Editor (K. Dykes)

Good job addressing reviewers' comments and nice overall work. Minor edits suggested below. Generally, the introduction can use some additional attention, but the paper is otherwise in good shape.

Thank you for your review and appreciation of the paper. Please find our responses and changes to the manuscript below your comments in blue.

Note, author name order reversed at present. Hopefully formatting from journal will correct.

- ⇨ We changed the order of the author names.

Section 1

Line 9 – what do you mean scale accordingly? Also, it is not good to cite an entire textbook – this is lazy. Should use a specific reference to content within the text or cite a particular paper on scaling of blade loads with length (there are several nice journal articles on blade scaling of loads and mass with length).

By this sentence we meant that the loads of individual components of the wind turbine scale as a function of the rotor diameter. This function depends on the actual component being considered. For this reason we mentioned 'accordingly'.

- ⇨ Changed the sentence so that it is clear that the loads scale as a power of the rotor diameter. We also added the pages of cited book.

Line 11 – you mean over conservatism correct? Differences is not specific – differences from what?

Yes that is what we meant.

- ⇨ Changed sentence to explicitly mention the over-conservatism on the load estimation.

Line 13 – again, citing textbooks without specific reference to in text content is not adequate for a journal quality paper. Go to the source and cite key peer reviewed literature. For instance, as you are using FAST, you might cite the papers that support the formulation currently in AeroDyn.

- ⇨ We added the pages in the textbooks where the blade element momentum theory is explained

Line 15 – be more specific. In the abstract line 4, you saw that BEM will over estimate loads, this is only self evident if the engineering corrections to the model are intentionaly conservative. How and why is BEM predicting wrong? Why aren't the engineering corrections good enough?

- ⇨ We extended the paragraph to explain more in detail why BEM can predict inaccurate loads. Basically, the inaccuracies arise when the turbine operates outside the conditions in which the correction models were tuned and tested. We added some examples of these conditions including citations where these issues are a main source of load differences.

Line 22 – again, not self evident that using a more accurate method leads to lower deign loads… this is only the case if conservatism to counteract the uncertainty of the lower fidelity model. Expand on this point within the preceding paragraph.

- ⇨ Expanded the whole paragraph to explain the point further. The paragraph now briefly explains why BEM methods can have inaccuracies in load predictions (your previous point). We also explain that the design loads can be reduced by either better load predictions with the LLFVW method or indirectly by reduced safety factors applied to the design loads.

Section 2.2

Line 20 – okay explanation but not great. Might speak to the limitations of this decision a bit more – for instance, what if you used a code like beamdyn with the respect bem and llfvw codes? How would that influence the comparison? You cover it a bit but not fully in the preceding paragraph

- ⇨ We expanded the section by addressing other ways in which structural models with higher accuracy affect the loads and very likely magnify the load differences coming from different aerodynamic methods. In order to quantify this, a separate study would be needed. We point this out in the conclusions. We also included a reference to a study that compares several combinations of ElastoDyn, BeamDyn, AeroDyn and QBlade'ss LLFVW method. It shows that changing the structural model has large influence on the loads.

Line 13 – again okay explanation, but might speak to the limitations of this decision

- ⇨ Expanded on the limitations of our decision: we expect the controller to work suboptimal in the LLFVW simulations, because it was optimized based on BEM calculations.

Section 3

Line 11-13 – why is qblade predicting higher rotor speed? Lacking full explanation

Basically, the full explanation is that the induction factors and the loads are being calculated with fundamentally different aerodynamic models. It should be no surprise that there are small differences in the predictions of the steady state variables such as the rotor power and the rotor thrust. The higher rotor speed comes from the higher power coefficient calculated with QBlade. Section 3 expands on this by including several comparisons with other codes. Higher power coefficients for the same wind speeds are also seen when the CFD-based code EllipSys3D is compared to the BEM-based code HAWCStab2. Differences of 4-5% in rotor power between different BEM-based and vortex-based codes are also reported in the reference (Madsen et al. 2012), which we included and compared to in this section.

- ⇨ Added a brief explanation about the higher rotor speed in this section.

Section 4

Line 2-3- Can you justify the selection of these DLCs? Here and upfront in the introduction?

The DLC 1.2 accounts for most of the fatigue damage the turbine components see. Including this DLC group limits the number of calculated load cases while still giving a good estimate of the lifetime fatigue loads of the turbine components.

- ⇨ Added the explanation of our selection in this section and briefly in the introduction.

Section 4.1

Line 11-12 – inadequate explanation of sensor selection

- ⇨ Added detail to the sensor selection section to explain why we chose them.

Figure 5 – figures are quite small and it is hard to see the differences. Consider enlarging them a bit

We agree that this figure is somewhat small in the paper. The actual figure is much larger and the differences are easier to see. Yet from our understanding of the template, there are only two possible figure sizes. This is already the larger figure size (two column). Perhaps the size can be increased in the final formatting from the journal. Including the figures as individual figures would take too much space and give these figures too much apparent importance. In our opinion, these figures should only give an overview of the turbulent load calculations using integrated rotor quantities. One of the results is that for these integrated quantities the differences between the models are small. The source of the load differences is therefore more subtle.

- ⇨ Added a sentence to explicitly say that the differences in these integrated quantities is small.

Section 4.2

Overall lacking critical analysis of the differences of the results. These performance differences will obviously lead to differences in loads. Why is it happening? Need to tie this back to the physics or the model differences or nuances of the controller… hint at what is coming in the following sections.

This section is supposed to present an overview of the results. Including already an analysis of why this is happening in this section is not straight forward and would need much explanation that is included later in the paper. We believe that the current structure of the paper in which the differences are presented, quantified and latter discussed and explained is relatively intuitive and helps improve the readability of the paper. Including extensive analyses at the beginning while the data is being presented would not improve the readability of the paper.

- ⇨ Expanded the section to include some preliminary analysis of the results and a better transition to the next sections.

Section 7

Good acknowledgement of future work – can you speak a bit more to the broader impacts of this effort? Its value?

- ⇨ We added a sentence tying the conclusion to the initial motivation of this study: By obtaining lower fatigue loads by adopting a higher order aerodynamic model, we see real potential of this aerodynamic method to reduce the design loads of future wind turbines. But more work needs to be done before we can say this as a general conclusion.