Topics for Theses and Student Projects at LWET

General Information

- The topics listed in this document are suggestions for theses and student projects including
  - Bachelor theses,
  - Software Lab Projects / Pre-Theses and
  - Master theses.
- The specific task will be concretized in consultation with the student.
- Interested students are asked to contact the responsible person stated under contact via phone or e-mail.

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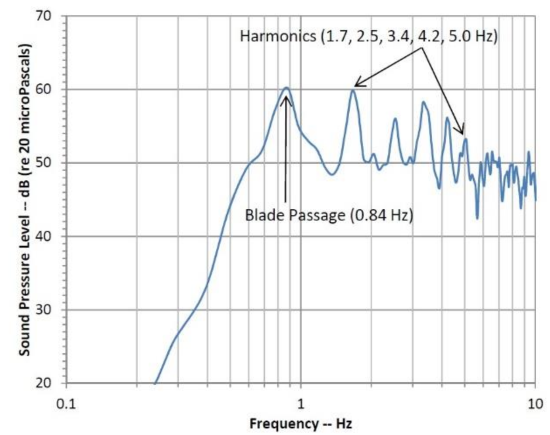
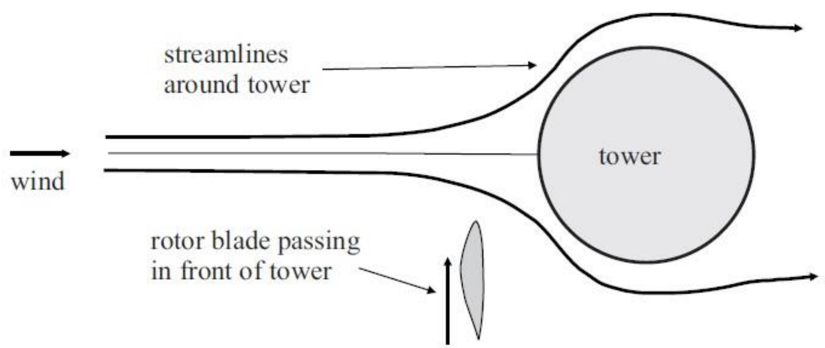
Measurement and Analysis of Infrasound from Wind Turbines

Scope

- Measurements with an acoustic camera and infrasound sensors (low pressure microphones) in the vicinity of a test facility under different atmospheric conditions and operational states
- Investigation for connection between higher and lower frequencies by comparing the results of the infrasound sensor and the acoustic camera



4 Autospectrum of wind turbine infrasound at a distance of 622 meters



Blade-tower interaction

Literature

1. Carman, R. A. (2015, August). Measurement procedure for wind turbine infrasound. In INTER-NOISE and NOISE-CON Congress and Conference Proceedings (Vol. 250, No. 1, pp. 6143-6153). Institute of Noise Control Engineering.
2. Hansen, C., Zajamšek, B., & Hansen, K. (2016). Infrasound and low-frequency noise from wind turbines. In Fluid-Structure-Sound Interactions and Control (pp. 3-16). Springer, Berlin, Heidelberg.

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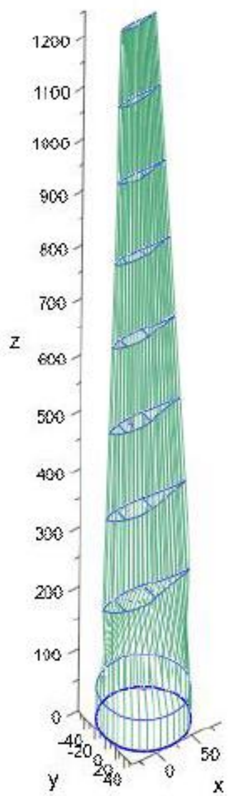
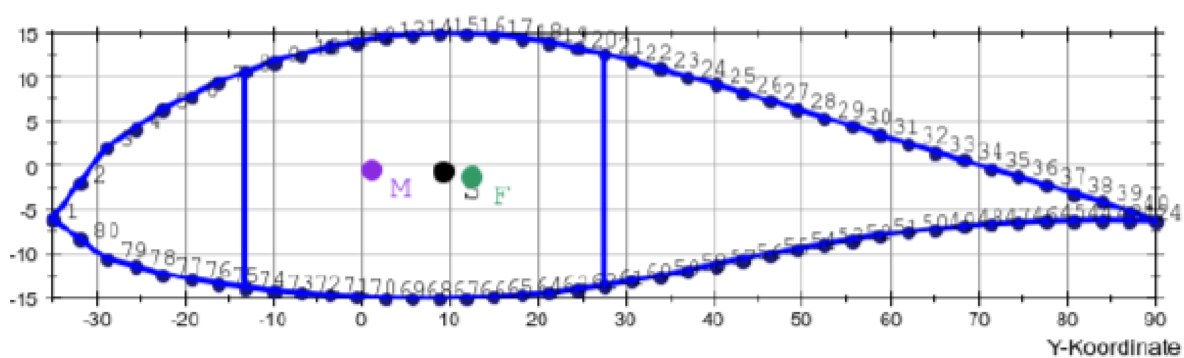
Computer Tools for Calculation of Mass and Stiffness data of Rotor Blades



