Response to 2nd review

Dear Reviewer,

    Once again, thank you for your comments and corrections, which we've now implemented. The newest corrections are shown in red.

Yours Sincerely,

Jens Nørkær Sørensen, Stefan Ivanell, Björn Witha, Simon-Philippe Breton, and Søren Juhl Andersen

Reviewer 1

Specific Comments

Line 45. Important work on blockage is also done by Segalini and Dahlberg, Wind Energy, 23(2), 120-128 (2020).

Thanks, we have added this relevant reference.

Line 47. Other reviews related to the present work include Duckworth, Barthelmie, Wind Engineering 32(5), 459–475 (2008) Stevens and Meneveau, Annu. Rev. Fluid Mech. 2017. 49:311–39

Thanks again, we have added these references as well.

Line 72 Continuous work by Andersen et al. (2015) ==> I am not sure what exactly is meant by continuous work. The preceding sentence discusses Andersen et al. (2016) so the order is confusing here

Thanks, we have rephrased for clarity.

Line 100: Specify the participating groups here

We have specified the participating research groups.

Line 168: Double check "prescribed boundary layer"; the abbreviation PBL is generally used for planetary boundary layer, so perhaps consider not using the abbreviation.

We are aware of this potentially confusing abbreviation. However, the use of

PBL is clearly defined and consistent within the article, and we prefer not to introduce a new name for an existing method, when it is not the focus of the present work.

Table 1: Define the different participating institutions here

We have defined the institutes.

Table 2: How is shear defined here / indicate units.

We have expanded the explanation of the shear coefficient in Section 3.1.1.

line 213: The authors explained that they were not in the position to perform all simulations for the same turbulence intensity. That is fine. However, in line 213 the differences between the various cases should be specified for clarity.

Here, we compare three specific cases based on their similarities, but we have rephrased slightly to highlight again that the different methods yield different vertical profiles.

Line 256: Is this also the reason the numbers in figure 5 are lower than in figure 4?

Good observation, but the lower numbers in Figure 5 compared to Figure 4 appears consistent with Figure 2, where the power productions seen in the FW simulation is lower than those in the DTU.

Section 4.2.1: It should perhaps be mentioned that the authors just consider 2 example models. Over the years various other models have already been developed.

The additional of the suggested references by the reviewer shows that numerous simple wake models exist, so we have kept the previous formulation here.

Figure 12: Does the clustering of sample points affect the obtained fit? I also asked this question before, but did not get a full answer on this. When this is not fully known perhaps just clarify this around line 380.

We have extended our explanation, which hopefully makes it very clear that the response surfaces are directly dependent on the available data and that

adding more data would improve the confidence in the response surfaces. It would also enable for the creation of more advanced surrogates using for instance polynomial chaos expansion, neural networks or other methods.

Technical corrections

Please double check the manuscript for typos and use of single / plural, etc.

Thanks, we have gone through the manuscript again and made corrections, when found.

Line 15 wind farm(s).

Fixed.

Line 37 (and other places) Porte-Agel needs a accent on the e

Thanks for spotting this, we had a typo in our bibtex.

Line 68 "of the 10 turbine row"

It is unclear to us, what the suggested correction is?

Line 71 "5th of 6th turbine" ==¿ specific that this concerns rows

We have specified this.

Line 230-235: Consider combining the different paragraphs

Done.

Line 247 double dot at the end of the sentence

Fixed

Line 294 IWBL model is not defined

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Thanks. We have decided to denote the two engineering models as the Jensen and the Frandsen model, respectively. The IWBL (internal wind farm boundary layer) was an internal abbreviation, not used by Frandsen in his 1992 paper.

Line 323 "turbulence(TI" ==¿ add space

Fixed

Line 355 "rror(MSE)" ==¿ add space

Fixed

Line 392 "textcolorredresources."

Fixed