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**Aerodynamic Performance Enhancement of a Finite Span Wind Turbine Blade using Synthetic Jets** KEITH TAYLOR, CHIA MIN LEONG, MICHAEL AMITAY, Rensselaer Polytechnic Institute — Modern wind turbines undergo significant changes in pitch angle and structural loading through a revolution. Recent developments in flow control techniques, coupled with increased interest in green energy technologies, have led to interest in applying these techniques to wind turbines, in an effort to increase power output and reduce structural stress associated with widely varying loading. This reduction in structural stress could lead to reduced operational costs associated with the maintenance cycle. The effect of active flow control on the aerodynamic and structural aspects of finite span blade was investigated experimentally. When synthetic jets were employed the effect on aerodynamic performance and structural vibrations, during static and dynamic pitch conditions, was significant. In order to investigate if the jets can be actuated for less time (reduce their power consumption), they were actuated during only a portion of the pitch cycle or using pulse modulation. The results showed that these techniques result in significant reduction in the hysteresis loop and the structural vibrations.

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