Scope

- Enhancement of a MATLAB tool for calculating the profile data of thin-walled rotor blades
- Programming of an object oriented computer tool for calculating the cross section stiffness and mass data for rotor blade airfoils in C#



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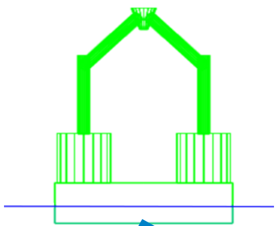
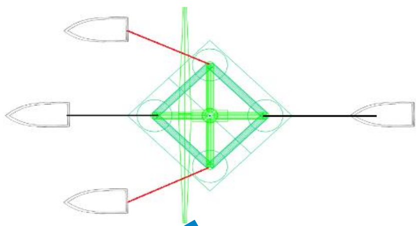
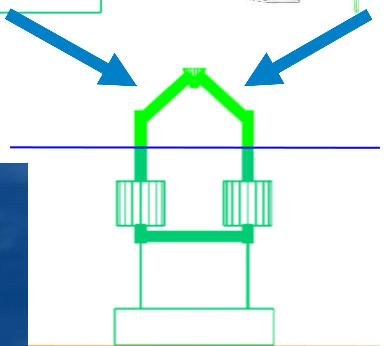
Development and simulation of the transport & installation procedures of different types of floating substructures

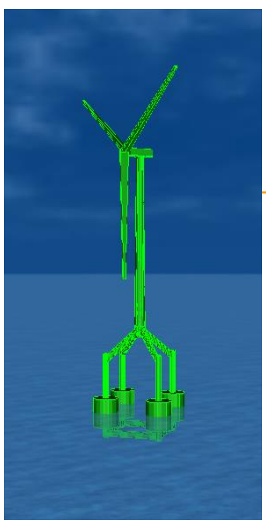


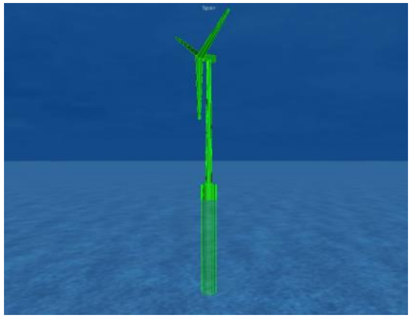


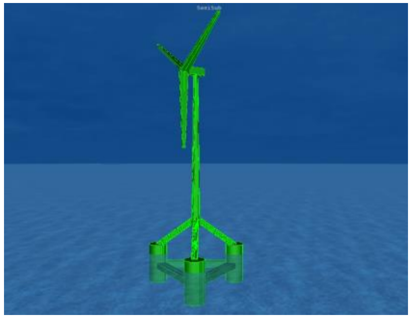


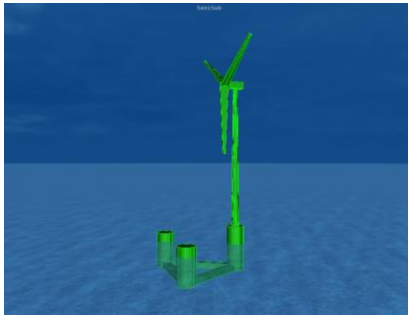
Scope

- Development of transport and installation procedures for different floating substructures designed for OWEA in the ≥15MW class
- Conducting feasibility studies of transport and installation procedures for different floating substructures designed for OWEA in the ≥15MW class
- Conducting stability analyses for different floating substructures designed for OWEA in the ≥15MW class using MOSES and ANSYS AQWA









