Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Dynamic stall characterization using modal analysis of phase-averaged pressure distributions[1] TANNER HARMS, POURYA NIKOUEEYAN, JONATHAN NAUGHTON, University of Wyoming — Dynamic stall characterization by means of surface pressure measurements can simplify the time and cost associated with experimental investigation of unsteady airfoil aerodynamics. A unique test capability has been developed at University of Wyoming over the past few years that allows for time and cost efficient measurement of dynamic stall. A variety of rotorcraft and wind turbine airfoils have been tested under a variety of pitch oscillation conditions resulting in a range of dynamic stall behavior. Formation, development and separation of different flow structures are responsible for the complex aerodynamic loading behavior experienced during dynamic stall. These structures have unique signatures on the pressure distribution over the airfoil. This work investigates the statistical behavior of phase-averaged pressure distribution for different types of dynamic stall by means of modal analysis. The use of different modes to identify specific flow structures is being investigated. The use of these modes for different types of dynamic stall can provide a new approach for understanding and categorizing these flows.

[1]This work uses airfoil data acquired under Army contract W911W60160C-0021, DOE grant DE-SC0001261, and a gift from BP Alternative Energy North America, Inc.

Jonathan Naughton
University of Wyoming

Date submitted: 02 Aug 2017 Electronic form version 1.4