

***Interactive comment on* “Structural monitoring for lifetime extension of offshore wind monopiles: Can strain measurements at one level tell us everything?” by Lisa Ziegler et al.**

Anonymous Referee #1

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General comments:

The paper presents a simple way of extrapolating damage (equivalent loads) to unmeasured hotspots on a monopile using only a single strain measurement. The method relies on aero-hydro-servo elastic simulations, an (updated) finite element model, and a statistical algorithm. The work is certainly considered worthy of publication. However, an effort should be made to present a more realistic estimate of the accuracy of the presented method by taking into account at least well-known error sources, e.g. noise on the measurements.

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Specific comments:

- Potentially the largest errors come from situations in which the DELs calculated from the measured strains are inaccurate (since these form the basis for the extrapolation). This will be the case even for relatively low signal-to-noise ratios. It is suggested to investigate the effect of commonly encountered noise levels on the DEL calculation in order to give a more nuanced image of the accuracy that can be obtained with the proposed method.
- A review of existing literature on the subject is presented in the Introduction. It would be interesting to also see a comparison of the proposed methodology to the methods reviewed.
- It is presumed that the model updating mentioned on p2/line 23 is rather important for the accuracy of the estimates obtained with the proposed method. For this reason it might be good to give more detail regarding the proposed updating procedures.
- p8/line 1: “The algorithm also provides an estimate of the extrapolation uncertainty. This can be used for probabilistic assessment and potentially reduction of design safety factors.” Care should be taken with statements like these since only uncertainties related to the ideal case (perfectly accurate structural model) are now considered.

Technical corrections:

p8/line 5: Please correct “continuous”.

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