Optimization design in Wind Turbine Blade Based on Wind Characteristics

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Abstract: The highest possible power output under specified atmospheric conditions plays great role in designing a wind turbine blade, In this paper, The maximum likelihood estimation method was used to compute the hub height wind speed (65m) mathematical model based on the observation data of Hexi Corridor wind at 10m height, taking 40m blade as an example, The modle is established by blade element momentum theory, At same time the tip loss is taking into account, Each section of the chord, twist angle of wind energy utilization coefficient, skin ply and girder cap layer thickness parameters were optimized, The aerodynamic performance and stress distribution are given out, the results showed that the optimized: the optimized blade wind energy utilization coefficient is greatly improved and the quality of the blade is reduced significantly, It is suitable for wind characteristics of the blade design condition performance supper than that of general blade, It provides a theoretical basis for the blade design .

Keywords: The wind; maximum likelihood estimation; aerodynamic performance； wind energy utilization coefficient; optimization model;