High frequency microphone measurements for transition detection on airfoils. NACA-0015 appendix report - DTU Orbit (01/01/2019)

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Time series of pressure fluctuations has been obtained using high frequency microphones distributed over the surface of airfoils undergoing wind tunnel tests in the LM Windtunnel, owned by 'LM Glasfiber', Denmark. The present report describes the data analysis, with special attention given to transition detection. It is argued that the transition point can be detected by observing the increase in the mean of the Fourier spectre and that this method is very stable from a numerical point of view. Other important issues are also discussed, e.g. the variation of pressure standard deviations (sound pressure) and Tollmien-Schlichting frequencies. The tests were made at Reynolds and Mach numbers corresponding to the operating conditions of a typical horizontal axis wind turbine (HAWT). The Risø B1-18, Risø C2-18 and NACA0015 profiles were tested and the measured transition points are reported.

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