

Interactive comment on “Investigating the loads and performance of a model horizontal axis wind turbine under IEC extreme operational conditions” by Kamran Shirzadeh et al.

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Overall, is an interesting paper with high potential. Nevertheless, there are several issues throughout it that needs to be elaborated on before the publication. The main issues to consider are the complete description of the inflow and its reproducibility, and render the conclusions to the results on the paper. I did line to line comments below; I hope these are helpful towards a more complete version. Best regards.

Abstract:

L11: add the corresponding parameter to the length, radius or diameter.

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L11-13: It seems that the two sentences were together before, the second one does not sustain itself.

L16: the TSR was not studying to state that. Moreover, is this not always the case?

1. - Introduction

L20-30: note that the word energy is used nine times during these two paragraphs.

L32: the number “2” should be written with letters according to the standard of the Journal, this type of corrections go throughout all the paper (equation -> Eq, figure -> Fig, etc.), you can take a look in the submission settings (<https://www.wind-energy-science.net/submission.html>)

L41: First person is used only a couple of times during the text (we L41, our L42, our L121), like the rest of the manuscript does not, this should be changed.

L47: please check the use of blade's and blades' throughout the manuscript.

L72: This statement is regarding this setup? L42 says that there is a previous work.

L76-79: This is a sentence for the methodology.

2. - Deterministic EOC

L93: please number both equations.

L113: This is unclear. TSR is by definition a function of freestream, rotational speed and radius, so the length scale is only a function of TSR, using the same argument. Is it possible to show this similarity approach by additional equations?

L120: The inflow was just represented by the theoretical profiles and four probes position? This is critical for the study, the gusts were performed several times to study reproducibility?

L122: What are the consequences of this?

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L126: ..that these extreme “operational condition” models However, they provide...

L129: are there more realistic approaches?

3. - Experimental methodology

L131: The homogeneity of the flow is missing, were the measurements (normal and events) done more than once?

L141: please provide the specific downstream location.

L142: Please consider the word opening instead of open to avoid the open-close confusion.

L146: change filed by field.

L147: What does mean 1.3m from the centerline of the primary flow direction?

L148: It is the case? How are the probes in relation to the fan positioning? Was the inflow studied with more probes?

L151: Please provide details from all the sensors.

L154: specifications are needed. The signal synchronization details are missing. The calibration procedures of the sensors are missing.

L162-168: How is this correlation done?

L163: the most important in terms of? (Also in L243)

L168: Here is stated that the inflow has heterogeneity, how much?

L173: Why only part of the results are normalized? Are then the results comparable?

Table 1: is this TI calculated as the EIC description? AS this shows only the average of the four probes, how scattered are the results between probes? The axis letters are small and Figure 4 shows them in capital. As the mean values are different, the

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normalization is done by different values?

L193: this is from only one probe?

L194: which frequencies?

L195: add dimension to the value.

L195-197: this is unclear.

L204: check the comma position.

L207: Is this 0.25% over the full scale range? This needs clarification to neglect it.

L209: There are more than moving average method, which one was used? Please provide a reference.

L211: This is unclear

L215: Please elaborate on this.

Table 2: Is the power epistemic uncertainty 0%? This table should include the values aforementioned in [N] and [Nm]. Clarification in what is the reference to the %. How was the combined uncertainty calculated?

4. - Turbine test case results Clarification of the correlation and its use over the results is needed.

L221: A brief introduction on how the results are presented would improve the understanding of the following sections.

L225: normalized electrical power

L226: starred.

L227: Due to the normalization, as both quantities have uncertainties there is an error propagation, is this considered?

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L232-234: This is an outlook that could go at the end of the document.

Figure 6: This can be improved by separating them into three Figures with a)...e) subfigures. As there is no much information or analysis on the steady parts, it would be beneficial zoom in on the event. On the caption: starred. It is possible to perform a frequency spectrum analysis and decouple some influences?

L246: is there some reference that supports the magnitude of this value?

L249: The first sentence should go in the methodology. The second sentence needs to be rephrased.

L252: Is this the case or could be a time delay?

L251-258: From here, it can be inferred that any electrical power data do not provide valuable information? Which is the rated condition of the turbine? Do the conclusions could change with a reduced, rated or overrated operational condition?

L259: How can be stated that these differences depend on the hub height and diameter if they were fixed?

L263: please add a reference.

L264-267: Is this a hypothesis? Is this not contradictory with the electrical power statement on L251-258?

L268: First sentence needs to be rewritten.

L274: Why they might not?

5. - Conclusions

L277: add the corresponding parameter to the length, radius or diameter.

L284: No control was done in this study to state that.

L286: No variation of the TSR was done to conclude this.

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