



RAMBOLL

ROSA FLEX

Integrated Aero Elastic and Hydrodynamic Load Simulation

ROSAP

Rambøll has initiated a project that will develop a state of the art wind/wave loading design tool that integrates best practices from current wind turbine design and from the offshore industry. The prime goal for the development is to develop an approach that allows coupling of an existing wind software package (e.g. FLEX5) with the Rambøll structural analysis program ROSAP.

Design tools

Offshore wind farms are likely to become a very important source of energy in the near future. As a consequence the foundation structures will be exposed to both significant aerodynamic and hydrodynamic loads, and the cost of the foundation structure will increase from small in comparison with the turbine, to potentially of the same or larger importance as the turbine.

This development calls for further attention to the design of the foundation structures and the design methods used.

An important aspect in this process is the lack of proper design tools for wind park foundation structures of general space frame layout exposed to simultaneous wind and wave loading. Such a tool does not yet exist, but is much needed for a consistent and optimal design of offshore wind turbine foundations.

Aero elastic analysis

A state of the art load calculation on a wind turbine must be based on an aero elastic calculation procedure, i.e. the mutual interaction between aerodynamic and elastic deflections must be considered.

The purpose of the aero elastic analysis is thus to solve the equations of motion for a given set

of forces acting on the structure and for forces generated by the structure itself.

This leads to an analysis requirement in which the total structure must be represented in the dynamic analysis as the instantaneous loading and the aerodynamic damping at a given time depend on the structural configuration.

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