The present report constitutes the Protocol Manual for ensuring harmonisation of offshore wind and wave simulation being implemented at MaRINET facilities. Wind and wave climates for five offshore wind sites in the North Sea and the Baltic Sea have been presented in terms of probability distributions for wind speed along with a series of lumped sea states and turbulence intensity values, parameterised with respect to the wind speed. Further, extreme values for wind speed and significant wave height have been provided. Further to the wind distributions and lumped characteristics, the Weibull parameters for the wind distribution and explicit formulas for the turbulence intensity and significant wave height are provided. For the correlation of wave peak period and significant wave height, a standard formula from the IEC-61400-3 code have been found to cover the scatter in the data, although one coefficient in this formula must be decided upon by the user. Further, the value of $\gamma$, the JONSWAP peak enhancement parameter must be chosen by the user. This can be done either from an explicit formula or by the standard choices of $\gamma=1.0$ or $\gamma=3.3$. Hereby a full description of a unidirectional wind-wave climate can be constructed. If needed, this climate can be supplemented by the user with the combined directional distribution of wind and waves, either based on data or in terms of parametric studies. The scaling method proposed is the dynamic-elastic scaling, which maintains the ratios between hydrodynamic, aerodynamic, stiffness-induced and gravitational forces. This scaling preserves the Froude number for the water phase and the tip speed ratio for the rotor. The Reynolds numbers for air and water, however, are not conserved. A redesign of the model-scale blades will therefore be needed. Here the scaled thrust-curve must be matched. Further, if possible, the torque from the airfoil should be matched. This requirement, however, is difficult to achieve due to the change in lift/drag ratio at low Reynolds number. It is therefore foreseen, that the aerodynamic torque and thus produced power will not be scaled correctly. As a consequence, roll-forcing induced by the dynamic change in generator moment will not scale correctly. However, the correct scaling of rotor thrust is found to have higher priority and thus justifies the scaling choice.

An example of down-scaling of wind and wave conditions has been supplied. The example also demonstrates how the structure (a floating wind turbine) should be scaled. It is demonstrated that the proposed scaling yields modelscale results for thrust- and wave- induced motion that can be up-scaled to prototype scale with a perfect match.

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State: Published
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Number of pages: 50
Publication date: 2012

Publication information
Original language: English
Electronic versions:
Collation_of_offshore.pdf
Research output: Research › Report – Annual report year: 2013