Optimization design of airfoil profiles based on the noise of wind turbines

Based on design theory of airfoil profiles and airfoil self-noise prediction model, a new method with the target of the airfoil average efficiency-noise ratio of design ranges for angle of attack had been developed for designing wind turbine airfoils. The airfoil design method was optimized for a relative thickness of 21\% and a new airfoil was obtained. To illustrate the optimization method, the aerodynamic characteristics and noise of the optimized airfoil were calculated and analyzed. Through performance comparison of a DU93-W-210 airfoil and a FFA-W3-211 airfoil which are widely used in wind turbine constructing blades, and wind tunnel test, the practicability and commonality of the optimization method were verified.

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