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Optimization of Airfoil Design for Flow Control with Plasma Actuators THEODORE WILLIAMS, THOMAS CORKE, JOHN COONEY, University of Notre Dame — Using computer simulations and design optimization methods, this research examines the implementation of active flow control devices on wind turbine blades. Through modifications to blade geometry in order to maximize the effectiveness of flow control devices, increases in aerodynamic performance and control of aerodynamic performance are expected. Due to this compliant flow, an increase in the power output of wind turbines is able to be realized with minimal modification and investment to existing turbine blades. This is achieved through dynamic lift control via virtual camber control. Methods using strategic flow separation near the trailing edge are analyzed to obtain desired aerodynamic performance. FLUENT is used to determine the aerodynamic performance of potential turbine blade design, and the post-processing uses optimization techniques to determine an optimal blade geometry and plasma actuator operating parameters. This work motivates the research and development of novel blade designs with flow control devices that will be tested at Notre Dame's Laboratory for Enhanced Wind Energy Design.

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