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Comment on wes-2022-13

Galih Bangga (Referee)

Referee comment on "A WaveNet-based fully stochastic dynamic stall model" by Jan-Philipp Küppers and Tamara Reinicke, Wind Energ. Sci. Discuss., https://doi.org/10.5194/wes-2022-13-RC1, 2022

Dear Authors,

The paper aims to provide an alternative for dynamic stall prediction to classical (semi-) empirical methods. The proposed method was constructed based on data driven approaches, adopting the DeepMind's WaveNet architecture. Overall, the paper was written well and can be followed easily. The model also produces good results with sound discussion. I enjoyed reading the whole content of the paper. Despite that, I found several issues with the paper which I would hope could be considered in the revised version of the paper.

- Although this is minor, the usage of English needs to be checked appropriately. I found some grammatical mistakes, especially on the usage of mixed tenses.
- For a paper, the words "Chapter" does not feels right, please use "Section" instead.
- Motivation to adopt a data-driven technique for dynamic stall modelling is lacking in Introduction.
- Another type of simple data driven technique for optimization (such as standard gradient method, GA, etc) has been proven powerful and is practical enough to use in industry. Our group has demonstrated in (Herrmann and Bangga, J. Renew. Sustain. Ener. 2019) that this is practical enough for wind turbine design. How can we justify the real potential implementation for this approach?
- Please clearly mention the novelty of the paper.
- How does the proposed model perform compared to a more established time series prediction models like Bi-LSTM? Or a combination of CNN-Bi-LSTM?
- What is the size of the time series width for the selection of the window sliding method? We demonstrated in our soon to be published paper that the size of the window width plays a decisive role in the accuracy for a time series prediction. Have you made an initial study?

- The Reynolds number is fairly low for wind turbine applications. Can the model be scaled to a higher Reynolds number case?
- Figure 4 is not useful, please use log scale for the y axis. The magnitude of the oscillation amplitude also does not look right, a lift coefficient amplitude as large as 40 does not feel like a right value to me.
- What is the impact of the experimental data downsampling? How if all the high frequency data is included? Will it crash due to instability? Loss in accuracy? Please justify.
- "Therefore, the model can only work with a constant time step of 0.01 s" I see this as a drawback. What if the user would like to choose a larger or a smaller timestep?
- Please check the FFT for Fig 11 (see above comment)
- As the author mentioned, the prediction is slow compared to semi empirical models, will it hinder implementation in a real wind turbine simulation tool?
- When you do the clustering using hierarchical clustering, is it possible to show the silhouette plot?
- Any tests for different airfoils? Are the weights obtained here still valid?
- Last, but the most important comment, how could we adopt the model in a real wind turbine simulation tool (like Bladed, FAST, HAWC2)?

Kind regards,

Galih Bangga