Bachelor/Master Thesis

Finite Element Simulation for Operational Underwater Noise Radiation from Offshore Wind Turbine Monopile

The offshore wind energy sector is continuously expanding and is one of the fastest-growing renewable energy sectors worldwide due to increasing demand for sustainable electricity generation and decarbonization. Most research on noise assessment for offshore wind turbines focuses on noise generated by impact pile driving during construction. Consequently, operational underwater noise generated during normal functioning has received significantly less attention. During the operation, mechanical and aerodynamic excitation originating from components such as the gearbox, generator, drivetrain, blades, and tower induces structural vibration in the support structure. These vibrations propagate through the monopile, resulting in the radiation of acoustic waves into the surrounding water. This produces continuous underwater noise during the operation of the wind turbine. Although operational noise levels are considerably lower than impact pile driving noise, the continuous long-term exposure may influence marine organisms, especially fish and marine mammals that are sensitive to low-frequency underwater sound.

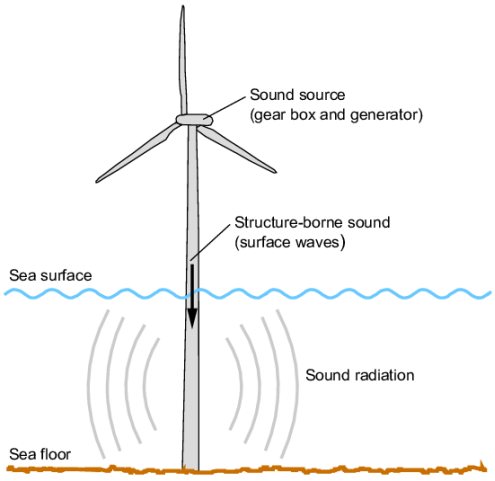
The purpose of this thesis is to investigate underwater acoustic radiation from monopile-supported offshore wind turbines using finite element methods.

Task/Objectives

- Literature research on the underwater noise from offshore wind turbines
- Develop a coupled structural-acoustic finite element model
- Simulate underwater sound radiation from monopile vibrations
- Investigate the influence of structural parameters and the size of the monopile
- Model the soil as a linear elastic model (optional)
- Analysis, discussion, and documentation

Your profile

- Student of Civil Engineering, Mechanical Engineering, or Computational Engineering
- Independent, structured way of working
- Working Language: English or German



Supervisor:
Nitesh Bhume, M.Sc.
Institut für Statik und Dynamik
Appelstraße 9A
30167 Hannover
E-Mail: n.bhume@isd.uni-hannover.de