

Dear Referee #2,

First and foremost, thank you for reviewing our paper “*A machine learning-based approach for active monitoring of blades pitch misalignment in wind turbines*” (Preprint wes-2024-100).

Thank you for your positive feedback.

We have revised the original manuscript to include all your suggestions. In the amended version of the paper, the changes marked in red refer to your suggestion. The reply to your major comment is reported here below.

Major comment

*[Reviewer] I noticed that the manuscript focuses on the scenarios with unbalanced blade misalignments. These unbalanced cases ensure the Yawing moments differ from the healthy case. I was wondering if the Yawing moments will still be at the non-N Rev positions when the three turbine blades have the same amount of misalignments. In this case, can the proposed ML model make accurate predictions?*

[Answer]

The cases in which all blades present the same amount of misalignment, which can be briefly called “collective misalignment”, were analyzed but not included in the manuscript. The collective misalignment does not imply an imbalanced rotor, because the rotor loads remain almost symmetrical, with the wind turbulence being the only mild source of asymmetric loading. Consequently, the characteristic peak at 1xRev is not visible in the spectral analysis. Regarding the ML performance in these cases, since the vibrations do not present distinguishing features compared to the healthy case, the model would not detect significant anomalies in terms of yawing and nodding moments.

To also detect collective misalignment, the ML model could be integrated with additional features, e.g. power data. Preliminary investigations show that, in the above-rated speed range, the controller compensates for the collective misalignment and trims the machine at maximum power, basically canceling out its fingerprint in the produced power. However, at low wind speeds (below rated), the collective misalignment is associated with a mild reduction of power with respect to the healthy case. Since we haven’t yet obtained consolidated results, we prefer not to update the present methodology, leaving this opportunity as a future application.

[Action] No additional analysis on this specific scenario has been included in the manuscript, as the focus was on unbalanced cases where rotor asymmetries lead to more prominent yawing and nodding moments and detectable anomalies. A sentence, to briefly describe the case of collective misalignment, is included in the conclusion within the paragraph related to possible outlooks.

We look forward to your kind reply, and in the meanwhile, we send our warmest regards.

Sincerely yours,

Sabrina Milani, on behalf of all Authors.