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Design and Development of High Efficiency Vertical Axis Wind Turbine by Modifying Turbine Blade Profile and Introducing Deflectors at Low Wind Speed

Sanath J.A and Sumith Baduge

Department of Mechanical & Manufacturing Engineering, University of Ruhuna, Galle.

The present study deals with design and development of wind turbine blades and deflectors with a rudder mechanism for the efficiency improvement of a vertical axis wind turbine. Wind turbine blades were modified considering effect of lifts and drags forces acting on the blade. Darrieus type wind turbine with modified turbine blades including deflectors and a rudder mechanism is tested by using the CFD simulation. With the introduction of deflectors and the rudder mechanism, the simulation results show a large increase in effective tangential forces of the turbine blades due to correct projection of wind towards the blades and reduction of drag on the blades. The results of the study show that power coefficient the present design can be increased up to 25% for the wind speed range 4 m/s to 10 m/s.