

## ***Interactive comment on “Development of a Second Order Dynamic Stall Model” by Niels Adema et al.***

**Niels Adema et al.**

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Dear Referees,

First, the author(s) of the paper would like to thank both referees for their comments and feedback. The positive attitude towards publishing of the paper and the constructive feedback is highly appreciated. The comments and feedback has shown the author(s) room for improvement that had not yet been thought off and are valuable for improving the overall quality of the work. The discussion paper has been revised accordingly. The response is structured as follows: first the comments from Vasilis A. Riziotis will be discussed after which the comments from Xabier Munduate are looked upon.

Starting with the RC's of Vasilis A. Riziotis: 1) Chapter 3 has been revised such that it

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follows a more clear structure as suggested. Now, in chapter 2, the model is described and validated. Then, in chapter 3, the proposed modifications are presented and in chapter 4 the results are discussed and compared to the original model. Section 3.10 has been removed as this was indeed redundant. The test matrix has been kept in the validation section in chapter 2 as the proposed modifications use this matrix as well. 2) Agreed that this is a very interesting subject of the inflow velocity changes. This paper does indeed not describe how the model could be transferred to that case. Lines have been added to the discussion part of the paper for further research. As this paper mainly focusses on an initial improvement step for the original this could be, in the view of the author, a nice addition in future research on the Snel model. Hopefully the referee can agree, otherwise this step will be looked upon for sure. 3) Fully agreed that the shedding frequency used in for 90 degrees AoA is not correct. This is a reason why this number is mentioned as a model parameter that will be allowed to be changed by the user. In this study a number of around 0.10-0.13Hz has not yet been tested. So nevertheless, the references suggested are included in the discussion of the results and it is mentioned that further research should definitely take this into consideration.

Accompanying PDF file: Line 55, References for the CFD studies of DTU have been added. Line 66, The methodology section has been moved into the introduction. Line 109, The explanation of the OSU experiments has been put into the validation section of the paper. Line 118, The timestep is chosen indeed such that the higher frequency events from the OSU experiments are captured. It is agreed that this value might be a little too small for practical design calculations. Nevertheless, the timestep is kept at this value, a line has been added explaining the choice. Figure 2, For the figures: the information from the title has now also been put into the figure description for completeness. Table 2, The author agrees that the structure of table 2 has room for improvement. Anyhow, this has been kept as is. In the view of the author this is the most clear way to present this part without adding too many parameters into the initial model description and creating confusion. The author has added extra lines in this section outlining the impact on the different equations. Also because chapter 3.10 has

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been removed it is nice for the reader to see the final equations of the improved model. Hopefully this makes it a more clear section. Line 297, the difference in mean value is the same as in (Khan, 2018) who used different design codes as well as different DS models. Khan also did not find a clear explanation for this difference of the mean. A reference to this studie is added for completeness of the statement. Lastly, all the (smaller) textual and/or grammar errors highlighted the PDF file have been taken to heart and have been changed.

Secondly, the comments of Xabier Munduate: 1) Also here chapter 3 has been revised according to suggestions from V.A. Riziotis. 2) In the paper changes have been made such that it is now also clear that DS plays a key role not only fatigue but also in extreme loads and that these are relevant for standstill and idling cases. 3) The reference suggested from A. Gonzales and X. Munduate has been included in the introduction. 4) The updated model from Truong 2016 has been discussed and references have been made in the introduction and conclusion/discussion chapters. In chapter 2, where the Snel model is outlined, lines are present that discuss the difference between both models (Line 90-98). It is noted in the discussion that it is highly advised to conduct a future research into the differences between both approaches as they are indeed similar.

For the accompanying PDF: Comment 1,2,3, and 4 have been implemented. Comment 5, see point 4 above in the general response. Reference has been made and it is outlined in chapter 2 where the difference lies. In the discussion it is mentioned that further research with a comparison of both is highly recommended. Comment 6, the statement is changed so that it is less optimistic, also lines are added referring to the figures 9,10 en 11, to state that more work is needed to optimize the model. Comment 7, the typo has been resolved.

The author hopes that by changing the paper as described above satisfies both referees. If there are any further questions/comments/feedback please do not hesitate to contact Niels Adema.

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Kind regards, Niels Adema

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Interactive comment on Wind Energ. Sci. Discuss., <https://doi.org/10.5194/wes-2019-87>, 2019.

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