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.

Contact: PROF. UWE RITSCHEL
Statikgebäude – Raum 10
☏ (0381) 498-9570
✉ uwe.ritschel@uni-rostock.de

LWET LEHRSTUHL WINDENERGIETECHNIK

Chair of Wind Energy Technology
Universität Rostock
Albert-Einstein-Str. 2
18059 Rostock

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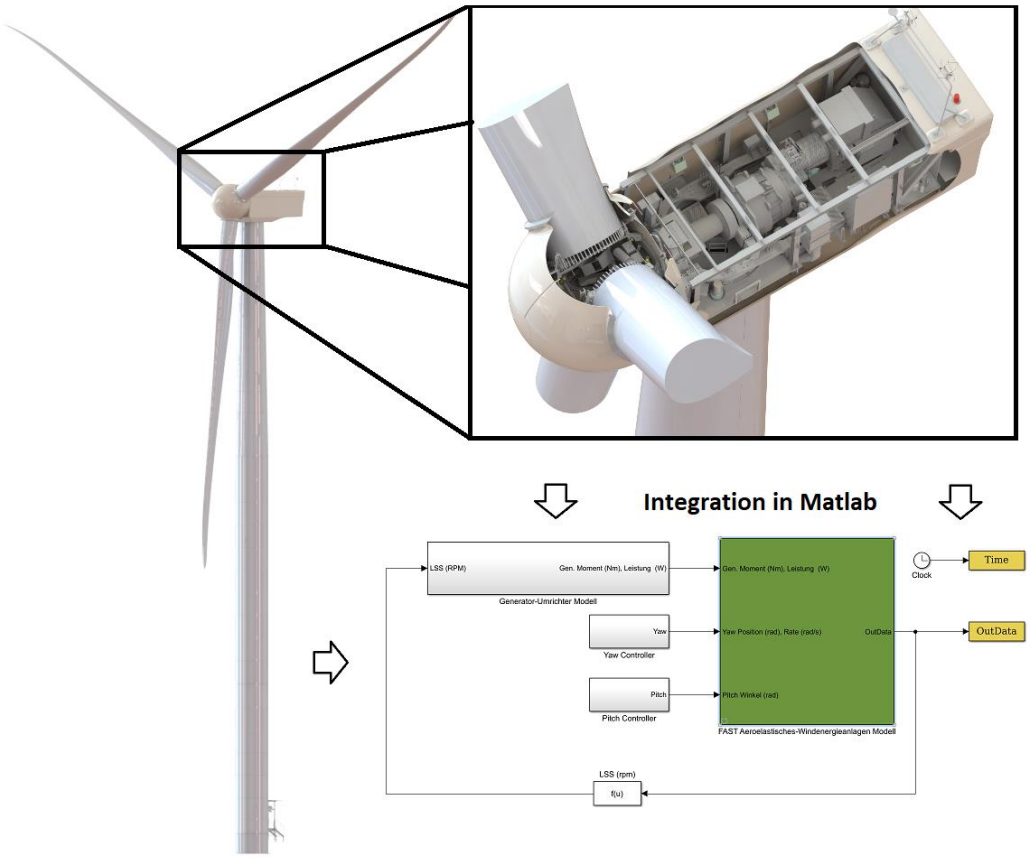
Modeling of the electrical system of wind turbines



Responsibilities

- Development of mathematical models of electromechanical components for wind turbines
- Design and development of control strategies for single wind turbines and windfarms
- Modeling with MATLAB, Simulink and OpenFAST

Contact: DIPL.-ING. STEFAN GANZEL
Stelzengang – Raum 130
☎ (0381) 498-9574
✉ stefan.ganzel@uni-rostock.de

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Chair of Wind Energy Technology
Universität Rostock
Albert-Einstein-Str. 2
18059 Rostock