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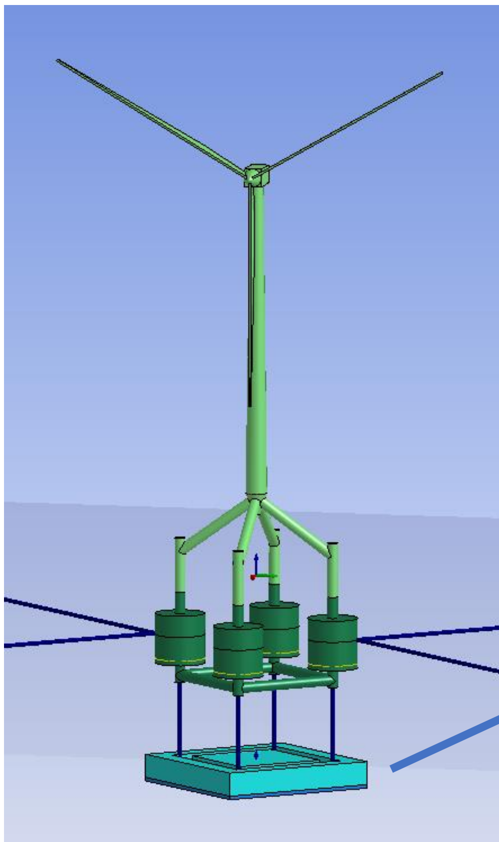
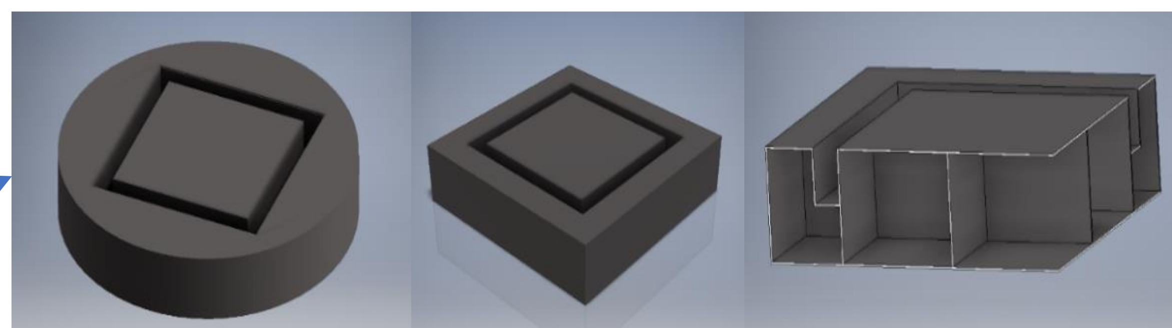
Investigation of the installation process of a floating substructure with a gravity based anchor



Scope

- Design, comparison and optimization of different gravity based anchor solutions by use of ANSYS AQWA
- Investigation of hydrodynamic effects during the installation process of the gravity based anchor by use of ANSYS AQWA
- Conducting parameter studies



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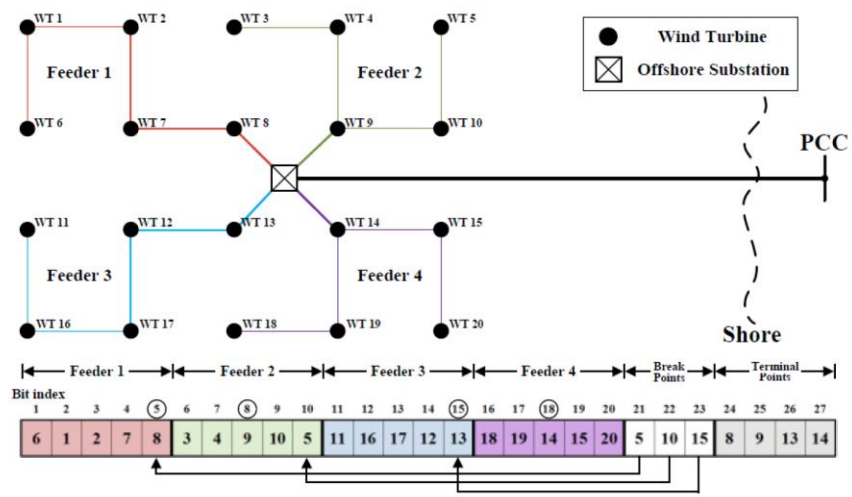
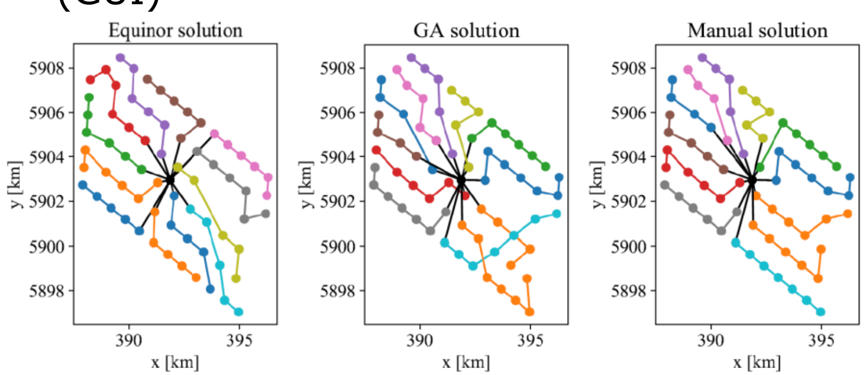
Optimization of the inter-array cabling of floating wind farms

