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Design and Analysis of Blade Length and Number of Blades of Small Horizontal Axis Wind Turbine

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Abstract : The current research is focused on the study of various lengths of blades (i.e. 1 to 5m) and several bladed rotors (3,5,7 & 9) of small horizontal axis wind turbine under low wind conditions usingQBlade software. Initially, the rotor was designed using airfoil SG6043 with five different lengths of the blades. Subsequently, simulations were carried out in which, under low wind regimes, the power output was observed. Further, four rotors having 3,5,7 & 9 blades were analyzed. However, the most promising coefficient of performance (CP) was observed at the 3-bladed rotor. Both studies established a clear view of harvesting wind energy at low wind speeds that can be mobilized in the energy sector. That suggests the utilization of wind energy at the domestic levelwhich is acceleratory growing in the last few decades.

Keywords : small HAWT, QBlade, BEM, CFD
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