General

- I note that the article is written by different authors with their own style and notations e.g. sometimes y as radial coordinate (line 233), sometimes z(figure 10). For the free stream velocity, I sometimes see v_in (line 200), sometimes it is U_infty (figure 12). In figure 13 you even use 2 two different notations for the free stream velocity in the same figure: U_infty and w.
  An overarching coordination effort to make the different chapters more consistent, not only editorial but also in terms of structure, level of detail and content would improve readability a lot. I see chapters on two different experiments and 3 different models with a nice summary in section 4 but also from this summary the chapters seem mostly independent to me and a reader will wonder how they are connected, i.e. what is the 'red line'. Maybe there are not so many connections (apart from the fact that it is all about boundary layer transition on wind turbines) but then that needs to be explained in the introduction.
- Another comment is the definition of turbulence intensity i.e. the standard deviation of velocity fluctuations normalized by mean velocity. On a rotating wind turbine blade, in particular at the outer part the normalization velocity is largely driven by the rotational speed. At the same time the spectrum of the turbulent velocities on a rotating blade section is different than the turbulent free stream spectrum. I donot see this aspect mentioned somewhere and between the lines it seems to me that you assume the turbulent intensity and spectrum on a blade section to be similar to the free stream turbulent intensity. Maybe it is not so relevant and it is just a matter of definition but I am not sure if this is true when you apply the Mack relation. I want to be sure that you donot apply the free stream turbulence intensity for a rotating blade section. Could you elaborate?

Then there are several small comments:

- Title: It says transition mechanisms on **Multi MW** wind turbine blades. The results are given for Multi MW turbines indeed but Multi MW can range from 2 to \infty where the results of your research seems limited to 2 MW's turbines (Actually I cannot find the rated power of the turbine on which the glove experiment is done but I guess it is around 2 MW).

- Table 1: Could you add the rated power in the table. (As mentioned above the title of the article refers to rated power, then I would expect that the rated powers of the turbineare mentioned in the text)

- Table 1: Could you tell something on the airfoils involved?

- Table 1: The following transition experiment is done in the field too so it may have to be mentioned? *Experimental investigation of Surface Roughness effects and Transition on Wind Turbine performance O Pires et al 2018 J. Phys.: Conf. Ser.* ***1037*** *052018*

- Line 72: Could you elaborate a bit more on the measurements. In particular the number of microphones and pressure taps. I suggest to add a statement that the frequency response of the pressures from the taps is relatively slow.

- Figure 1 is very interesting but I found it difficult to understand. This is partly due to my color blindness (which you may ignore) but also due to the explanatory text. For example how

does a reader recognize laminar spectra with apparent small peaks. Which small peaks? Can you clarify, possibly by indicating these peaks in the figures itself. It also helps to indicate the the transitional spectra with T-S wave peaks in the figure.

- Figure 2 is difficult for me too. There are very many lines for different conditions but why do you need so many conditions, what is the message of this figure? You make use of dashed and solid lines but that distinction is not visible anymore at the high frequency. Would it be an idea to divide the results over two figures to improve readability.

- The legends of figure 6 say: x/c_tr. I would make it x_tr/c

- Section 2.2: You mention that the experiment was intended to be done with microphones but it was enhanced with ground based thermography. Was it enhanced or replaced? In other words do you have results from microphones and if so why aren't they presented?

- Section 2.2. The description of the measurement technique is very limited. Could you add a few words on what ground based thermography means. How does the distance from the ground to the blade plays a role. These are averaged measurements? How many revolutions? Also why do you need two teams. Did they use different techniques in what respect?

- Line 163 How do you know it is equal accuracy, I donot see scientific evidence for that? Is there some kind measurement accuracy analysis carried out? The technique seems to find a transition location indeed but in theory it could a wrong location.

- Line 163 This suggests as if this technique is of equal value than the microphone technique but that is not true: Information on the spectrum is lacking.

- Line 169. *Prdmdl* looks a bit weird for unfamiliar readers. From the text I understand it is a transition model but could you add a few explanatory words or a reference?

