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Preliminary Investigation of the Active Flow Control Benefits on Wind Turbine Blades[1] GUANNAN WANG, JAKUB WALCZAK, MARK GLAUSER, BASMAN ELHADIDI, Syracuse University — This study investigates the benefit of flow control over a 2D airfoil specially designed for wind turbine applications. The experiments were carried out in Syracuse University's Anechoic Wind Tunnel, both with and without large scale unsteadiness in the freestream. When there is no large scale unsteadiness introduced in the flow, under open loop flow control conditions with unsteady blowing, the leading edge separation was delayed and maximum lift coefficient was increased. For the cases where large scale unsteadiness was introduced into the flow, the experiments showed that both open loop and closed loop control cases were able to reduce lift fluctuations by a measurable amount. However, only the closed loop control case which utilized surface pressure information from the airfoil near the leading edge was capable of consistently mitigating the fluctuating load.

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