Correlation of amplitude modulation to inflow characteristics

Amplitude modulation (AM) of noise from wind turbines and its more extreme version named "other amplitude modulation" (OAM) have been investigated intensively during the last few years due to the additional annoyance impact this type of noise has compared to broad band noise. In a recent published research by RenewableUK the hypothesis has been that one of the causes of OAM is transient stall on the blade due to non uniform inflow such as shear. Part of the RenewableUK research work was a contribution by DTU on analysis of data from the DANAERO MW experiment from 2009. In the DANAERO experiment a new 38.8m test blade for a 2MW NM80 turbine was manufactured and equipped with a massive instrumentation comprising flush mounted surface microphones, pressure taps and five hole pitot tubes. The correlation of the spectra from the surface microphones and the measured inflow angle (IA) confirmed the strong increase in the noise source for high IA. As only few 10min data sets were measured in the DANAERO project a data set with measured inflow angle from 2003 on the same turbine has been used to explore the statistical properties of AM and OAM based on assumed correlation to IA.

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