

An Investigation on Designing and Enhancing the Performance of H-Darrieus Wind Turbine of 10KW at the Medium Range of Wind Speed in Vietnam

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Abstract : This paper describes an investigation on designing and enhancing the performance of H-Darrieus wind turbine (HDWT) of 10kW at the medium wind speed. The aerodynamic characteristics of this turbine were investigated by both theoretical and numerical approaches. The optimal design procedure was first proposed to enhance the power coefficient under various effects, such as airfoil type, number of blades, solidity, aspect ratio, and tip speed ratio. As a result, the overall design of the 10kW HDWT was well achieved, and the power characteristic of this turbine was found by numerical approach. Additionally, the maximum power coefficient predicted is up to 0.41 at the tip speed ratio of 3.7 and wind speed of 8 m/s. Particularly, a generalized correlation of power coefficient with tip speed ratio and wind speed is first proposed. These results obtained are very useful for enhancing the performance of the HDWTs placed in a country with high wind power potential like Vietnam.

Keywords : computational fluid dynamics, double multiple stream tube, h-darrieus wind turbine, renewable energy

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