1) Scientific significance: Does the manuscript represent a substantial contribution to scientific progress within the scope of Wind Energy Science (substantial new concepts, ideas, methods, analyses, or data)?	○ Excellent ● Good ○ Fair ○ Poor
2) Scientific quality: Are the scientific approach and applied methods valid? Is sufficient information given so other researchers (in principle) can repeat the work? Are the results discussed in an appropriate and balanced way (consideration of related work, including appropriate references)?	○ Excellent ● Good ○ Fair ○ Poor
3) Presentation quality: Are the scientific results and conclusions presented in a clear, concise, and well-structured way (abstract conveys efficiently the essence of the paper; number and quality of figures/tables; appropriate, fluent and precise use of English language)?	○ Excellent ○ Good ○ Fair ● Poor

For final publication, the manuscript should be

- ○ **accepted as is**.
- ○ accepted subject to **technical corrections**.
- ○ accepted subject to **minor revisions**.
- ● reconsidered after **major revisions**:
- ○ **rejected**.

Were a revised manuscript to be sent for another round of reviews:

- ● I would be willing to review the revised manuscript.
- ○ I would not be willing to review the revised manuscript.

The paper

"Dynamic displacement measurement of a wind turbine tower using accelerometers: tilt error compensation and validation"

By

Clemens Jonscher et al.

focuses on vibration-based structural health monitoring (SHM) for wind turbine support structures, specifically addressing the challenge of tilt error in accelerometer measurements. Tilt error arises from the gravitational acceleration component mixed with structural acceleration data. If not accounted for, this error can lead to inaccurate evaluations, especially in fatigue estimation and dynamic displacement assessments.

Traditional methods require an additional sensor to measure the tilt angle at each point, which is not feasible for previously recorded measurements lacking tilt information. To address this, the study proposes a novel tilt error compensation method using the static bending line of the structure. This approach allows for estimating the tilt error in advance without the need for extra sensors.

The method was validated on an onshore wind turbine tower using accelerometer measurements and compared with contactless absolute distance measurements obtained via terrestrial laser scanning (TLS). Results show that the tilt error significantly impacts quasi-static motion below 0.2 Hz, leading to a minimum amplitude error of 9%. However, normalized bending mode shapes around 0.3 Hz are only slightly affected.

In summary, the proposed tilt error compensation method is interesting and could be vey useful to researchers and practitioners alike. However, before granting full acceptance, the following remarks should all be addressed by the Authors.

1. A flowchart of the complete method, building upon the one already reported in Figure 1 for signal preprocessing, could improve the reader's understanding, , reporting in a clearer and visual way a step-by-step breakdown of the methodology
2. The authors could provide more context for the amplitude error percentages (e.g., 9% and 95% errors) and how these values impact the practical application of the method. Do these errors have significant consequences in real-world monitoring for daily operations?
3. If this Reviewer understood well the Authors’ intended meaning, the "95% overestimation of dynamic displacement amplitude" at low frequencies is quite high. Addressing whether this error can be reduced, or how it might impact the overall results, would strengthen the analysis.
4. It would be useful to further expand on how noise is currently handled in the TLS data and accelerometers, and what further preprocessing techniques can be applied to minimize it.
5. Further elaboration on how this tilt compensation method could be integrated with existing structural health monitoring (SHM) systems (e.g., in wind turbines) would be useful. Discussing how feasible the implementation is, whether it requires specific hardware, and any practical challenges would add practical value. In this regard, it can be useful to introduce and mention the recent review works of https://doi.org/10.3390/s22041627, where several technologies and strategies are discussed.
6. If this Reviewer understood correctly, the idea of using bi-axial versus tri-axial MEMS accelerometers for tilt error compensation is interesting but underexplored. More details on this comparison and how it might influence future designs would enhance the discussion.
7. It would be beneficial to include error bars or confidence intervals for the measurements, providing a more robust quantification of uncertainty. Also visualizing these C.I.s would be useful.
8. The Conclusions are a bit lengthy and could be shortened.
9. The conclusions touch on some potential limitations (e.g., inaccuracies in the laser and accelerometer positioning, deviations from the FE model). These could be highlighted more explicitly as limitations in the paper, so readers understand the scope and limitations of the proposed method.
10. The conclusions suggest that the method works well for wind turbine tower dynamics but could be expanded to other applications (e.g., rotor blades or other low-frequency displacement measurements). Providing a clearer discussion on the method’s scalability to other structures or conditions would add value to the paper.

11. The applicability of the method for different frequencies and measurement environments (such as offshore wind turbines) could also be discussed in more detail.