



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.

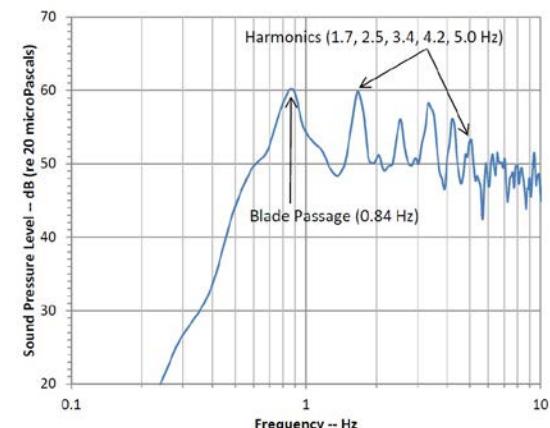
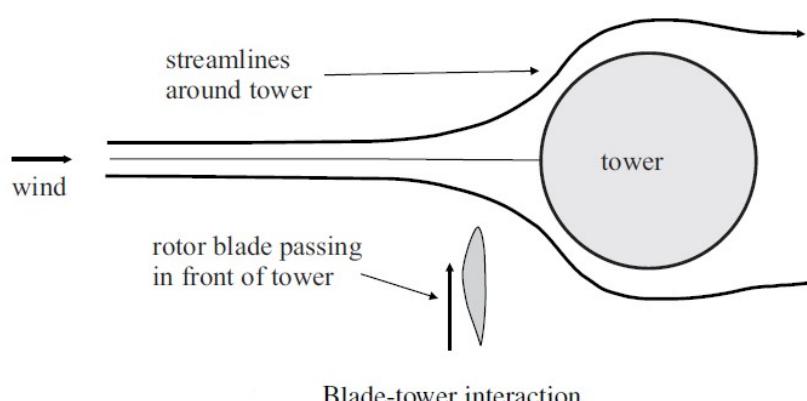




Measurement and Analysis of Infrasound from Wind Turbines

Scope

- measurements with an acoustic camera and infrasound sensors (low pressure microphones) n 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



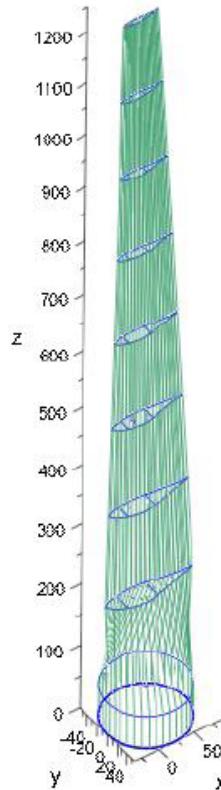
4 Autospectrum of wind turbine infrasound at a distance of 622 meters

Literature

- 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.
- 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.