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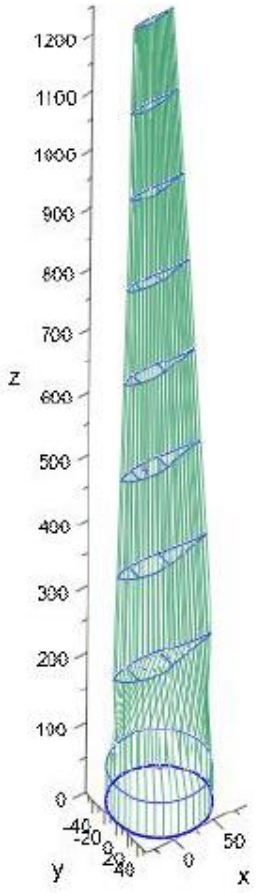
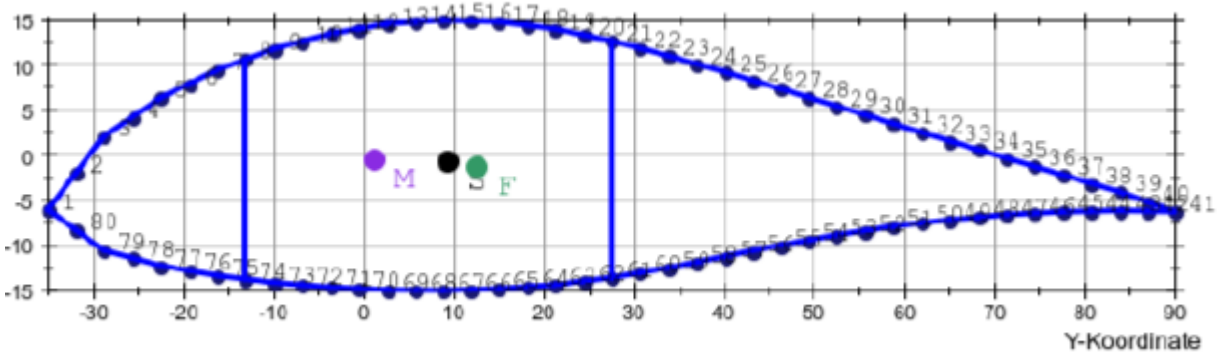
Computer Tools for Calculation of Mass and Stiffness data of Rotor Blades



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#



Contact: PD DR.-ING. HABIL. EVGUENI STANOEV
Statikgebäude – Raum 09
☎ (0381) 498-9383
✉ evgueni.stanoev@uni-rostock.de

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Chair of Wind Energy Technology
Universität Rostock
Albert-Einstein-Str. 2
18059 Rostock

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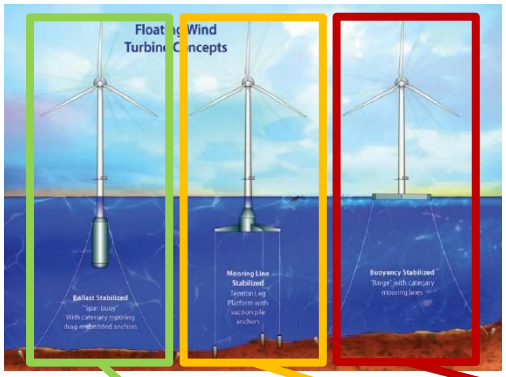
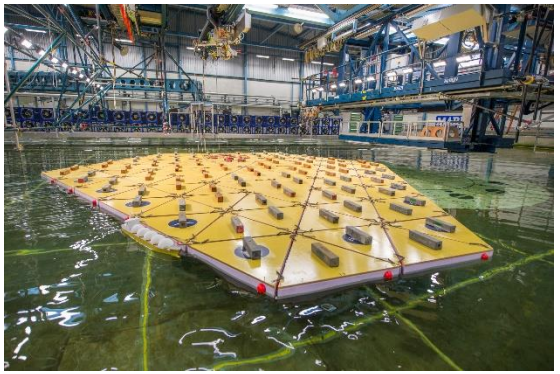
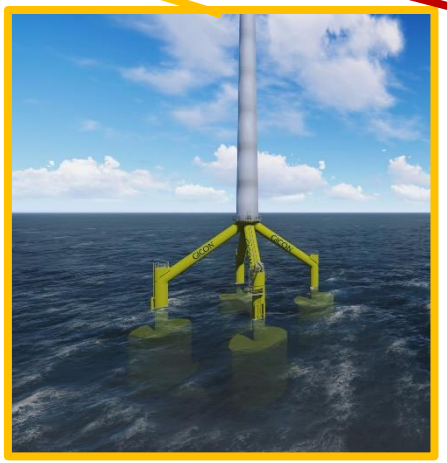
Floating Sub-Structures for Offshore Applications