Scope

- Advancement of a genetic algorithm for optimizing the cable routing, e.g. by considering environmental conditions (waves, current) or by preventing cable crossings
- Development and implementation of a software interface to a T&I tool or a sea state data base
- Development of a graphical user interface (GUI)



↑ Encoding of the cable layout of a wind farm for use in the genetic algorithm (from [1])



← Different cable routings for the dudgeon wind farm (with without cable crossings)

[1] W.-S. Moon, J.-C. Kim, A. Jo, J.-N. Won, Grid optimization for offshore wind farm layout and substation location, in: ITEC Asia-Pacic 2014 – Conference Proceedings, Beijing, 2014. doi:10.1109/ITEC-AP.2014.6941124.

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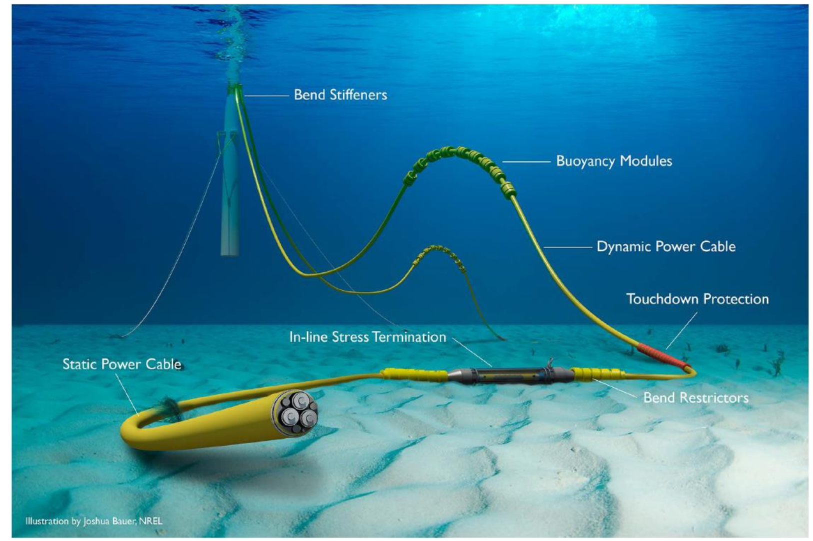
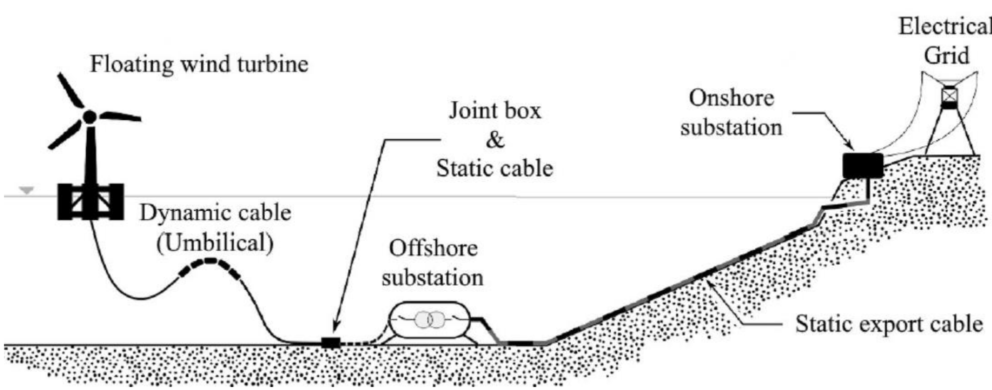
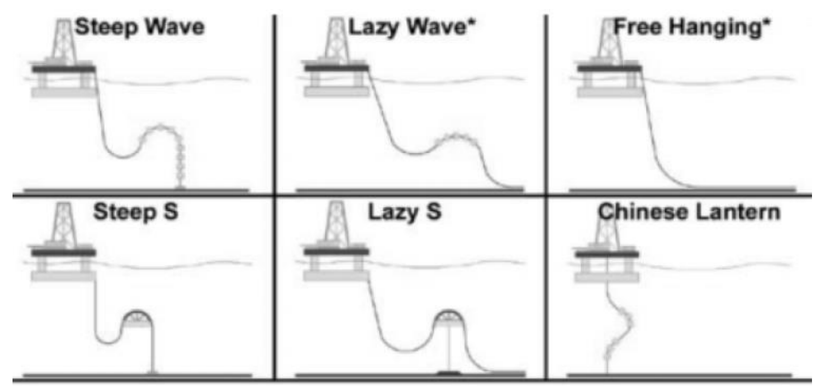
Dynamic Power Cables for Floating Offshore Wind Turbines

