

Wind Energ. Sci. Discuss., referee comment RC1
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Comment on wes-2021-24

Sarah Barber (Referee)

Referee comment on "Validation of a modeling methodology for wind turbine rotor blades based on a full-scale blade test" by Pablo Noever-Castelos et al., Wind Energ. Sci. Discuss., <https://doi.org/10.5194/wes-2021-24-RC1>, 2021

General comments

- Scientific relevance: A very relevant and unique paper. The relevance of validating this one specific in-house method needs to be made more clear, though (see specific comments).
- Scientific quality: Very well explained and reasoned. Just some specific improvements to be made as mentioned below.
- Presentation quality: Very nicely explained and presented. Just a few suggestions as below.

Specific comments

ABSTRACT

- Line 4: "However, there is a lack of test results for which the blade data are completely available": it's not entirely clear what this means. Please be more specific about which data you are talking about.
- Line 5: Please explain why this "one particular methodology" is validated. Is it the most common / important one?
- Line 6: Please explain why providing test results to the public for an in-house methodology is important / interesting.
- Line 7: Why not mention the name of the code here?
- Line 8: Again, it's not clear to me exactly what "all relevant data" are. Same for the next sentence: "some data have been measured" doesn't really make sense to me.
- Line 9: Why not mention "according to IEC 61400-23" here?
- Line 13: Please quantify "good".
- Line 14: Why and how do you conclude that "good" comparisons are equal to "validated"?

1. INTRODUCTION

- Generally: The "story" in this section is unclear. I suggest splitting this section into "Motivation", "State-of-the-art" and "Objectives of this paper", and move the paragraph starting at line 50 to the "Objectives of this paper" section, together with the paragraph starting at line 64.
- Line 17: "designated": do you mean "expected"?

- Line 20: I suggest writing "...one time only per blade design"
- Lines 26-27: Does "have to be performed" mean that this has to be done because of the standard or in order to reach the required accuracy, in which case what is the required accuracy and why?
- Line 29: I don't really understand how automated model creation avoids model errors. Please elaborate on this.
- Line 30: "neglecting details on structural information": such as?
- Line 32: what do you mean by a "proper composite definition"? Please explain this better
- Line 36: specify what you mean by a "high discretization of stations" (how many?)
- Line 41: I guess you mean here "the best compromise between accuracy and costs" rather than "a solution at minimum costs"??
- Line 55: here you need to say why the method presented here is better, i.e. is it just more accurate or is it also more computationally efficient, thus offering a better compromise between costs and accuracy?
- Line 56: This is important because..? Please elaborate.
- Lines 77-78: "Generally good agreement..." Please remove this sentence. It doesn't belong in the introduction, just the conclusions and the abstract!

2. MODEL CREATION FRAMEWORK

- Line 87: please specify what you mean by "efficient" (quick? easy?).
- Lines 100-110: it is not that clear which sentences correspond to which blocks in the figure. Please help readers by putting the relevant block name in brackets when it's not obvious, i.e. "First, the blade segmentation, i. e. the discretization in span-wise direction, is defined ("eval. CS geometry") (note -I don't even know if that's correct). Actually, it would be even better if you could number the blocks and refer to them in the text.
- Lines 111-117: same comment as above.
- Lines 123-131: same as above.
- Line 147: "there are no relative displacements between the master and the slave nodes". I'm not an expert on this: are there any consequences of this? Is it OK to do this? Maybe elaborate here.

3. MODELLING OF THE TEST BLADE

- Line 165: please quantify "negligibly small" (and how you decide what "negligible" is in this context)
- Line 173: put 5.2m in terms of relative position (xR) in brackets too. Also, indicate if the pressure side is the top or bottom (it's not obvious from that picture and we don't know which direction the blade is moving in :-)).
- Lines 173-175: be more specific about these deviations. Is this picture just an example of one deviation? Were all sections like this or just this one?
- Line 175: "is much thicker than specified in the design"...please explain how the picture shows this (is it the green part that is sticking out? and mark it on the picture!

4. TEST DESCRIPTION AND VIRTUAL MODELLING

- Line 198: The sentence " the weight of the blade bolts was subtracted from the total mass." doesn't really make sense: you don't subtract a weight from a mass. Be careful to be consistent with weight and mass (weight = mass x g).
- Line 219: It's a bit strange that you mention "fatigue test" here as if it was obvious that you were carrying out "the fatigue test", whereas it is actually the first time you mention the word. "The fatigue test" therefore needs to be first introduced and described.
- Line 225: Explain why "almost horizontally" and what the consequences of this "almost"

are.

- Line 238: Error in what? Displacement? Strain? And 0.5% of what?
- Line 264: again, please write what these radii are in terms of % along the span.
- Line 297: I'm not entirely sure what you mean by "the torsional moment is not parallel to the pitch axis" - that the moment is not applied around the pitch axis? Surely what you mean is that the applied forces are not perpendicular to the blade chord? Why does this influence the axis around which the moment is applied? Also, please be more specific about the descriptions here. Why did you assume that the location is 30 m above the ground (why not 10, or 100?) What is the consequence of this assumption?
- Line 303: "...as discussed in section 3"
- Section 4.4: This belongs in Section 3. I don't get why you have described some of the segment measurements in Section 3 and some here.

5. COMPARISON OF RESULTS

- Line 325: Please explain why you didn't first obtain the mass in the numerical model and then add mass until these values matched, before continuing with the simulations.
- Line 325: Explain how you estimated the measurement uncertainties.
- Line 328: Quantify "perfectly" (i.e. to the nearest two decimal places).
- Line 332: How do you decide what "acceptable" is?
- Lines 332-345: Can you give the reader some idea of how good these comparisons are? Do other comparisons of experiments and simulations show similar results? Or are yours much better or worse than others?
- Line 378: Clarify exactly what you mean with "due to the wrong twist". Wrongly measured? Wrongly simulated? Wrongly assumed?
- Line 410: "Such high errors during torsional loading may base on the shell element with a node offset to the exterior surface used for this model": Do you have any suggestions to improve / solves this?
- Line 425: "because the sandwich core material vanishes towards the trailing edge": Can you explain what this means please? Does this happen in the simulations but not in reality?
- Line 441: Explain what you mean by "a wrong calibration or malfunction of the strain gauge"
- Section 5.5: Again, it's not clear to me why these couldn't be "calibrated" before running/repeating the simulations

Technical corrections

- Generally: "state-of-the-art" instead of "state of the art"
- Generally: please be consistent with your usage of British and American English, i.e. either always use "z" ("optimize") or always use "s" ("analyse"). You keep mixing them up.
- Generally: when making abbreviations such as MPC, you should refer to the original in capital letters, i.e. "Multiple Point Constraints", not "multiple point constraints"
- Generally: you often mix tenses in the middle of a sentence or paragraph. Either use "is" or "was" but don't mix them up.
- Generally: remove the gaps between numbers and the % signs.
- Line 10: "directions" instead of "direction"
- Line 28: "enhancing" instead of "enhance"
- Line 28: "computational time" instead of "time consumption"
- Line 33: "The same holds" instead of "Same holds"
- Line 33: ", now part of" instead of "which is now part of"
- Lines 36&39: "the span-wise direction" instead of "span-wise direction"
- Line 40: "losing" instead of "loosing"

- Line 57: "such as" instead of "like"
- Line 69: a reference is missing
- Line 110: "in more detail" should be at the end of the sentence.
- Line 140: put MPC in brackets
- Line 180: "with" instead of "wit"
- Line 183: re-position "in advance": "...was performed in advance"
- Line 393: Remove the word "Anyways".