Scope

- Application of novel materials and manufacturing techniques for offshore substructures
- Optimizing the structure of floating substructures using FEM
- Logistics for installation, operation and dismantling



Contact: DR.-ING. FRANK ADAM
Stelzengang – Raum 131
☎ (0381) 498-9573
✉ frank.adam@uni-rostock.de

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Chair of Wind Energy Technology
Universität Rostock
Albert-Einstein-Str. 2
18059 Rostock

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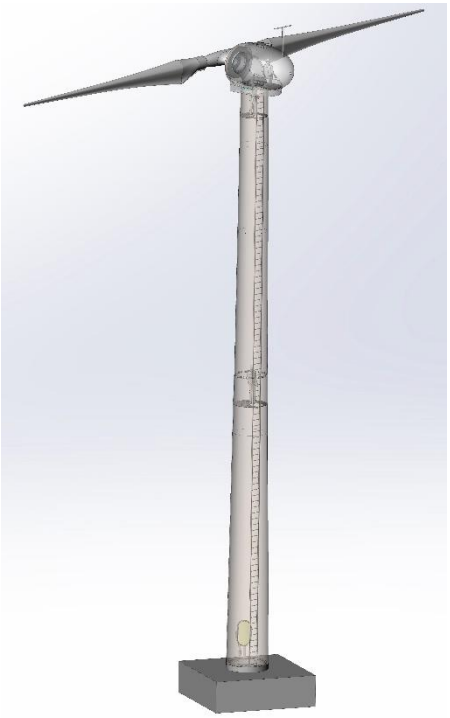
Compact Design Solutions for Wind Turbines



Scope

- Constructive extension and further development of wind turbine concepts and / or wind turbine components
- Economic structure optimization with ANSYS and CAD for wind turbines and / or its components
- Sector coupling with a wind turbine as the core of a renewable energy system

Contact: DR.-ING. FRANK ADAM
Stelzengang – Raum 131
☎ (0381) 498-9573
✉ frank.adam@uni-rostock.de

