

Responses to Reviewers' Comments for Manuscript [10.5194/wes-2026-83](#)

# **SCADA-free wind turbine drivetrain health monitoring using a physics-informed multivariate autoencoder**

Addressed Comments for Publication to

Wind Energy Science

by

Faras Jamil, Cedric Peeters, and Jan Helsen

## Document Overview

This document contains the authors' responses to the reviewers' comments for manuscript 10.5194/wes-2026-83, "SCADA-free wind turbine drivetrain health monitoring using a physics-informed multivariate autoencoder." The document is structured as follows:

- **Section 1:** Responses to Reviewer 1's comments
- **Section 2:** Responses to Reviewer 2's comments

## Authors' Response to Reviewer 1

**General Comments.** This paper proposes a wind turbine vibration condition monitoring method based on a physics-informed multivariate autoencoder. Verified and analyzed by experimental data, the proposed method can effectively fuse multi-dimensional vibration monitoring indicators, realize early fault diagnosis of wind turbines, and significantly reduce the labor cost and operation and maintenance pressure of manual condition monitoring. In general, the paper has a complete framework, clear logic and standardized writing. However, there still exist several issues to be improved and discussed in the research content. The specific revision suggestions are provided as follows.

### Response:

Thank you for the assessment. We agree with it and have improved the manuscript based on your review.

### Comment 1

It is suggested that the introduction section be further refined. On the basis of the review of current research status, the authors should explicitly state what this paper aims to accomplish and how it differs from previous studies.

### Response:

The Introduction has been revised to explicitly state the research gap, the objective of the paper, and the novelty of the proposed method.

**Changes to the manuscript:** Pages 4-5, Lines 114-139 (LaTeX diff file).

### Comment 2

There appears to be a formatting or rendering issue around Line 201, where unexpected symbols "???" are displayed. Please carefully check the manuscript formatting and correct this issue.

### Response:

The formatting issue around Line 201 has been corrected. The unexpected symbols ("??") were caused by a LaTeX rendering/formatting error in the manuscript and have now been fixed.

**Changes to the manuscript:** Page 8, Line 224 (LaTeX diff file).

### Comment 3

The description of Figure 5 is not sufficiently clear. Although the blue and red colours are described as representing the minimum and maximum values, respectively, the actual numerical values corresponding to these extrema are not provided. It is recommended to include the corresponding numerical values, either in the figure or in the caption, to improve the readability and facilitate quantitative interpretation.

#### Response:

Figure 5 has been updated to include the numerical values corresponding to the minimum and maximum values of the colour scale. This improves readability and enables quantitative interpretation of the results.

**Changes to the manuscript:** Page 11, Figure 5 (LaTeX diff file).

### Comment 4

Although the authors state that detailed information cannot be disclosed due to confidentiality, Section 2.2 investigates the correlation among signals from 11 vibration sensors. Therefore, it would be beneficial to provide a schematic illustration showing the approximate locations of these vibration sensors on the drivetrain. Such a schematic does not need to reveal confidential structural details but would greatly improve readers' understanding of the sensor configuration and the physical interpretation of the results.

#### Response:

A schematic illustration of the wind turbine drivetrain, including the approximate locations of the 11 vibration sensors, has been added to Section 2.2. The figure improves the interpretation of the correlation analysis while maintaining the confidentiality of proprietary drivetrain details.

**Changes to the manuscript:** Page 12 Section 2.2.2 and Figure 6 (LaTeX diff file).

### Comment 5

The results indicate that the diagnostic performance is sensitive to the selected threshold. However, the current analysis only compares relatively high and low threshold values. It is observed that a higher threshold leads to false negatives (FN), while a lower threshold increases false positives (FP). It is recommended that the authors investigate several intermediate threshold values. This may provide a better trade-off between sensitivity and specificity and further improve the diagnostic performance.

#### Response:

The performance analysis has been expanded to include an intermediate threshold level (MT) in addition to the previously evaluated low (LT) and high (HT) threshold levels. The results show that the MT level achieves the highest balanced accuracy while maintaining complete detection of all confirmed fault cases and reducing the number of false alarms. This additional analysis provides

a more comprehensive assessment of the trade-off between sensitivity and specificity and supports the selection of a practical operating threshold.

**Changes to the manuscript:** Pages 23-27, Lines 446-464, 477-495, 509-513, 526-541, and 546-549 (LaTeX diff file).

**Concluding Response.** We thank the reviewer for the constructive comments. We have revised the manuscript to clarify the research gap and novelty, improve the presentation of the results, add a schematic illustration of the sensor locations, correct formatting issues, and extend the threshold analysis with an intermediate threshold level. We believe these revisions improve the clarity, completeness, and practical relevance of the manuscript.

## Authors' Response to Reviewer 2

**General Comments.** To the best of my knowledge, I have thoroughly reviewed the revised manuscript, and I would recommend in accepting the manuscript based on my review.

### **Response:**

We would like to thank the reviewer for the careful review of the manuscript and for recommending its acceptance. We greatly appreciate the positive feedback and the reviewer's time and effort in evaluating our work. No further modifications to the manuscript were required.