

## Response to reviews

September 8, 2022

Thank you for the revision of our manuscript. In this document we indicate the response to the referee's comments and how we have included them into the paper.

### Referee #1:

The manuscript has improved and the authors have adequately addressed most of the comments. Some minor remarks still remain unaddressed and are reported in the following:

A general revision of the English is recommended. For example, line 301 "produce" not "produced".

We have reviewed the English and we have corrected: "hypothesis" instead of "hypotheses" (Line 277), "produce" instead of "produced" (Line 301), "are showed" instead of "are shown" (abstract)

The following comment was not addressed in the manuscript: Comment RC1- No. 11: P12 L223: Do the authors have an explanation on why pitch response (fig 12a) at the systems natural frequency seems to be almost completely missed by the numerical models? Response to comment RC1- No. 11: We have discarded that the difference in the PSD peaks are caused by low frequency 2nd order effects because this difference also appears at the turbulent wind only cases. Thus, we believe that the difference in PSD pitch peaks are related with uncertainties in the characterization of the couplings in DoF of the retention systems and the changes of the hydrostatic coefficient in pitch that are occurring in the experiments but not modeled in OpenFAST. Please include this hypothesis in the manuscript, it could help other researchers that are observing the same. Also, underprediction of low-frequency response is also observed in various literature works, that may help explain what you observed: [1,2] [1] Robertson A N, Gueydon S, Bachynski E, Wang L, Jonkman J, Alarcón D, Amet E, Beardsell A, Bonnet P, Boudet B, Brun C, Chen Z, Féron M, Forbush D, Galinos C, Galvan J, Gilbert P, Gómez J, Harnois V, Haudin F, Hu Z, Dreff J L, Leimeister M, Lemmer F, Li H, Mckinnon G, Mendikoa I, Moghtadaei A, Netzband S, Oh S, Pegalajar-Jurado A, Nguyen M Q, Ruehl K, Schünemann P, Shi W, Shin H, Si Y, Surmont F, Trubat P, Qwist J and Wohlfahrt-Laymann S 2020 OC6 Phase I: Investigating the underprediction of low-frequency hydrodynamic loads and responses of a floating wind turbine J. Phys.: Conf. Ser. 1618 032033 [2] Wang L, Robertson A, Jonkman J and Yu Y-H 2022 OC6 phase I: Improvements to the OpenFAST predictions of nonlinear, low-frequency responses of a floating offshore wind turbine platform Renewable Energy 187 282–301

We have cited the mentioned reference and add a brief discussion on why, according to the current knowledge, this underestimation could be caused: *"The underprediction of low-frequency response has been also described in several publications such as \cite{azcona19} and \cite{robertson20}. According to \cite{robertson20}, the numerical model low-frequency response could be improved by including  $2^{nd}$  order terms to the wave kinematics or tuning the drag coefficients."*

Figures 7-16: No values are present in the x-axis. Please add labels to the x-axis of the PSDs if possible. I suggest normalizing the x-values by some physical parameter. A good choice could be the surge natural frequency.

This point is also mentioned by Referee #2. We have followed Referee #2 recommendation of eliminating the PSD units.

## **Referee #2**

### Referee #2

#### Abstract

"are showed" should be replaced by "are shown"

"My-Mz" should be removed as it depends on the frame reference that has not yet been defined

These errors have been corrected.

#### Figures

Frequency domains Figures are labelled "Frequency [Hz]" on the horizontal axis: the unit should be removed since values are not given for confidentiality reasons.

We have removed the units as suggested

#### Conclusion

the sentence "it was used the more recent version of the SiL method" should be replaced by "we used the most recent version of the SiL method developed at CENER"

The sentence has been replaced as suggested.