

Virtual sensing for strain estimation in wind turbine support structures based on a biaxial accelerometer

Answer to the reviewer's comments

The authors would like to thank the editor and reviewers for their time and effort to review the article and for their constructive and relevant comments. We appreciate the chance to clarify the addressed points. This will undoubtedly help in improving the quality of the manuscript. The article is revised according to the reviewers' remarks and queries, with detailed responses and explanations of the edits given below. Edits in the manuscript have been highlighted in red color for the first reviewer (Report #1) and in blue color for the second reviewer (Report #2). We note that during the revision, the number of lines has been changed. Therefore, in the proceeding paragraphs, we refer to the revised article.

Report #1

The authors thank the reviewer for their feedback. As no revision was suggested, no changes were made in the manuscript based on Report #1.

Report #2

The authors thank the reviewer for their feedback. The following typos have been corrected:

- Page 9 line 211:

The two Euler angles ϕ and ξ represent a rotation about the sensor x -axis and z -axis, respectively

$$R = \begin{bmatrix} \cos \xi & -\sin \xi & 0 \\ \sin \xi & \cos \xi & 0 \\ 0 & 0 & 1 \end{bmatrix} \cdot \begin{bmatrix} 1 & 0 & 0 \\ 0 & \cos \phi & -\sin \phi \\ 0 & \sin \phi & \cos \phi \end{bmatrix}. \quad (9)$$

- Page 22 line 427:

However, it should be noted that frequencies above 2 Hz, which are dominated by the rotor dynamics and higher tower eigenmodes, can have a larger influence on the fatigue loads in the support structure for other operational or environmental conditions, for example by increasing the strain amplitude during sudden events like shut-down or start-ups.

- Page 26 lines 490-493:

Other loads acting on the tower like the rotor load eccentricity or the wave load do not distort the strain estimation in the investigated dataset. Furthermore in SS-direction, the quasi-static frequency range, where the load assumptions effect the estimation, is less relevant in SS-direction than in FA-direction, as a larger share of the fatigue-relevant vibration occurs at the first eigenfrequency.