Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Propagations of fluctuations and flow separation on an unsteadily loaded airfoil ANDREW TENNEY, JACQUES LEWALLE, Syracuse Univ — We analyze pressure data from 18 taps located along the surface of a DU-96-W180 airfoil in bothand steady flow conditions. The conditions were set to mimic the flow conditions experienced by a wind turbine blade under unsteady loading to test and to quantify the effects of several flow control schemes. Here we are interested in the propagation of fluctuations along the pressure and suction sides, particularly in relation to the fluctuating separation point. An unsteady phase of the incoming fluctuations is defined using Morlet wavelets, and phase-conditioned cross-correlations are calculated. Using wavelet-based pattern recognition, individual events in the pressure data are identified with several different algorithms utilizing both the original time series pressure signals and their corresponding scalograms. The data analyzed in this study was collected by G. Wang in the Skytop anechoic chamber at Syracuse University in the spring of 2013; the work of Zhe Bai on this data is also acknowledged.

Andrew Tenney
Syracuse Univ

Date submitted: 01 Aug 2014 Electronic form version 1.4