Offshore Engineering Society

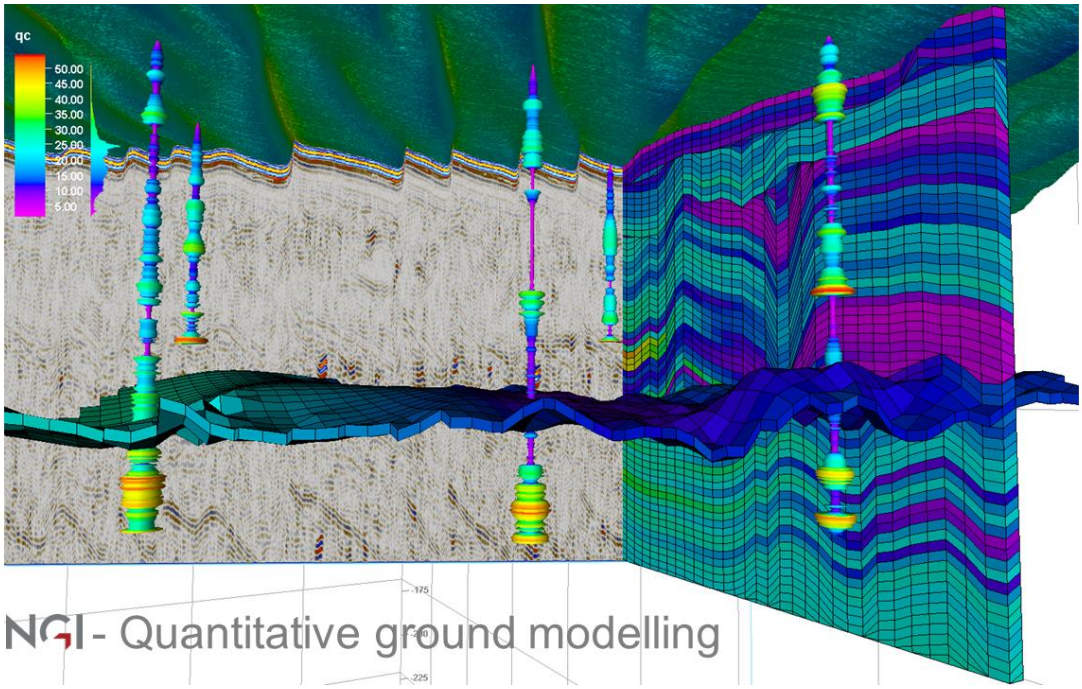
DATA-DRIVEN GEO-SOLUTIONS FOR EFFICIENT OFFSHORE WIND FOUNDATIONS

Wednesday 2nd October 2019

Institution of Civil Engineers

One Great George Street, Westminster, London SW1P 3AA

18:00 (refreshments available from 17:30)



For offshore wind farm developments, there is potential for significant cost savings by utilising all collected data in improved integrated and streamlined quantitative geo-models. Reduced costs result from better planning of geophysical and geotechnical site investigations, better prediction of soil parameters and associated uncertainties and early-phase semi-automated foundation design at specific unsampled locations as well as across the entire site. Hence, these data-driven geo-solutions provide robust tools for improved site characterisation, and hazard and risk assessments associated with the foundation design in different phases of a project, ultimately leading to efficient foundation designs.

The keystone in the data-driven solution is the quantitative ground model which provides a tool to estimate various soil parameters as well as their associated uncertainties, through the full integration of geological, geophysical and geotechnical data, across the development site. This presentation by Rasmus T. Klinkvort will provide a summary of the latest work on quantitative ground models done in

cooperation with *Maarten Vanneste, Guillaume Sauvin, Carl Fredrik Forsberg* from NGI and *Mark Vardy* from SAND Geophysics.

A workflow has been developed to build quantitative ground models and to evaluate the associated uncertainties. The presentation will first discuss why the in-depth integration of geology, geophysics and geotechnics is important and what the challenges are. The workflow will then be illustrated using publicly available data from the Holland Kust Zuid wind farm site in the Dutch sector of the North Sea. Keywords in this workflow are Quantitative Interpretation, Seismic Inversion, Machine Learning and Geostatistics. The focus is to understand the associated uncertainties when using data-driven models to evaluate geotechnical parameters. The next step is to demonstrate how the quantitative ground model is efficiently used in foundation design, for example, how we can obtain optimal monopile foundation geometry for the entire wind farm area, also for non-borehole locations. Finally, the presentation will provide some challenges, ideas and recommendations on the way forward to implement these models in practice.

Speaker:

Rasmus Tofte Klinkvort, Senior Consultant, NGI

After finalising his PhD on monopile foundations for offshore wind turbines, Rasmus joined NGI in 2012. After 3 years in Oslo, he relocated to Paris and is now working as consultant for NGI from there. His main focus is offshore foundation design and he has worked extensively on projects with challenging soil conditions covering topics such as installation design, design for cyclic loading and also re-assessment of capacity based on aging of the soil. He has lead, reported and published several advanced centrifuge test studies on monopile and suction caisson foundation solutions for offshore wind turbines in both sand and clay. Rasmus uses this experience from offshore geotechnical design, offshore site work, offshore laboratory work, research and project management as foundation to navigate between theory and practice, often working in an integrated team of geotechnical engineers, geophysicists, geologists and programmers. Lately, being exposed to multi-disciplinary R&D initiatives and sensing a growing interest for scripting and optimisation, he started working with Python programming in combination with Geostatistics and Machine Learning techniques as important tools used in the models that lie at the heart of the presentation.

Booking information:

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