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Interactive comment on "System-level design studies for large rotors" *by* Daniel S. Zalkind et al.

Anonymous Referee #2

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The aim of the present work is to examine the effect of rotor design choices on the power capture and structural loading of each major wind turbine component. The authors present an interesting approach towards the analysis of the impact of design parameters such as cone angle, blade length, and axial induction. Some major clarifications are needed before it can be published. Some specific comments are listed below.

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1. In section 3, it is unclear what is the justification of assuming that the tower fairing is present in the current simulations. Can the authors be elaborated.

2. In section 4, do the authors have an explanation why at different wind speeds, the rotors have different transitions? How's that can affect the parameters of control architecture?

3. In section 5, why the authors select only the first four harmonics to reconstruct the

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load signal? is that because of the linearity of these harmonics or because of their energy? How would the results change if we consider more or random harmonics?

4. In subsection 5.1, the author used Weibull distribution which is one of the most widely used lifetime distributions in reliability engineering, can the authors explain what is the range of Whöler exponent used in the steady state and with turbulence cases? Can the authors explain the effect of the gust or rare-events on the Whöler exponents and the dominant harmonic components.

5. In section 6, it is unclear why the peak loads are more deterministic than DELs and rotating component loads are more deterministic than non-rotating component loads?

6. In section 6, the authors mentioned that "turbine parts have large turbulent components that are not directly modeled in steady state"; what are the authors mean by not directly modeled, and how much this point can affect the correlation and standard deviation shown in figure 6?

7. In section 6, do the linear calibration factors are related to selecting only first four harmonics?

8. In section 6, what is the correlation between the uncertainty and level of turbulence?

9. In section 6, the authors mentioned that "the most erroneous value (using the metric of standard deviation normalized by the mean) is the minimum tower clearance, but this is influenced by the small average tower clearance over all rotors" How much this point affect the result by assuming the tower fairing is present?

10. In subsection 8.1, can the authors be elaborated on the impact of the constraining the transition on the above-rated control at lower wind speeds?

11. In subsection 8.1, I see a potential innovation in the analysis and comparison should be provided in figure 9.

12. In subsection 8.1, the authors highlighted that the blades of the three-bladed rotors

experience lower loads in comparison with the two-bladed rotors, it is unclear if this is the case for the damage equivalent load, can the authors explain that.

13. In subsection 9.1, please can the authors explain how 2P harmonic load components were used to determine 3P load. Also, what is the impact of the 2P and 3P on rotating and non-rotating parts? Did this analysis include the effect of steady-state and turbulence? Please be elaborated.

14. In section 9.2, it is unclear why the authors omitted the turbulent component from the calibration set of 2-bladed rotors.

15. In subsection 9.3, can the authors highlight the turbulence contribution on the peak load on the main bearing and the other non-rotating components in term of the cone angle and combine that with the yaw bearing and tower.

16. Can the authors include the citations for the equations used in this study?

In closing, thank you for considering my comments. I found this work potentially interested and could help in improving blade design.

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