Date October 27, 2021
Our reference n/a
Your reference n/a
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Subject Response to referees

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Anonymous Referee #1, Anonymous Referee #2
Referees, Wind Energy Science

Dear Referees,

First of all, the authors would like to thank the referees for their positive and constructive feedback. We believe that the comments have helped us to improve the quality of the paper. In our attempt to account for the comments, we have thoroughly revised different aspects of the paper. The objective of this document is to respond to the points raised by the referees and to provide a detailed overview of the changes made to the paper. The document consists of two sections where we will respond to the review report provided by each of the referees.

Yours sincerely,

Sachin Navalkar
Mees van Vondelen
Alexandros Iliopoulos
Daan van der Hoek
Jan-Willem van Wingerden

Enclosure(s): Response to comments of Anonymous Referee #1
Response to comments of Anonymous Referee #2

Response to comments of Anonymous Referee #1

- As a negative point, it can be said that the fact that the work is focused in offshore wind turbines it is not always clear, which originates from the structural similarity to onshore wind turbines. The text would benefit from a small mention to the onshore counterparts, though this is not mandatory.
  A clarifying mention was made to the onshore counterparts in the introduction.

Response to comments of Anonymous Referee #2

- The reviewer thinks that the effort the authors spent in their introduction to justify the need for more accurate damping estimation would better be directed to the damping estimation during the real lifetime of the structure. Continuous estimation of damping along with other structural properties would enable continuous updating of the lifetime predictions. If the initial conservative damping assumptions were replaced continuously by more realistic damping estimates longer lifetimes associated with economic benefits can be expected. However, it must be kept in mind that the accuracy of lifetime predictions depends on the length of prediction times and does not only depend on the estimated structural properties but, for example, also on the implemented inspection philosophy.
  The authors agree that the main benefit from operational damping estimation can be gained with improving estimations for lifetime predictions rather than optimizing structural design during the design phase. The authors also believe that the successful estimation of structural damping in operational projects will help in a better understanding of the phenomenon, in turn leading to more accurate damping assumptions in the design phase. It is expected that such an increase in the accuracy of damping models will be accompanied by a reduction in the level of conservatism currently demanded in wind turbine design. A modification to this motivation was made throughout the entire paper.
- Is the suitability criterion fulfilment in table 2 reported from literature or is it derived from the authors' own judgement?
  Although the authors evaluated several of the considered algorithms in a practical case, the conclusions in table 2 are drawn from current literature only. A clarifying sentence has been added in the introduction to emphasize this.
- Did the present authors evaluate one or more algorithms by their own software implementations? The authors evaluated the SSI, KF-SSI, PolyMAX, Enhanced PSDT, LSCE, Cepstrum editing and Modified LSCE algorithms on experimental and simulation data from an operational offshore wind turbine. The results from this study will be presented in a future publication.

- Looking on the notation used for the equations the authors should improve the definition for the indices. For example, in Eq.(1) the sample point k and indices t1 are not explained. Index t1 is not unique on the left hand and the right hand side of the equation. Other equations should be reviewed accordingly.
  The missing definitions of indices have been added.