Wind Energ. Sci. Discuss.,
doi:10.5194/wes-2016-57-RC2, 2017

eawe european academy of wind energy
Open Access WIND ENERGY SCIENCE DISCUSSIONS

Interactive comment on "Flow angle measurement of a yawed turbine and comparison to models" *by* Tyler Gallant and David A. Johnson

Anonymous Referee #2

Received and published: 13 March 2017

The manuscript addresses the measurements of the flow angles of a rotating blade subject to normal and to yawed flow.

As usual the authors start with an overview of the published literature. Unfortunately this overview is biased, and not covering all important activities in the field. As an example all the contributions and contributors to the IEA wind task 29, where a.o. yaw modelling and yawed flow experiment are extensively treated, are absent. But more serious is the set-up of the experiment and the results presented in the manuscript.

Instead of a full configuration, there is only one of the three blades physically present. The other two blades are replaced by bars, intended for dynamically balancing the rotor. The aerodynamics are thus not representative for a wind turbine rotor. It is just one single blade, operating in an environment, polluted with the viscous wake and with

Printer-friendly version

Discussion paper

the added forces of two rotating rods (with a lot of viscous drag).

But the most serious issue can be seen when observing the figures 5 and 10. These figures show the measured AoA (derived from the measured angles with the 5 hole pitot tube in front of the blade) as a function of azimuth angle. Since this is a kind of wind tunnel set-up, the measured AoA should be constant over the azimuthal position of the blade. But it is not, as can be seen in figures 5 and 10.

Depending upon the tip speed ratio lambda and the radial position (fig 5 r/R=0.55 fig 10: r/R=0,72) the “measured” variation in AoA over the azimuthal position is typically +/- one to two degrees!!

The authors do not provide any explanation for this variation. They only refer to earlier work of Maeda and Kawabuchi (2005). But the experiments of these authors refer to measurements in an outdoor environment and there variations of AoA over azimuthal position can be expected due to the influence of the atmospheric boundary layer. Here such ABL simulation is absent, that is at least the presence of an ABL simulation on the facility it is not mentioned, nor quantified by the authors. So the reviewer has to assume the rotor operates in a uniform inflow (with a turbulence level of about 6%)

And this has as consequence that nor fig 5 neither fig 10 can be properly understood by the reader. Why this periodic behaviour of the AoA?

And with an inaccuracy of up to +/- 2 degrees (the difference between the expected constant AoA over azimuthal position and the measured AoA’s) the interpretation and the comparison with numerical codes and/or empirical models for yawed flow also become useless. On other words, to my opinion the present manuscript (lacking information and explanation and hence raising a lot of unaddressed, let alone answered, questions) has not a single added value to the scientific wind energy community.

Interactive comment on Wind Energ. Sci. Discuss., doi:10.5194/wes-2016-57, 2017.