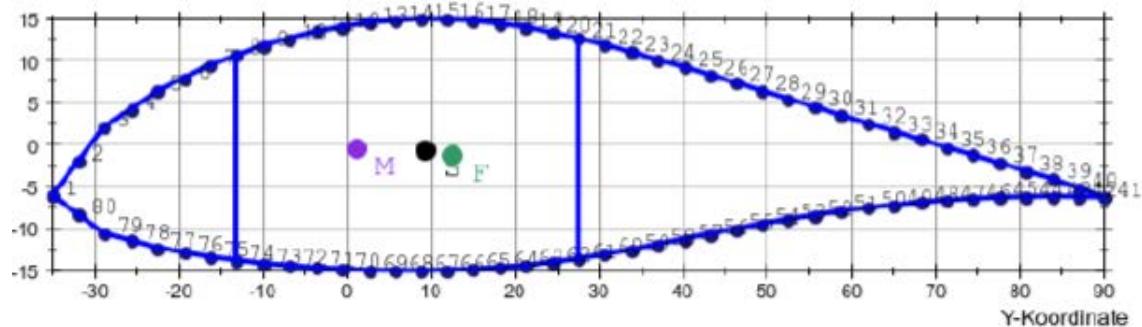


Computer Tools for Calculation of Mass and Stiffness data of Rotor Blades



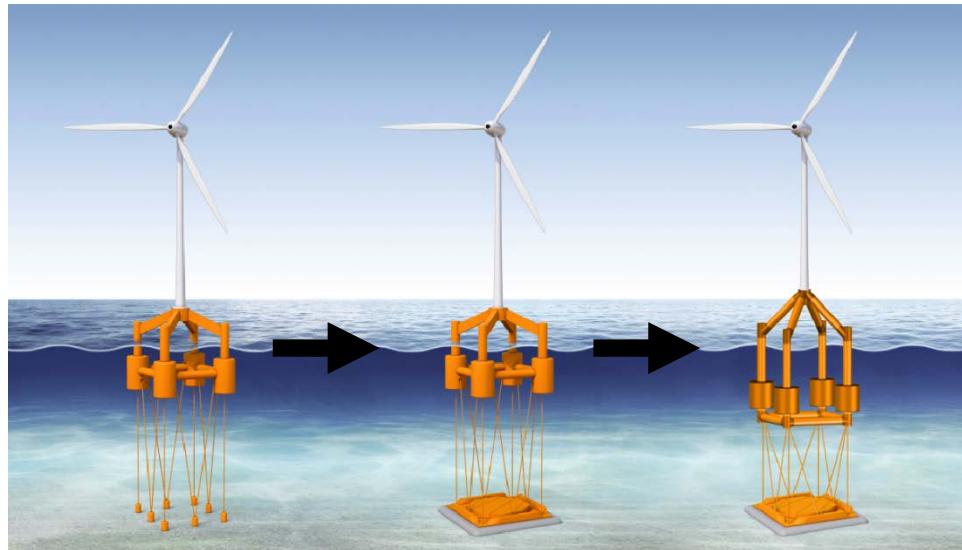
Scope

- 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#



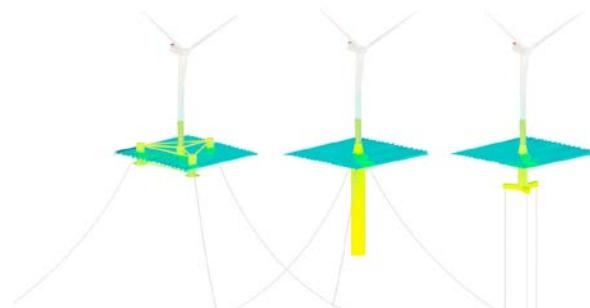


Design Optimization & Concept Development for Floating Wind Turbines



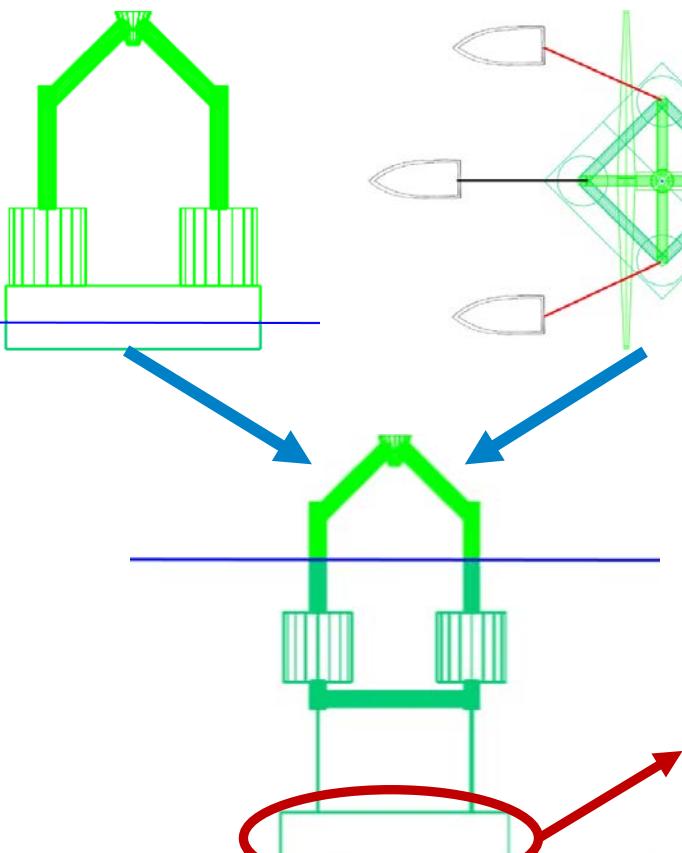
