

Observation of the starting and low speed behavior of small horizontal axis wind turbine

Sikandar Khan

King Fahd University of Petroleum and Minerals, Saudi Arabia

This paper describes the starting behavior of small horizontal axis wind turbines at high angles of attack and low Reynolds number. The unfavorable relative wind direction during the starting time leads to low starting torque and more idling time. Wind turbine models of sizes less than 5 meters were simulated at wind speed range of 2 m/s to 5 m/s. Wind turbines were modeled in Pro/E and based on the optimized designs given by MATLAB codes. MATLAB coding was done on the basis of blade element momentum theory and Pro/E modeling was done by selecting various planes along the blade radius. Aerodynamic force components were calculated by a MATLAB function. Wind turbine models were simulated in ADAMS for improving the starting behavior. The models with high starting torques and less idling times were selected. The starting behavior was successfully improved and the optimized wind turbine models were able to produce more starting torque even at wind speeds less than 5 m/s.

Biography

Sikandar Khan has completed his MS at the age of 27 years and currently is a Ph.D. scholar at Mechanical Department of King Fahd University of Petroleum and Minerals KSA. He is also serving as a lecturer in King Fahd University of Petroleum and Minerals KSA. He has published more than 10 papers in reputed journals and international conferences.

sikandar@nwfpuet.edu.pk