

Bachelor's thesis / Master's thesis / Interdisciplinary project
Comparison of time integration schemes in the context of large offshore wind turbines

Background

Offshore wind energy is a central component of the decarbonisation of our energy system. To use the potential of offshore wind turbines, they are continuously growing in size, reaching the power-range of 20 MW and rotor diameters of approx. 400 m. Designing such turbines is only possible using new simulation tools which find a trade-off between the computational efficiency of state-of-the-art simulation tools and the accuracy of complex and expensive methods. To this end, at ISD we are developing the in-house simulation tool “DeSiO” for the coupled aero- hydro-servo-elastic simulation of the nonlinear dynamic behaviour of such large wind turbines.

In this framework, aeroelastic equations are solved numerically using a time integration scheme. The accuracy and computational effort can vary greatly depending on the chosen method. The aim of this work is to analyse the properties of different time integration methods using a simple mechanical or aeroelastic model. In particular, the work addresses the question of which properties must be fulfilled and how well the “DeSiO”-scheme performs in comparison to commonly used methods.

Depending on the type of thesis, the scope of the investigations can be adapted.

Tasks

- Literature research to time integration schemes
- Implementation of a simple mechanical/aeroelastic model in MATLAB
- Investigation and comparison of several time integration schemes
- Documentation of the results

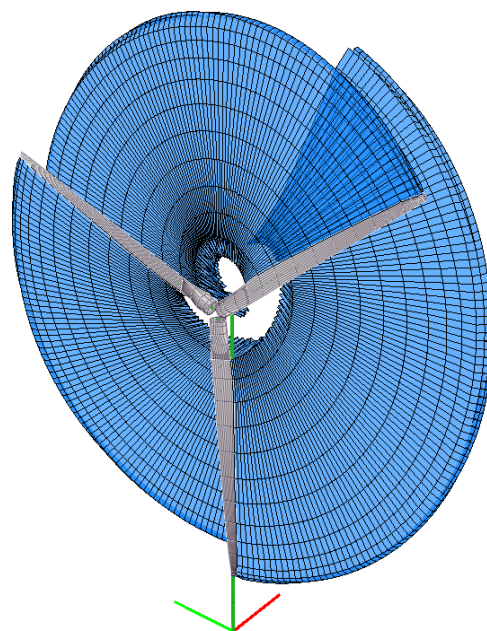
Your profile

- Interest in mechanics and modelling
- Basic knowledge in mechanics, especially in dynamics, required
- First programming experience with Matlab or similar is desirable
- Motivated and independent working style

The thesis can be written in German or English

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“DeSiO”-model of a 5 MW wind turbine