Scope

- 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





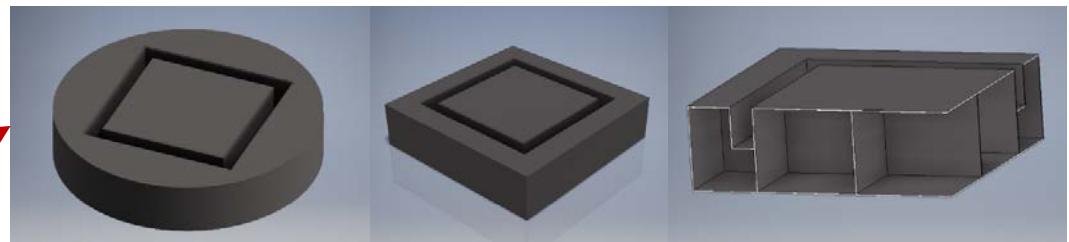
Installation of Floating Offshore Structures



Installierte Substruktur

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

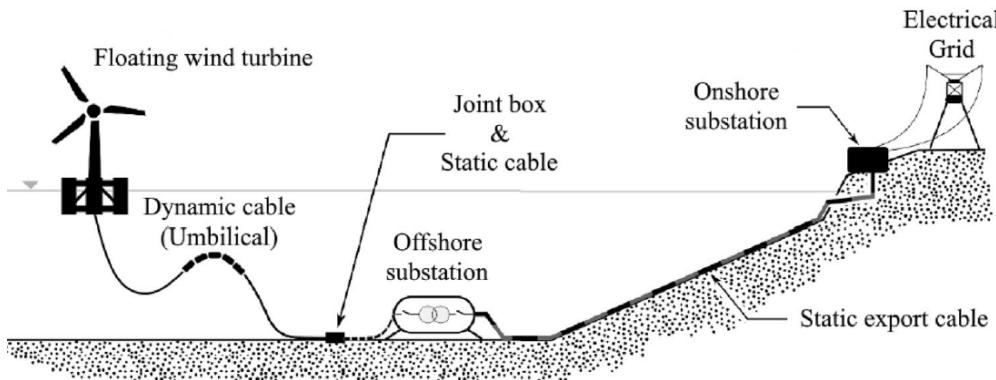
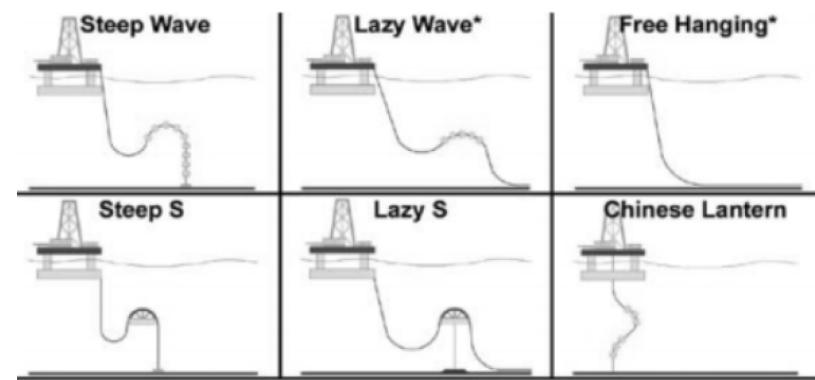
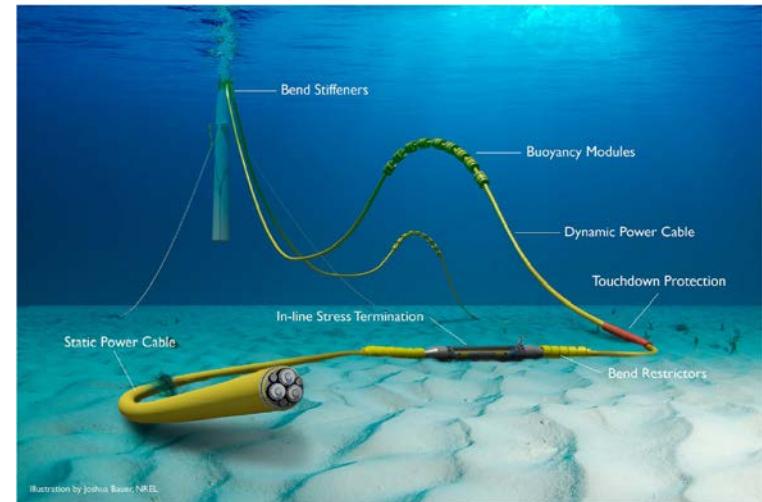




