Article Abstract

Title:	Investigation of blade performance of horizontal axis wind turbine based on blade element momentum theory (BEMT) using NACA airfoils
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Abstract:	The basic principle of wind turbine converting wind energy into electricity comes from the lift produced by the air flowing through the rotor. The shape of rotor blade plays an important role in determining the overall aerodynamic performance of a horizontal axis wind turbine. In this work, blade is designed for a 5KW horizontal axis wind turbine which is already in market. For designing blade, blade element momentum theory (BEMT) is used and a computer program is developed to automate the complete procedure. Two NACA airfoils are taken for the comparative calculation of elemental power coefficient and other parameters such as chord, thickness and twist distribution. The airfoil taken for designing the blade is same from root to tip. Stresses are maximum at the blade root. In this work, the blade root is thickest portion of the blade and twist is maintained such that the angle of attack will be maximum at every station of the blade. In the designed blade, the elemental power coefficient is maximum in transition segment. The present method is useful for predicting the performance of wind turbine blade.
Keywords:	Power coefficient, Twist, Chord, Airfoil, Design.