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Universität Rostock
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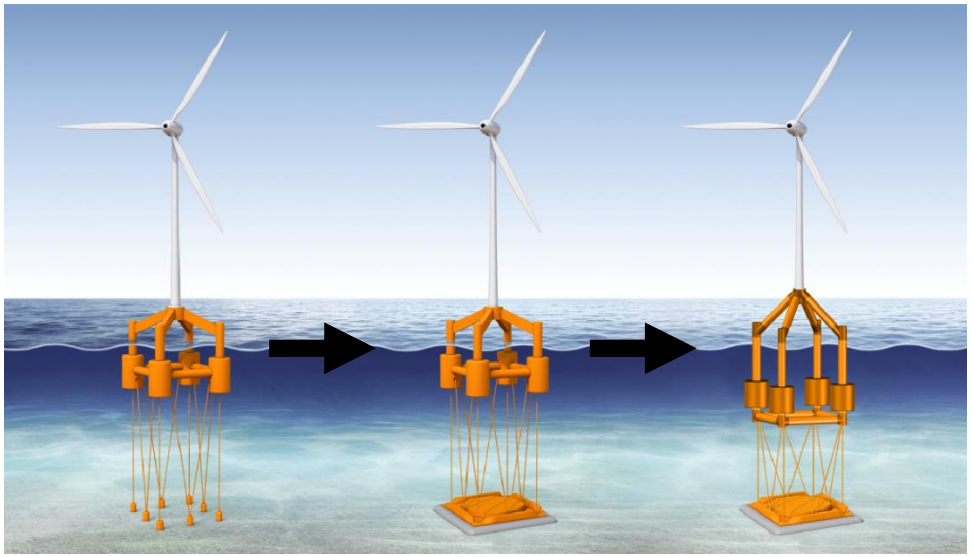
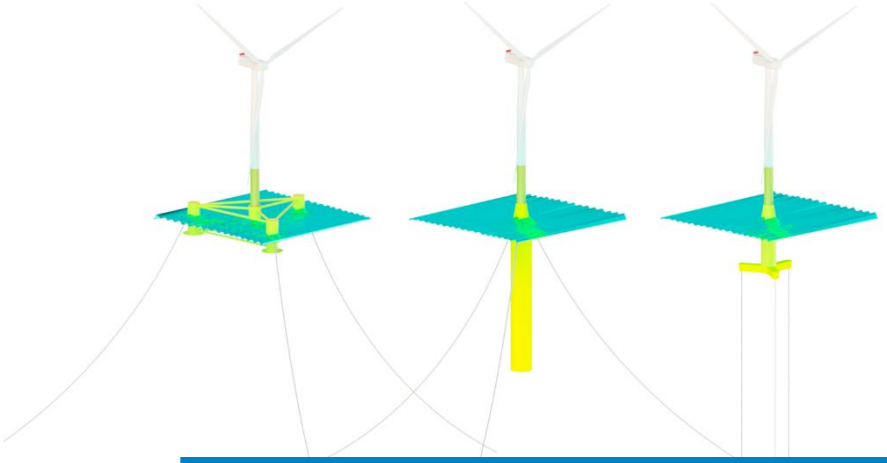
Design Optimization & Concept Development for Floating Wind Turbines



Scope:

- Concept development for the design of innovative substructures and their single parts
- Parameter study based design optimization with Bentley Moses
- Design of various floating substructures with ANSYS Aqwa



Contact: M.SC. HAUKE HARTMANN
Stelzengang – Raum 132
☏ (0381) 498-9576
✉ hauke.hartmann@uni-rostock.de

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Chair of Wind Energy Technology
Universität Rostock
Albert-Einstein-Str. 2
18059 Rostock