Dynamic Power Cables for Floating Offshore Wind Turbines

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. Krugel, 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

```
----- SERVODYN V1.05.* INPUT FILE -----
DOWEC GRP control system properties for use of DISCON_x64.dll
----- SIMULATION CONTROL -----
True    Echo           - Echo input data to <RootName>.edc
"default" DT            - Communication interval for concrete
----- PITCH CONTROL -----
3      PCMode          - Pitch control mode (0: none, 3: u
0      TFCOn           - Time to enable active pitch control
9999.9 TPitManS(1)    - Time to start override pitch mane
9999.9 TPitManS(2)    - Time to start override pitch mane
9999.9 TPitManS(3)    - Time to start override pitch mane
2      PitManRat(1)    - Pitch rate at which override pitch
2      PitManRat(2)    - Pitch rate at which override pitch
2      PitManRat(3)    - Pitch rate at which override pitch
0      BIPitchf(1)     - Blade 1 final pitch for pitch man
0      BIPitchf(2)     - Blade 2 final pitch for pitch man
0      BIPitchf(3)     - Blade 3 final pitch for pitch man
----- GENERATOR AND TORQUE CONTROL -----
5      VSContri         - Variable-speed control mode (0: s
2      GenModel         - Generator model (1: simple, 2: T3
94.4   GenEff           - Generator efficiency [ignored by
True   GentlStr         - Method to start the generator (T
True   GentlStp         - Method to stop the generator (T
9999.9 SpdGenOn        - Generator speed to turn on the ge
0      TimGenOn         - Time to turn on the generator for
9999.9 TimGenOff       - Time to turn off the generator (s
----- PROGRAM FAST -----
USE FAST_Sub           ! all of the ModuleName and ModuleName_types modules are inherited from
IMPLICIT NONE
! Local parameters:
REAL(DK4), PARAMETER :: t_initial = 0.0DK5
INTEGER(Intk1), PARAMETER :: NumTurbines = 1
! Other/Global variables
TYPE(FAST_TurbineType)
  INTEGER(Intk1) :: Turbine(NumTurbines)
  INTEGER(Intk1) :: i_turb
  INTEGER(Intk1) :: n_t_global
  INTEGER(Intk1) :: ErrStat
  CHARACTER(100) :: ErrMsg
  CALL NFTC_Init() ! open console for writing
  Program = "FAST"
  CheckpointRoot = ""
  CallCheckArg(CheckpointRoot, ErrStat, Flag=FlagArg)
  Restart_step = 0
DO i_turb = 1,NumTurbines
  CALL FAST_Initialization_(t_initial, i_turb, Turbine(i_turb), ErrStat, ErrMsg)
  CallCheckErr(ErrStat, ErrMsg, "during module initialization")
  CALL FAST_Solution_(Turbine(i_turb), ErrStat, ErrMsg)
  CallCheckErr(ErrStat, ErrMsg, "during simulation initialization")
END DO
[...]
END PROGRAM FAST
```

