

SeaFEM - OpenFAST coupled tool for the simulation of floating offshore multi-wind turbines

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ABSTRACT

A computational framework is developed capable of performing aero-hydro-servo-elastic simulations for the assessment of floating offshore multi-wind turbine (FOMWT) under wind and wave loads. OpenFAST [1], developed by the National Renewable Energy Laboratory (NREL), is coupled with SeaFEM's seakeeping hydro-elastic solver currently developed in house by CIMNE [2].

The data exchange in the time-domain implies that external loads computed by SeaFEM are sent to the OpenFAST wind turbine simulator, where the rigid body platform kinematics and aerodynamic wind turbine loads are computed and sent back to SeaFEM. The fully detailed structural FEM analysis of the platform and towers is performed using SeaFEM's hydroelastic capabilities [2].

The developed framework is demonstrated with the W2Power platform [3] as part of the work developed under H2020 FibreGY project [4]. In this case, two instances of OpenFAST, one for each wind turbine operating on the platform, are simultaneously coupled with SeaFEM's solver. Within the FibreGY project, the developed framework has been used to support the re-designing and assessment in fibre-reinforced composite materials of the full scale W2Power platform.

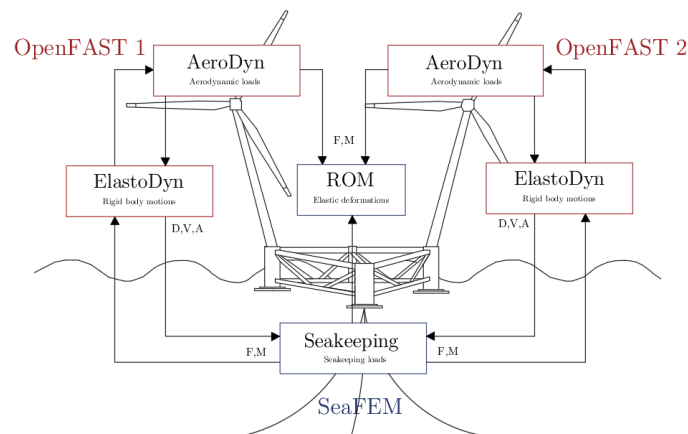


Figure 1. Numerical coupling strategy on the W2Power platform.

REFERENCES

- [1] <https://www.nrel.gov/wind/nwtc/openfast.html>
- [2] <https://www.compassis.com/en/software/seakeeping-tdyn-seafem/>
- [3] <https://enerocean.com/w2power-es/>
- [4] <https://fibregy.eu/>