

Wind Energ. Sci. Discuss., referee comment RC2
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Comment on wes-2021-84

Sarah Barber (Referee)

Referee comment on "Model updating of a wind turbine blade finite element Timoshenko beam model with invertible neural networks" by Pablo Noever-Castelos et al., Wind Energ. Sci. Discuss., <https://doi.org/10.5194/wes-2021-84-RC2>, 2021

General comments

- Scientific relevance: A very relevant paper, especially in combination with the previous one. As for the previous one, the relevance of validating this one specific in-house method needs to be made more clear.
- 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

1. INTRODUCTION

- Line 52: can you quantify "computationally expensive" in terms of computational time as well as just number of iterations? How long does one iteration typically take?
- Section 1.2: it would be better to introduce the three "problems" and then describe them, rather than describing one of them and then introducing the three problems.

2. SENSITIVITY ANALYSIS

- Introduction: Usually one would expect the text at the start of a section before the first sub-section to introduce the section. Instead, you just talk about a previous paper, which is confusing. I would suggest inserting a proper introduction to the section here, and/or just moving the existing text into the first sub-section.
- Section 2.1: Please explain briefly why you are using the Sobol method.
- Section 2.2: You refer to Figure 2 before Figure 1. Please swap the figures.
- Section 2.2: Are you using one particular blade for this study or is it generalised? Please explain this better.
- Line 111: With "In contrast to the simplified visualisation" do you mean the one used in the previous study?
- Line 118: Why "five equidistant nodes"?
- Line 163: "which does not necessarily improve the updating performance, but reduce the

performance." This is a bit confusing. Does the second "performance" refer to the computational performance?

3. INN ARCHITECTURE

- Lines 179-184: I would make the two colours in Fig. 4 more clear - it's hard to see them and differentiate between them.
- Line 190-198: can you give non-cINN-experts an idea of what the consequences of the flattening process are? I find myself not able to understand the effect of this on the results and it would be nice if you helped me out here (and others).
- Line 201: Please explain the table structure briefly. Remind us what the different clusters are.

4. MODEL UPDATING

- Line 244: Please quantify this, i.e. instead of "most of the values hit the ground truth." write something like " $x\%$ of the values are within $x\%$ of the ground truth"
- Line 249: You write "Thus, the ideal case would correlate to an exact line with a slope $m = 1$." (also with the intercept = 0?) - R^2 is not a measure of how close m is to one, but of how close the points are to the regression line $y = mx + c$ (isn't it???). Please clarify this discrepancy and forgive me if I'm wrong.
- Line 327: why 5%?
- Line 331: Please quantify the statement "most of the input features are predicted as accurate as with a clean output." (i.e. what do you mean by "most" and "as accurate")?
- Lines 377-378: Quantify these two statements too!
- Line 386: "The counteracting intrinsic model ambiguities cancel each other out". Could you explain this a bit more please?
- Line 390: Quantify this!
- Line 396: It would be better to first mention this when introducing Sobol above (I already mentioned that you should explain why you chose the method), and then refer to it here.

CONCLUSIONS

- Lines 471-475: Please say something about how realistic the assumptions were. You say that it should now be applied to a real life application. This means you think that the assumptions you made in this work will impact the results. How and why?

Technical corrections

- Line 78: "non-generic" might be better than "not generic"
- Section 1.4: please be consistent in your use of "Section" and "Sect."
- Line 153: The comma after "it has to be noted," should be removed
- Line 171: The comma after "transformations," should be removed
- Line 174: "transform" not "transforms"
- Line 195: "flattening" not "flatting"
- Line 201: you mean "is" not "if"
- Figure 6 label: "Schematic" not "Schametic"
- Line 332: missing space after "Additionally"
- Line 371: delete the extra "n" at the end of "resimulationnn"
- Line 393: remove the comma after "selection,"
- Line 449: "in" not "to"