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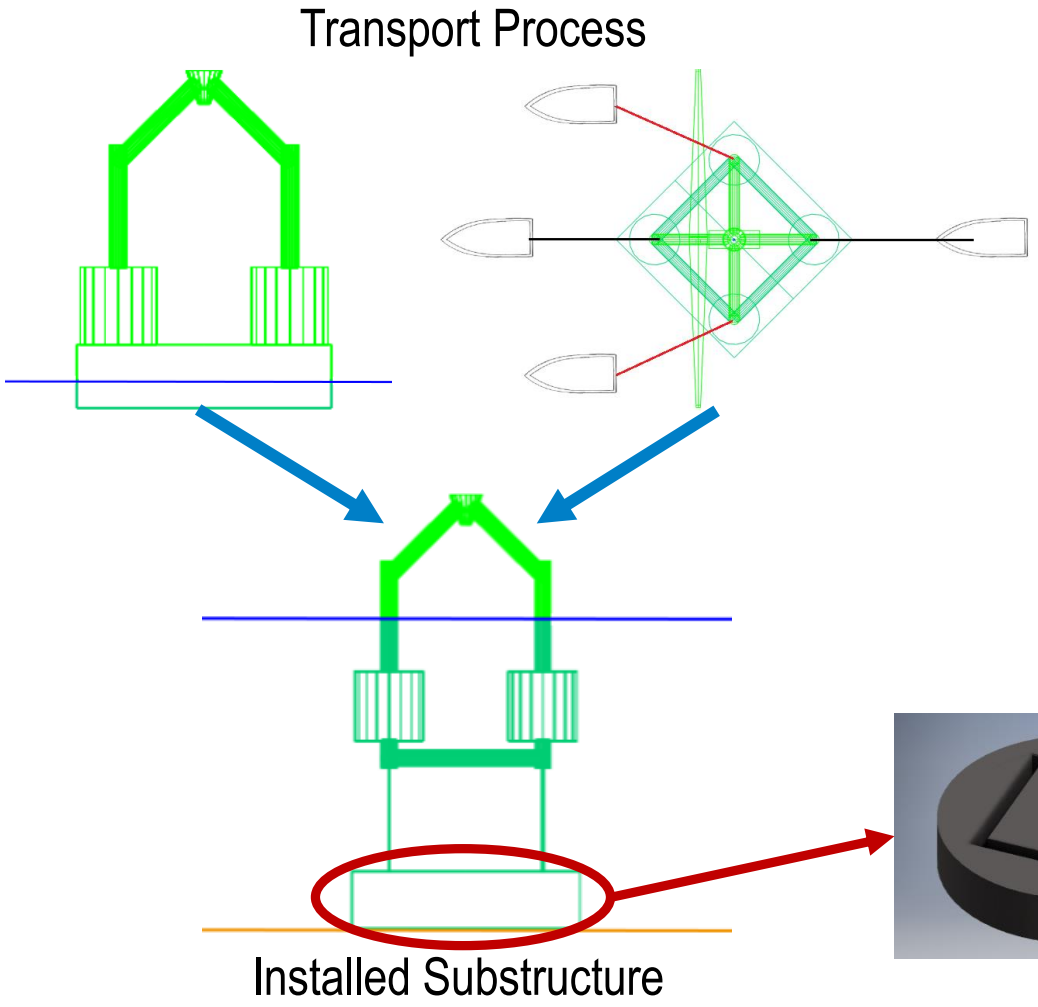
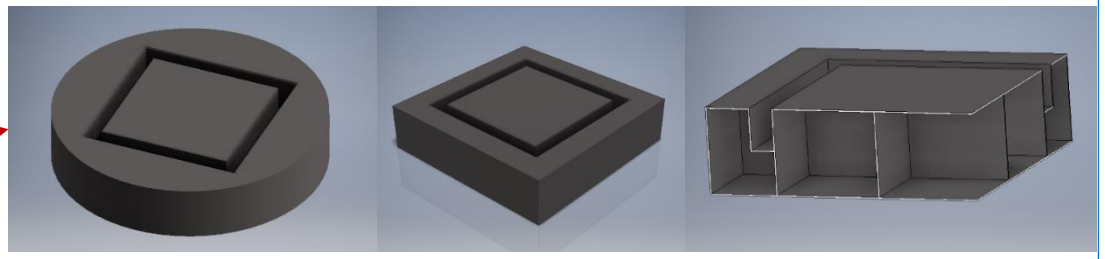
Installation of Floating Offshore Structures



Scope:

- Simulation of hydrodynamic effects during the installation process with ANSYS Aqwa and via CFD
- Design and optimization of gravity based anchor systems using ANSYS Aqwa
- Performing feasibility studies for installation concepts



Contact: M.SC. HAUKE HARTMANN
Stelzengang – Raum 132
☎ (0381) 498-9576
✉ hauke.hartmann@uni-rostock.de

