Review of : Sub-minute Fatigue Monitoring for Enhanced Lifetime Assessment of Wind Turbines

Summary

The paper investiagtes the effect of different factors in estimating fatigue damage from structural health monitoring measurements, with the objective of identifying the influence of several confounding factors on damage estimation. Specifically, the authors investigate the effects of damage representation, fatigue calculation methodology, analysis window length, and data sampling frequency, while considering both the high- and low-frequency contributions of the measured moment signal. The study compares established fatigue assessment standards (Eurocode 3 and DNV) together with different processing methodologies, including Low-Frequency Fatigue Dynamics (LFFD), start–peak–valley–end cycle extraction, and maximum–minimum approaches. The paper provides a valuable comparison of the factors influencing fatigue damage estimation and offers useful practical guidance for selecting appropriate methodologies. Overall, the paper is suitable for publication after addressing the minor comments listed below.

Comments

Comment 1 – Experimental setup

Without breaking confidentiality, would it be possible to provide more information on the wind farm from where the data was colected? Additionally, would it be possible to explore the effects of wakes on the turbine loads, if any?

Comment 2 – Extrapolation

Would it be possible to include an additional study investigating whether the fatigue damage estimated at the instrumented tower section can be extrapolated to other locations along the tower, such as the tower top or tower base? These locations are often of greater practical interest for structural health monitoring and lifetime assessment. Even if such an analysis is beyond the scope of the present work, a discussion of the challenges and limitations associated with extrapolating damage estimates to other structural locations would strengthen the

paper.

Comment 3 – Discussion on the damage calculation

For completeness, the authors could provide additional details on the fatigue damage calculation methodologies considered in the study. Including the governing equations or a brief description of the underlying algorithms for each approach would improve the paper's accessibility and allow readers to better understand the differences between the methods.

Comment 4 – Operational States

Did the authors consider analyzing the impact of different operational states (e.g., start-up, shutdown, normal operation, and idling) on fatigue damage accumulation? If not, could they comment on why this analysis was omitted? Understanding the contribution of individual operational states, particularly their role in generating low-frequency, high-amplitude load cycles, would provide valuable insights into the mechanisms driving fatigue damage and further strengthen the paper.

Comment 5 – Cluttered figures

Some of the figures in Section 4, particularly Figures 8, 10, and 11, appear visually cluttered and contain a large amount of information. I recommend simplifying these figures or splitting them into multiple panels to improve readability and make the key findings easier to interpret.