- Section 3.1: Overall I find this section a bit difficult to follow. Amongs others due to the following:

    - I donot like the title *Findings from IEA Wind TCP Task 29 Subsection 3.6* very much. Could you make it more descriptive e.g. by mentioning DanAero or something like that? Apart from that it is not 100% correct. It is not subsection 3.6 from the report. but Task 3.6, described in chapter 10. Moreover, although I am honored that you mention me to be the author I feel it is more fair to mention the authors of this particular chapter: A. P. Schaffarczyk, B. A. Lobo, H.A. Madsen, O. S. Ozcakmak

    - Table 2: Meshes of what? I assume it is for the DanAero blade but I donot think that is mentioned somewhere in the text.
    - Line 194: It may be a bit uncommon to mention individuals. You already acknowledge Leo at the end of the article so that could be enough.
    - Line 196: NN-2013 what is this?

- Line 193: On Line 185 you mention Ellipsys, Flower and Fluent but now OpenFoam is mentioned as well?
- Line 200: Case I of IEA Task (vin = 6.1 m/s and 12.3 rpm) is cryptic. You anyhow need to mention that it is for DanAero, I think you also need to mention it is for axi-symmetric conditions.
- Figure 10 shows a lot of results which come out of the blue to me and which I cannot relate to the previous text where you prepare me for results from Ellipsys, Flower and Fluent and OpenFoam.
- Line 203: What is Fluent *Bra* I have never heard of *Bra?*
- Line 205 and further seems to explain the results from table 3 but I find it very difficult to follow. You mention results from Siemens, LM and DTU but if I understand it correctly they come from separate study. What is the relation to the present study? You mention a CP of 0.482 +/- 0.015 with transition and 0.445 +/- 0.005 but table 3 seems to give different results.
- Figure 10: Transition instead of transition
- Figure 10: I donot think everybody understands the names mentioned in the legend? This needs further explanation.
- Table 3: I would not call wt_perf an outdated BEM code. BEM is BEM for such simple case.
- Line 217: You could add that is not only CP but also CT which is lower. An error in pitch larger that 0.4 degrees could explain both (Here I am just speculating).
- Line 227: How does that work? You prescribe a T.I. value as input to the bypass model but I assume that is std. deviation normalized to the local mean velocity, in other words I assume you donot use the free stream turbulence intensity?

- Line 233: I would mention the relative radial position instead of absolute y value
- Figure 13: Please indicate that is a blade section 36.8 meter from the hub like you do in figure 12.
- Line 257: Do you have some kind of estimate for changes in wind speed, turbulence intensity, and angle of attack which the blade section at y = 36.8 undergoes during a revolution. That would help interpretation even it is a rough indication only
- Figure 14: Maybe good to add that we look to the pressure side
- Line 271: How do you derive aoa from force measurements? That is far from trivial. Could you elaborate a bit.
- Section 3.3 You suggest as if the calculations are done on the Glove experiment but it seems to me a non-rotating blade section or am I mistaken?
- Line 298: I donot think that relative thicknesses of airfoil are mentioned in the other sections (I would suggest to do that)
- Page 19 and further: I think that the level of detail of this model description is higher than the level of detail for the model descriptions of the previous section. I realize this is partly due to the fact that you add inflow modelling but I still have the idea it is a bit out of line. Please check and if possible/needed try to improve it.
- Line 340: STIG what is that?
- Figure 17: Title says THE airfoil. There are many airfoils in this article so please indicate.
- Figure 18: Please put a label in the vertical direction (I assume that is spanwise direction?). The legend is unclear to me: *"up: …"* ??? I assume we see the suction side?
- Line 398: Lower frequencies of inflow turbulence?
- Line 403: Klebanoff modes: What is that? Can you refer?

- Line 475: I donot think I have seen evidence of laminar flow derived from measured pressure distributions?
- Line 500: On suction side?
- Line 502: But you have much less fully turbulent models isn't it? So that could lead to a smaller deviation?

Good luck!

Gerard Schepers