

Wind Energ. Sci. Discuss., referee comment RC1
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Comment on wes-2021-73

Anonymous Referee #1

Referee comment on "Influence of wind turbine design parameters on linearized physics-based models in OpenFAST" by Jason M. Jonkman et al., Wind Energ. Sci. Discuss., <https://doi.org/10.5194/wes-2021-73-RC1>, 2021

Jonkman et al. describe the development of a methodology to compute the sensitivities in linearized dynamic systems with respect to system parameters. The system parameters are treated separately from the state variables during the linearization, resulting in second-order derivatives. The approach is demonstrated on a SDOF mass-spring-damper in order to make clear the steps and fundamental results. It is then used in a case study, looking at how properties such as the tower materials affect the eigenmodes of a floating offshore wind turbine.

The linear analysis of complex systems like floating wind turbines is essential for a human understanding of the dynamics. Linearization is a straightforward mathematical operation, however there are certainly pitfalls and challenges from a practical standpoint, including computational effort. The development of the procedure for this "two-phase" linearization with respect to state variables and system parameters, including constraints, and the implementation of the equations in an open-source tool for the analysis of fixed and floating wind turbines, represents a significant advance in the state-of-the-art.

The manuscript is well-written, with a clear organization in the development of ideas. I have no objections to the technical content. However, I do have one significant objection regarding the writing:

(A) As a paper being published in a scientific journal, the references to previous work in the field are inadequate. In fact, only one reference is given to a paper that is not the work of the authors. The content in the manuscript needs to be placed in its proper context relative to the vast body of existing knowledge. Who else has developed tools for linearization of wind turbines? Well, Bladed and HAWCStab2 have such capabilities, for instance. How do they do the linearization? Do they support some sort of system parameter linearization? If not, then this novelty of your approach should be stressed. Is there a precedent in other related fields (aerospace, mechanics, civil, etc) for treating the linearization of state variables and system parameters in this way?

Minor comments:

(B) The reference to Herber and Allison's paper contains errors, both in the title (missing "Solution"; "Problems" instead of "Problem") and publication year (should be 2019).