

Suitability of NACA 63212, 63215 and 63415 airfoils for small horizontal axis wind turbine with a brimmed diffuser

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Wind energy is the promising renewable form of energy which have been used by the man kind from ancient times. Ancient sailors utilized wind energy for sailing purpose, then came the utilization for irrigation and at the end of 19th century wind power is utilized to generate electricity. Many promising developments have been occurred in the field of wind energy converters to improve its efficiency. A wind turbine equipped with a brimmed-diffuser shroud is called a Wind-Lens turbine. This is because a low-pressure region, due to a strong vortex formation behind the broad brim, draws more mass flow to the wind turbine inside the diffuser shroud. Since this unique wind turbine consists of not only rotating blades but also a diffuser shroud with a broad-ring brim at the exit periphery, the flow field around the turbine is highly complex and unsteady. These types of turbines are usually suitable for medium scale energy production mainly in offshore areas. The current research evaluate the effect of Brimmed diffuser geometry on the performance of small horizontal axis wind turbines having NACA 63212, 63215 and 63415 airfoils for urban areas. With the airfoil selected a small wind turbine is designed and analyzed with the diffuser designed. The results obtained where pleasing.

Key words: wind turbines, Brimmed diffuser, aerodynamics, k- turbulence model