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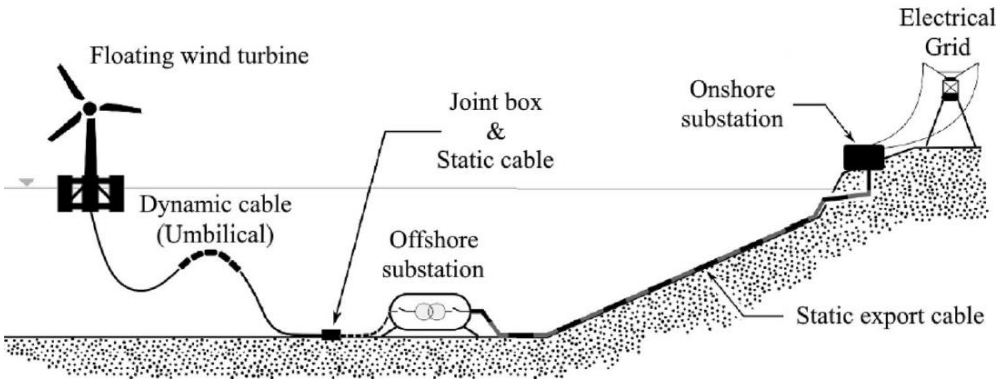
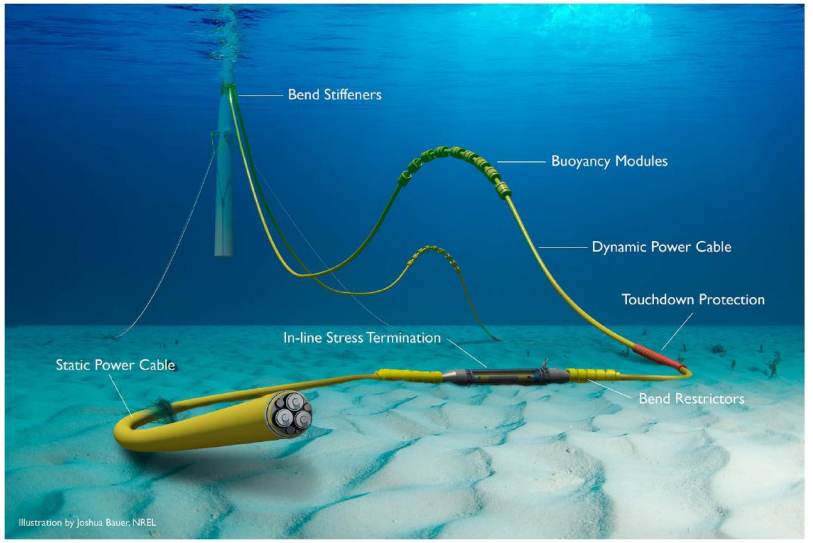
Dynamic Power Cables for Floating Offshore Wind Turbines

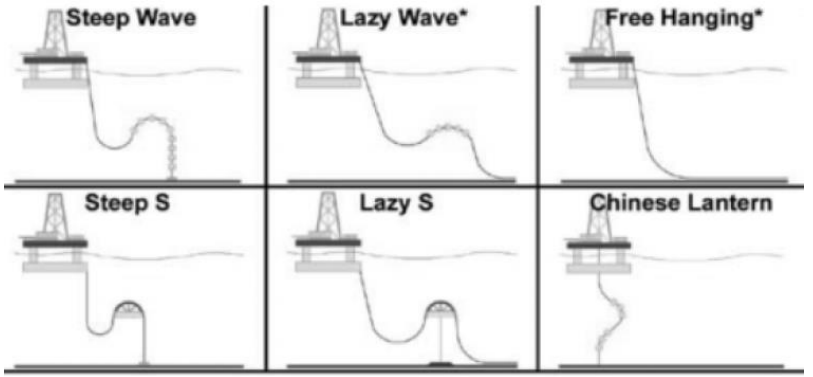
Scope

- 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.

