Investigating Computational Uncertainties and Their Effects on the Fatigue Life of Offshore Wind Turbine Foundations

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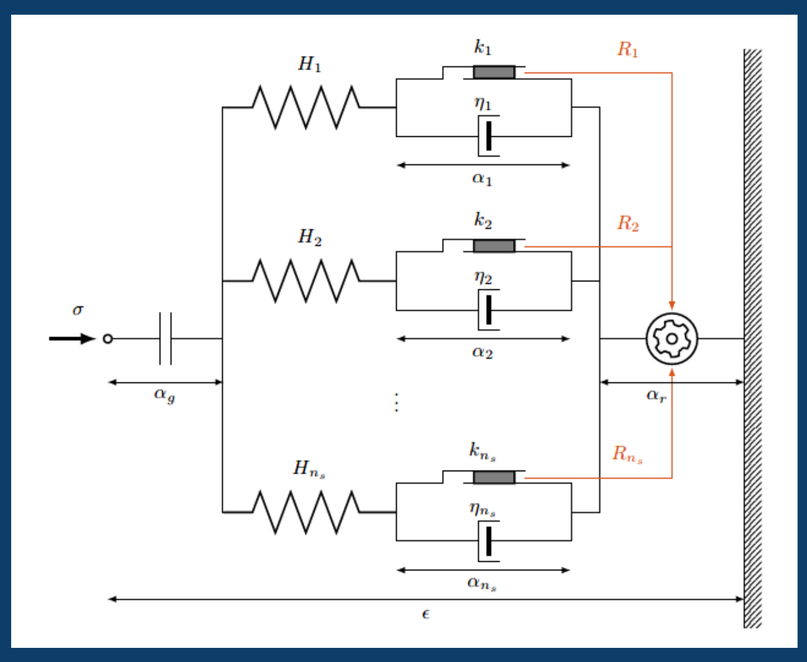
Introduction

Ooptimized design with low capital and operational cost can make renewable energy more feasible for future investments. One of the main goals in the offshore wind sector is to optimize the design of offshore wind foundations in terms of fatigue performance by using an elaborated SSI (Soil Structure Interaction) model.

Aims and Objectives

- Validate the linear viscous hypothesis for modelling OWT damping and quantify the accuracy of the existing studies and guidelines
- Enhance the methodology used for calculating the accumulated displacement in monopiles
- Estimate the level of optimization that can be achieved by using the model compared with the current design practice

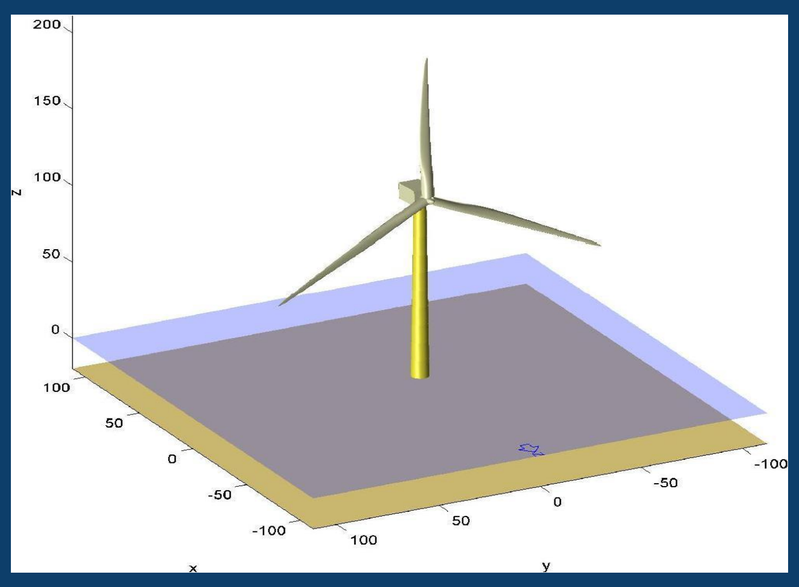
Soil Structure Interaction Model



Kinematic Hardening + Gaping , Ratcheting and Rate effects (Beuckelaers 2017)

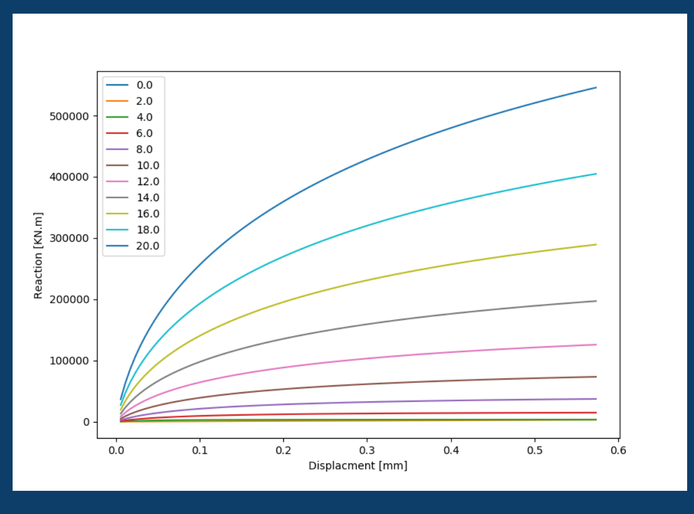
- Based on Ratcheting model developed by Houlsby based on hyperplasticiy framework
- Any model that includes kinematic hardening either using multi-surface model or hyperplasticiy framework

Numerical Model



Numerical Model 10Mw DTU wind turbine

- 10 Mw DTU standard Turbine
- Soil Model Cowden Clay
- Water Depth 30



Backbone Curves

Future work

Phase-1 Extend numerical and enhance SSI models
Phase-2 Bench Marking the results using an agile approach

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