

Review of WES-2022-36

Wind tunnel investigation of the aerodynamic response of two 15 MW floating wind turbines – Alessandro Fontanella et al.

The work investigates the aerodynamic response of a scaled 15MW rotor. The rotor is excited in Surge, Pitch, Sway, Roll and Yaw at the natural frequencies of two floaters that were designed for this rotor and at wave frequency. The article is well written, clearly structured and results appear credible and solid. The topic is scientifically relevant. I have some minor remarks for the authors:

As a general remark, although the wind tunnel dimensions are stated in the article, it would be useful to have a sketch of the wind tunnel, including its dimensions, shape, and the position of the wind turbine within it. This could go into an appendix.

L173-175: please rephrase, it is not completely clear which “last two conditions” the authors are referring to

L176-179: Is the response expected to be non-linear with respect to amplitude? The reason for testing two amplitudes should be explained more clearly

Fig.2: I understand that Heave was not tested due to limitation in wind tunnel height, however makers are present in both left and right figures which is confusing. Please either remove the heave frequency, or indicate it with different shapes/colors and add an appropriate statement to the figure legend.

L198-200. This statement is relative to all DOFs presented in page 8? What do the authors mean for “limit case”?

Figure 3: The values of C_p in the map on the right are confusing if compared to Table 3. Are these the values for the scaled model? According to table 3 C_p should be 0.35 in the “below” rated operating condition, while a value between 0.45 and 0.5 can be seen in figure 3.

L 248-250: Is it possible to estimate the effect of inertial torque? Significant variation in torque is noted in fig. 5 for roll, not matched by thrust variations. Is this caused by aerodynamic unsteadiness or does it result from inertial torque that could not be removed?

Section 5: I would suggest “wake measurement results” as an alternative section title

Figure 7: include oscillation frequency of measurements in the description

L 338-340: This statement can be confusing if read together with lines 349-351, where the contrary is suggested. I would suggest to rephrase in order to more clearly specify that the former statement is referred to low-frequency motion while the latter to high-frequency.

L 360-365: It is not clear if the meandering of the wake is noticed in above rated conditions only, or if it is noted below rated too. Conclusion suggest that this is only noted above rated but please clarify. Also, the oscillations in wake center may be interesting to investigate in more detail.

L385-387: If I interpret correctly, the quasi-static model performs well for surge, but does not predict the correct phase shift for pitch. It would be nice to elaborate on this with eq.1 and fig. 2 in mind. Perhaps rotor-level unsteadiness is more influential for pitch than for surge?

Minor text editing, for example: L 339: “helps to promote” instead of “helps promoting”, L 372: “forced to move” not “forced moving”