Contact: M.SC. PAUL SCHÜNEMANN
Stelzengang – Raum 132
☎ (0381) 498-9575
✉ paul.schuenemann@uni-rostock.de

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Chair of Wind Energy Technology
Universität Rostock
Albert-Einstein-Str. 2
18059 Rostock

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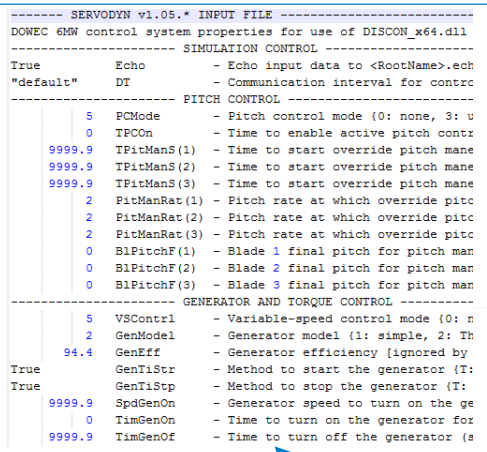
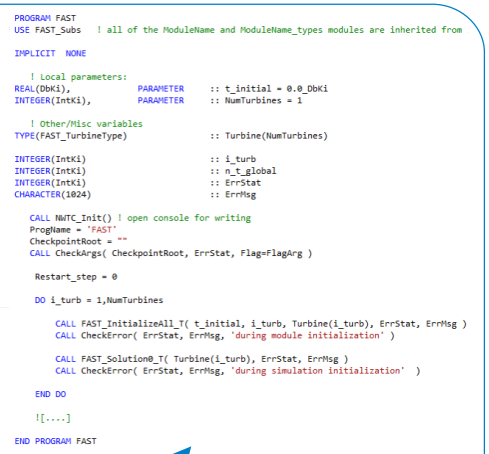
Investigation of Operational Loads of Floating Wind Turbines

Tasks

- 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





Contact: M.SC. PAUL SCHÜNEMANN
Stelzengang – Raum 132
☏ (0381) 498-9575
✉ paul.schuenemann@uni-rostock.de

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Universität Rostock
Albert-Einstein-Str. 2
18059 Rostock

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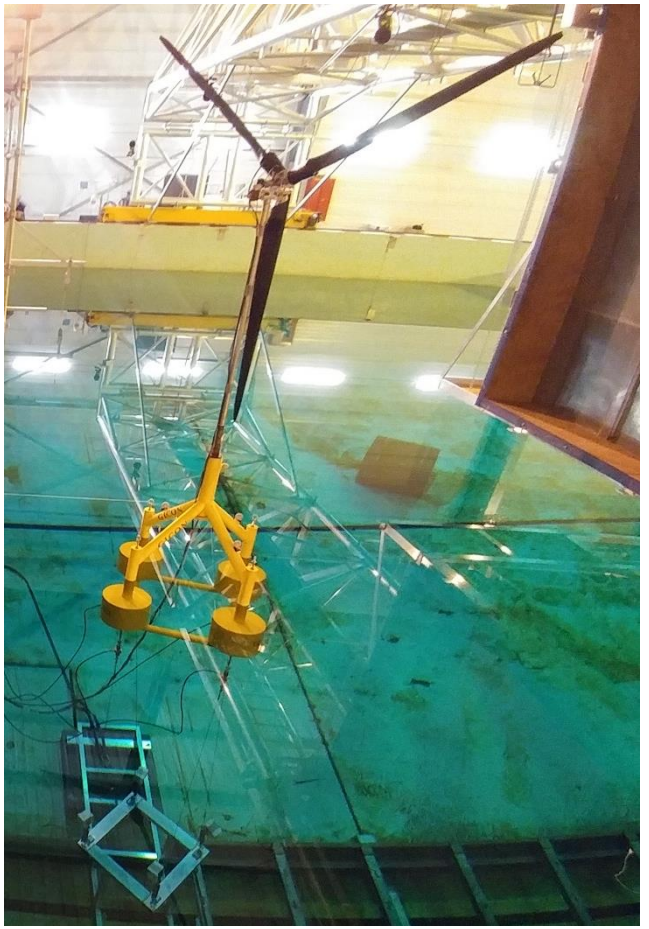
Physical and Computational Model Tests of Floating Wind Turbines

Scope:

