Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Unsteady Airloads on Airfoils in Reverse Flow ANDREW LIND, ANYA JONES, University of Maryland — This work gives insight into the influence of airfoil characteristics on unsteady airloads for rotor applications where local airfoil sections may operate at high and/or reverse flow angles of attack. Two-dimensional wind tunnel experiments have been performed on four airfoil sections to investigate the effects of thickness, camber, and trailing edge shape on unsteady airloads (lift, pressure drag, and pitching moment). These model rotor blades were tested through 360 deg of incidence for $10^4 \leq Re \leq 10^6$. Unsteady pressure transducers were mounted on the airfoil surface to measure the high frequency, dynamic pressure variations. The temporal evolution of chordwise pressure distributions and resulting airloads is quantified for each airfoil in each of the three unsteady wake regimes present in reverse flow. Specifically, the influence of the formation, growth, and shedding of vortices on the surface pressure distribution is quantified and compared between airfoils with a sharp geometric trailing edge and those with a blunt geometric trailing edge. These findings are integral to mitigation of rotor blade vibrations for applications where airfoil sections are subjected to reverse flow, such as high-speed helicopters and tidal turbines.

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Date submitted: 01 Aug 2014 Electronic form version 1.4