Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Plasma Enhanced Aerodynamics of Wind Turbine Blades[1] JOHN COONEY, THOMAS CORKE, ROBERT NELSON, University of Notre Dame — A series of computer simulations was conducted to determine the optimal method for reducing the chord length of large wind turbine blades while incorporating advanced flow control to offset the resulting loss in aerodynamic performance. The dominant building trend in the wind energy industry of turbines with progressively larger diameters provided the inspiration for this study. By reducing the chord along the inner region of the wind turbine blade, the total blade length could then be extended for the same mass of blade while limiting the additional costs and issues associated with increased blade length. In order to preserve certain geometric characteristics, the reduction in chord was achieved by scaling along the chord alone or by simply truncating the blade with a flat or circular cut. The aerodynamic requirements for the modified blade sections were to equal or better the total lift and the lift-to-drag ratio of the original blade sections. For this investigation, flow control consisted of plasma actuators located at a combination of the leading edge, maximum thickness, and trailing edge locations of the modified blade sections.

[1]Supported by General Electric Energy

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Date submitted: 06 Aug 2009 Electronic form version 1.4