Abstract

The present study explores the performance of the small horizontal axis wind turbine. NACA-44 profile for wind Education Kit at different wind velocity range of (3.5 to 5.5 m/s) is used to achieve this study. The effects of changing the pitch angles (10°, 30°, and 45°) of the blade on the power performance of small wind turbine rotor models were investigated experimentally. (3, 4 and 6 blades) have been used to compare the results at each pitch angle for the different wind velocity. A computer program code was built to simulate the mathematical model. The axial induction factor indicates the degree to which the wind velocity at the upstream of the rotor is slowed down by the turbine; the power coefficient and the thrust coefficient for a range of axial induction factor have been evaluated and compared for different blades pitch angles. The maximum power coefficient obtained is about 0.51 occurs at 10° pitch angle for the 3 blades. Furthermore, it has been shown that the increase of wind velocity at a certain point will drop the overall efficiency down.

Index Terms

Computer Science  Information Sciences

Keywords

Small horizontal axis wind turbine, axial induction factor, simulates the performance, pitch angles, power coefficient.