Tool development for fully coupled simulation of offshore wind turbine

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ABSTRACT

Nowadays the marine renewable energies are getting an important role in the transformation of the energy model. And tools for predicting the performance of these new technologies are essential in their commercial development. An example of these are floating wind turbines (FWT), and this work presents the coupling and verification of a set of tools to carry out fully coupled simulation of FWTs. These tools are built on the seakeeping software SeaFEM [1, 2, 3, 4, 5] and on the aeroelastic simulator code FAST [6].

First, the basic features of each tools are explained. Second, a coupling strategy to assess the performance of FWTs is presented. Third, the results obtained coupling SeaFEM-FAST are used for an inter-code comparison against those obtained coupling Hydrodyn-FAST. Forth, an intensive analysis of a FWT based on the NREL 5 MW baseline is carried out taking into account the environmental conditions of the selected location. These coupled computations are carried out following the Design Load Cases proposed by IEC rules [7] to assess the Ultimate Limit State (ULS). Finally, some comparison and conclusions based on the obtained results are drawn.

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