Dear Referee #1,
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)*. We are glad that your feedback was positive.
We have carefully revised the original manuscript to accommodate all your suggestions, taking this opportunity to make minor improvements to the text. In the amended version of the paper, the changes marked in orange refer to your comments. The point-by-point reply to your comments is reported here below.

Major comments

[Reviewer] Line 69: My one main comment/concern for this paper is the reproducibility. You mention that your method uses a "minimal set of sensors", but you never mention which sensors/measurements you use from the wind turbine. Without a clear discussion of what in-situ measurements are needed, this method will not be able to be reproduced or tested in the field.

[Answer] We agree with the reviewer. With the sentence "minimal set of sensors" we refer to the fact that the proposed methodology relies on a few sensors commonly installed on wind turbines for monitoring purposes. In particular, the measurements employed are 1) flap-wise and edge-wise blade root moments, sampled to capture the averaged values over a rotor revolution; 2) Nodding and yawing moments measured at main bearing, sampled to capture amplitude and phase of the oscillation at rotor frequency; 3) wind speed, sampled to capture averaged values over 10 minutes; 4) Rotor azimuth angle, sampled to perform the demodulation of nodding and yawing moments. No additional signal is required by the presented version of the approach to perform pitch misalignment detection and localization.
Additionally, we are actively working on improving the reproducibility of our approach, addressing the fact that moment sensors may not be available in some wind turbines. Accordingly, we recently submitted a paper focused on estimating the robustness of the presented approach when we use acceleration measurements, more often available, instead of loads, proving that similar performance is achieved in both the detection and localization of the fault. We will ensure to keep the reviewer informed should our submission be accepted.

[Action] As we agree with the Reviewer in considering this information key to appreciate the value of the work, we revised Section 2.2 "Collected dataset structure" in the manuscript accordingly, to better define the set of sensors and measurements needed to implement the proposed approach.

Minor comments

[Reviewer] Line 15-20: You may want to add a brief discussion about what typical misalignment ranges are and how frequently this occurs on a given turbine or within an array.

[Answer] Yes. Such a discussion is already present in literature (e.g. Astolfi, Machines 2019, 7(1), 8; https://doi.org/10.3390/machines7010008, and Kusiak and Verma 2011 IEEE Trans. Sustain. Energy1 87–96, being this latter already mentioned in our literature review). Hence, we will add some sentences, as suggested by the Reviewer, referring to the existing literature.

[Action] The text has been modified according to what we previously stated, specifically in the Introduction (Section I).

[Reviewer] Does turbine misalignment decrease energy production? .

[Answer] Yes, especially in partial power region, but it strongly depends on the severity of the problem. Mild misalignment, which may create significant vibratory problems, may have a limited impact on power and annual energy production. We can easily quantify such a decrease and we can provide a picture (or a table) of that.

[Action] We included a discussion on pitch misalignment-induced power in Section 2.2 of the revised version of the manuscript, showing the impact of pitch misalignment on power production.

[Reviewer]Also, is there a significant threshold where turbine misalignment becomes more of an issue/concern?.

[Answer] According to Regulation, the design of wind turbines is subject to the presence of a small misalignment equal to 0.3 deg. Hence, a good detection strategy should be able to capture misalignment of at least 0.3 deg to maintain the machine within its operative limits.

[Action] This discussion is added to the Introduction and to the Conclusions of the manuscript.

[Reviewer] Line 147: Would it be beneficial to show the power curve here?

[Answer] We agree with the Reviewer but, instead of showing a picture, it is better to simply report the values of cut-in, cut-out and rated speeds.

[Action] The text has been modified accordingly.

[Reviewer] Line 155: What ranges of wind speeds are you considering? Is there a difference in algorithm performance when the turbine is just above cut-in vs. at rated capacity?

[Answer] The velocities considered in this work range from cut-in velocity, $v = 3m/s$, to cut-out velocity, $v = 25m/s$. For example, when considering the algorithm performance only at cut-in velocity, the F1-score for the first classification layer is 65%. On the other hand, at $13m/s$, the

F1-score of the first layer is 90.7%. Indeed, at lower wind speeds performance is reduced since the higher turbulence intensity leads to a more difficult classification. However, the results remain well above 50% confirming the robustness of the approach even in these challenging conditions.

[Action] We have explicitly stated the values for cut-in, rated and cut-out speeds in the paper, without including any additional comments on the performance at selected speeds.

[Reviewer] Figures 2 and 3: I would recommend adding (a) and (b) to each figure. It will improve clarity when references the figures in the text.

[Answer] We agree with the Reviewer.

[Action] Figure 3 in the revised version of the manuscript has been modified according to the Reviewer's suggestions, Figure 4 is a stand-alone figure.

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.