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Trailing Edge Modifications for Flatback Airfoils

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Abstract

The adoption of blunt trailing edge airfoils (also called flatback airfoils) for the inboard region of large wind turbine blades has been proposed. Blunt trailing edge airfoils would not only provide a number of structural benefits, such as increased structural volume and ease of fabrication and handling, but they have also been found to improve the lift characteristics of thick airfoils. Therefore, the incorporation of blunt trailing edge airfoils would allow blade designers to more freely address the structural demands without having to sacrifice aerodynamic performance. These airfoils do have the disadvantage of generating high levels of drag as a result of the low-pressure steady or periodic flow in the near-wake of the blunt trailing edge. Although for rotors, the drag penalty appears secondary to the lift enhancement produced by the blunt trailing edge, high drag levels are of concern in terms of the negative effect on the torque and power generated by the rotor. Hence, devices are sought that mitigate the drag of these airfoils. This report summarizes the literature on bluff body vortex shedding and bluff body drag reduction devices and proposes four devices for further study in the wind tunnel.