Scope

- Development of appropriate cable models and implementation in OpenFAST and FAST.Farm
- Determination of design loads for the cable
- Comparison and Optimization of different cable shapes with suitable algorithms, e.g. genetic algorithm
- Conducting parameter studies







Quelle: K. Krügel, Hydrodynamic design of umbilical systems for floating offshore wind applications, Presented at the FOWT 2017 Conference on March 15th 2017 (2017)

Quelle: Clausen, T., & D'Souza, R. (2001). Dynamic risers key component for deepwater drilling, floating production. Offshore, 61(5), 89-90.

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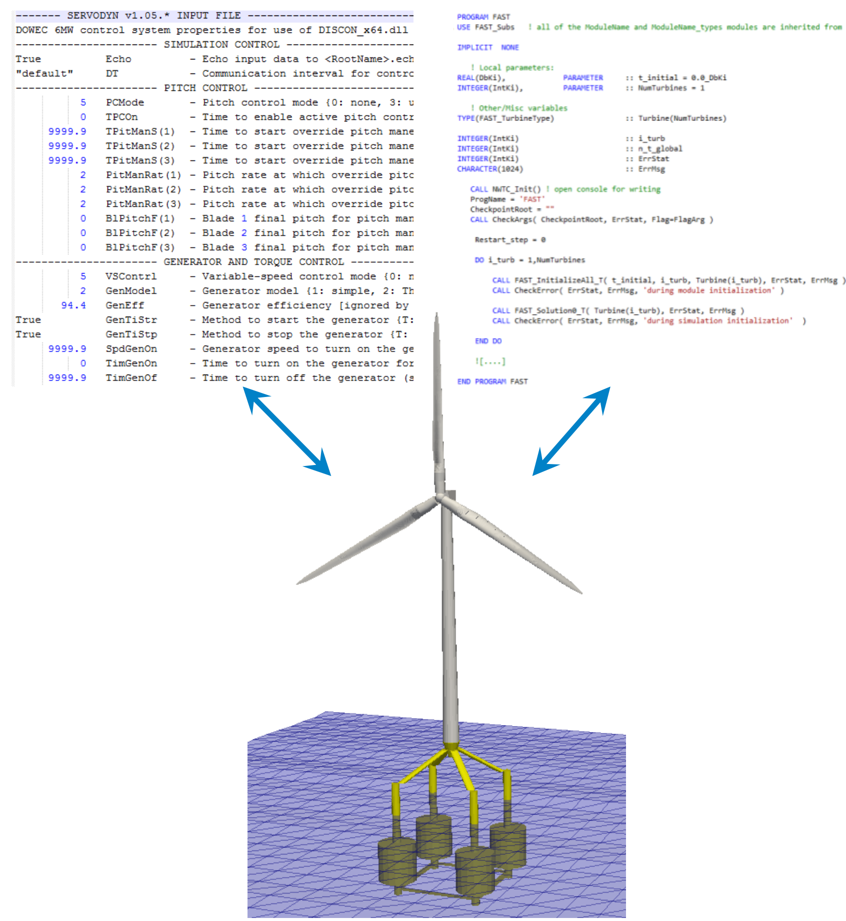
Investigation of Operational Loads of Floating Wind Turbines

Scope

- Modal analysis of floating wind turbines
- Investigation of the dynamic behaviour of platform and wind turbine with OpenFAST
- Comparison of different mooring models (quasistatic, dynamic) in OpenFAST
- Study on the impact of certain simulation parameters of OpenFAST
- Implementation of substructures in ANSYS Aqwa and coupling with OpenFAST



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