A wind tunnel test of the wind turbine airfoil Risø-B1-18 equipped with an Active Trailing Edge Flap (ATEF) was carried out. The ATEF was 9% of the total chord, made of piezoelectric actuators attached to the trailing edge of a non-deformable airfoil and actuated using an (electric) amplifier. The airfoil was tested at Re = 1.66 × 10^6. Steady state and dynamic tests were carried out with prescribed deflections of the ATEF. The steady state tests showed that deflecting the ATEF towards the pressure side (positive) translated the lift curve to higher lift values and deflecting the ATEF towards the suction side (negative) translated the lift curve to lower lift values. Testing the airfoil for a step change of the ATEF from = -0.30 to +1.8 showed that the obtainable cl was 0.10 to 0.13 in the linear part of the lift curve. Modeling the step response with an indicial function formulation showed that the time constant in the step change and in sinusoidal deflections in dimensionless terms was T0* = 0.6. Testing the ability of the ATEF to cancel out the load variations for an airfoil in sinusoidal pitch motion of AOA = ±0.7 showed that it was possible to reduce the amplitude with around 80% from cl = 0.148 to cl = 0.032. Copyright © 2009 John Wiley & Sons, Ltd.
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