Dear reviewer,
we would like to thanks you very much for taking your time to revise this extensive manuscript. We are aware that it contains a lot of information and text, which most likely made reviewing a quite time consuming task. Therefore, we appreciate that you were willing to invest this work and give us advice to improve it.

We respond to your comments directly in the following:

Several improvements to the validation process aiming at the reduction of the uncertainties were proposed and evaluated in this work. The major improvements were the measurement of the rotor thrust force excluding the tower top inertia loads, a significant improvement of 10 the wind field quality in the wave tank and the utilization of hybrid simulations based on the measured platform motions. These steps were applied to wave tank tests of a FOWT utilizing a single point mooring and the subsequent validation of the numerical panel method panMARE. The improvements allowed for a considerable decrease in the random and systematic uncertainty of

the model tests and made a valuable contribution to the distinction between cause and effect regarding the deviations between measurements and simulations.

This paper covers a lot of contents, so the introduction and analysis of each part is not very full.

We agree on this and tried to 'fill up' the analysis with a number of points so that a more complete and elaborate analysis results. The main changes in this context are:

1. More detailed characterisation of the utilised wind generator and analysis of selected wind generators used in comparable experiments (see section 4.1)

2. Comparison of wind tunnel measurements of the same rotor with measurements from the present test campaign and the present simulation model (see section 7.1)
3. Introduction of two sub-chapters to quantify the uncertainty of the tests in more detail (see sections 6.1 and 6.2)

The research content of this paper is very meaningful, but it is hoped that the author can find the main expression content of the paper, accurately refine it, and condense it into a journal article with academic value.

The reviewer hits a critical point here. The fact that a package of actions rather than one or two main actions have been performed to decrease the uncertainty of the whole validation process makes is very difficult to create a red line throughout the paper. Although the different design choices and applied methods cover a wide field, the authors believe that these need to be considered in one work instead of focusing on e.g. the wind generator only. This is due to the fact that the choice of the 'special' scaling methodology is a prerequisite the construction of the elaborate wind generator and the coverage of the full rotor area with a high quality wind field. However, as this choice comes along with a number of significant shortcomings due to the violation of the scaling rules, the advantages need to be justified with the quality of the presented results, especially regarding the rotor thrust force and its influence on the motions. This, in turn, requires (most of) the other described design decisions and applied methods (e.g. application of the inertia removal procedure, analysis of time series, focus on simple load cases,

hybrid simulations), as the increased accuracy in comparison to state-of-the-art validation approaches is needed to demonstrate the effect of the application of the scaling approach and the elaborate wind generator.

We fully understand this point and that the reviewer wishes to put more focus on one or two single topics. However, due to the above mentioned reasons, we find it difficult to correspond to this in a radical way without conflicting with the other reviewers, who seemed to be okay with the current general structure or even commented it positively. We therefore added a subdivision of the introduction into introduction, motivation and scope so that the structure of the paper becomes clearer. We are also open for more suggestions on how to practically improve the structure.

In addition, some suggestions are as follows:

1.The structure of the first and second chapters of the paper is inconsistent with the common articles. The first chapter is basically the author's statement, and the second chapter is the previous research work. In my opinion, the content of the first and second chapters should be properly integrated, and the research review of the second chapter should be used to support the views stated in the first chapter, so as to solve the sense of separation in the first two chapters of the paper.

2.In Chapter 2, so many previous works are introduced, all of which are supported by text. The authors should choose some important content to accompany the figure to illustrate.

We see the point of the reviewer here (1.), which is most likely in connected to the next comment (2.). The reason why we chose to deviate from the standard way to introduce our work is that we found the literature review to long (and detailed) to be properly integrated into the introduction as both together are about 6 pages long. Unfortunately, we do not know about a well structured work in literature, which discusses the uncertainties of wave tank testing and validation in a general and sufficiently detailed way with respect to the addressed sources of uncertainty in this work. Therefore, we found it necessary to justify our design decisions and evaluation methods on the basis of the issues occurring in original works, which finally leads to a comparatively detailed literature review.

As already discussed in the previous answer, we are afraid to impair the quality of the work in the eyes of the other reviewers when applying major changes here. Especially in case of the literature review, we received positive comments on the present version.

3.The title of Chapter 3 does not summarize the content of Chapter 3 clearly, it is too concise.

We agree on this and changed it to "Introduction and discussion of the scaling approach"

4.Chapter 4: It is best to provide a layout diagram here.

Thanks for hint. We added a layout diagram.

5.As stated in the abstract: The major improvements: a significant improvement of the wind field quality in the wave tank. This section describes the advantages of this wind generating system, but I think the advantages should be reflected by comparing the quality of the wind generating system with that of other existing basin tests. Therefore, I think a table should be used to compare some important parameters to verify the advantages of this wind generating system.

Thanks for this hint. We believe that this gives evidence that the choice of this special scaling approach and wind generator design is advantageous with respect to other wind generators. We listed the characteristics of selected wind generators from literature and performed an analysis of the flow quality based on the published figures. This analysis clearly shows the increased flow quality of the present wind generator and test setup (see Table 1 and appendix B) .

6. Table1: What is the scale ratio of the test? What scaling criteria do periods, wave heights, and wind speeds follow?

Thanks for this hint. We forgot to mention that in general, Froude scaling is applied:

"While the the platform and the hydrodynamic environment are scaled using conventional Froude scaling with a scaling factor of 45, the geometric scaling factor for the wind turbine rotor diameter was chosen to be 150….. In order to maintain the Froude similarity of the mean thrust assuming a constant thrust coefficient and tip speed ratio, the wind speed needs to be increased by the factor $\ lambda_{aero} / \lambda_{hydro}$ in comparison to conventional Froude scaling."

7. The conclusion is too long, requiring extensive cuts and rigorous generalizations

The authors agree that the conclusion was not well structured and too long. Major parts have been cut and restructured.

Best regards and many thanks for your extensive review,

Christian W. Schulz on behalf of the authors