performance of the three-blade spiral TASH model, through a wind tunnel by assessing the measured parameters, namely the shaft rotation speed (rpm), voltage (Volts), current (Amp), torque value (Nm), as well as reviewing the test results TASH on unmeasured parameter values, namely the power coefficient C_p , torque coefficient C_t and Tip Speed Ratio (TSR). The method was carried out by experimental testing using a wind tunnel at variations in wind speed between 1.0 m/s to 10 m/s at the Mercu Buana University laboratory facility. The material used for the turbine is an aluminum plate with a thickness of 0.5 mm, a turbine length of 120 mm, and a diameter of 2,750 mm. The results showed: The TASH model can operate at low wind speeds $TSR < 2.0$ m/s, the TASH model shows torque coefficient values, $C_t = 0.61$ at low wind speeds of 2m/s and $C_t = 0.25$ at 10 m/s This means that the TASH model has pretty good self-torque capability. The TASH model shows power values, $C_p = 0.128$ at low wind speeds of 3 m/s, $TSR = 0.224$

Keywords : Horizontal Axis Wind Turbine; Experimental test; Wind Tunnel power coefficient (C_p); torque coefficient (C_t); Tip Speed Ratio (TSR).

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