- Preparation and construction of models for scaled towing and installation (T&I) tests including a lowerable gravity foundation
- Evaluation of results of T&I tests
- Evaluation of model tests for the determination of operating loads
- Creation of a 1:50 model in OpenFAST and comparison of results of physical model tests and simulations



Contact: M.SC. DANIEL WALIA
Stelzengang – Raum 131
☎ (0381) 498-9577
✉ daniel.walia@uni-rostock.de

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Chair of Wind Energy Technology
Universität Rostock
Albert-Einstein-Str. 2
18059 Rostock

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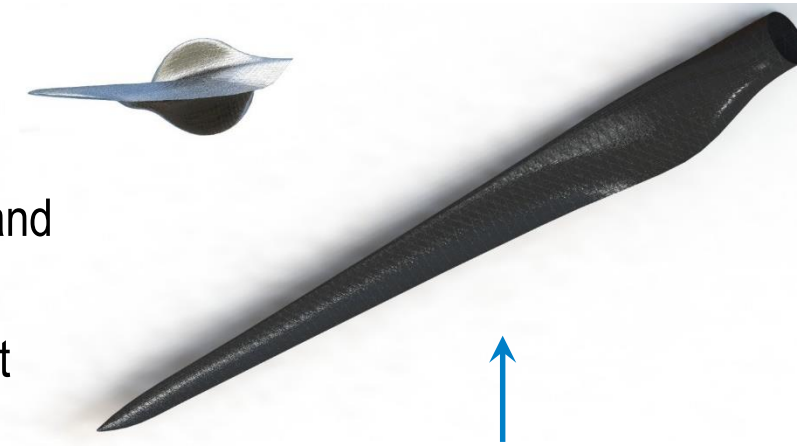
Design and Test of a Scaled Wind Turbine for Tank Tests

Tasks

- Design of optimized scaled rotor blades
- CFD-Analysis of different airfoils to determine lift and drag coefficients
- CFD-Analysis of a turning rotor to determine thrust and power coefficients
- Experimental Analysis of scaled rotor blades and rotors in a wind tunnel



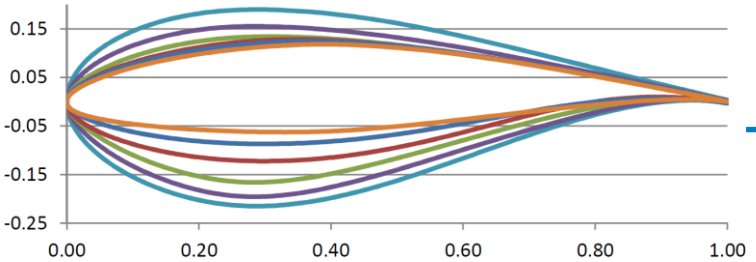


Abb. 1: Außenkontur ausgewählter Blattprofiltypen

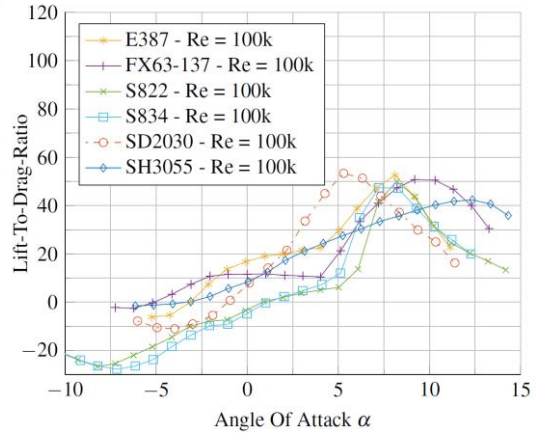


Abb. 2: Gleitzahlen ausgewählter Blattprofiltypen in Abhängigkeit vom Anstellwinkel

Contact: DR.-ING. FRANK ADAM
Stelzengang – Raum 132
☎ (0381) 498-9573
✉ frank.adam@uni-rostock.de

LWET LEHRSTUHL WINDENERGIETECHNIK

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18059 Rostock