POSEIDON – MSCA DN: DC09

PhD Project Title: Performance-based design of offshore wind turbine foundations with Explainable Artificial Intelligence (XAI)
Enrolment in Doctoral degree(s): Norwegian University of Science and Technology **Supervisors: d**r. Zhongqiang Liu and dr. Nallathamby Sivasithamparam **Recruitment host:** Norvegian Geotechnical Institute **Secondment host:** DNV, University of Warwick

Work description:

NGI is seeking candidates for a PhD position related to performance-based design of offshore wind turbine foundations within the Risk Assessment and Slope Stability department under the Natural Hazards Market Area. For more information about NGI, see www.ngi.no. The candidate will further be enrolled in the PhD program at the Norwegian University of Science and Technology, NTNU.

The position is attached to the Horizon Europe POSEIDON project (https://poseidon-dn.eu/) which is a Doctoral Training Network under the MSCA, and will include 13 individual Doctoral Candidates (DCs). The position is entitled "Performance-based design of offshore wind turbine foundations with Explainable Artificial Intelligence (XAI)" and is position DC09 within the project. The overall project objective is to improve offshore infrastructure resilience against geohazards towards a changing climate. The topic for this PhD grant is related to develop an XAI framework for performance-based design of FOWT foundations.

The candidate will be responsible for exploiting the recent advances in performance-based approaches and machine learning (ML) to develop a fully probabilistic performance-based assessment method for floating offshore wind turbines (FOWT) foundation design. To ensure safety in the design, the performance of FOWT foundations subjected to aero- and hydrodynamic loadings should be quantified. The method will take into account stochastic metocean conditions and variability of soil properties. Explainable Artificial Intelligence (XAI) techniques will be utilised to model the fragility function of FOWT foundations over a range of loading intensities. The performance-based design model will capture the uncertainties present in the data as well as in the XAI-driven physics-based model.

The applicant is expected to visit partners from the POSEIDON consortium other European countries for extended secondments of up to approximately six months and will have to participate in joint network-wide training activities abroad.

Competence requirements:

The candidate must have an MSc, or other corresponding education equivalent to a Norwegian MSc covering some of the following fields: civil engineering, FEM modelling, scientific computing, applied mathematics, or related fields. Solid skills in both programming (e.g. FORTRAN) and scripting (e.g. Python), are prerequisites.

Moreover, experience in one or more of the following topics will be positively valued:

- Experience with Finite Element Modelling (FEM) and/or computational fluid dynamics (CFD).
- Strong background in statistics, probability theory, and machine learning.
- Experience with wind, surge, and wave modelling, fluid-soil-structure interaction.

- Excellent technical writing and strong communication skills.

Planned Secondment(s):

DNV, 3 months: Discuss the current design and guidelines

University of Warwick, 3 months: Discuss and compare with AI models for Discuss and compare with AI models for Offshore Wind Turbine foundation design.

Eligibility criteria
- Your education must correspond to a five-year Norwegian degree program, where 120 credits are obtained at master's level.
- You must have a strong academic background from your previous studies and an average grade from the master's degree program, or equivalent education, which is equal to B or better compared with NTNU's grading scale. If you do not have letter grades from previous studies, you must have an equally good academic basis. If you have a weaker grade background, you may be assessed if you can document that you are particularly suitable for a PhD education.
- Master's students can apply, but the master's degree must be obtained and documented by August 2024.
- You must meet the requirements for admission to the faculty's doctoral program (https://www.ntnu.edu/studies/phiv).
- Excellent written and oral English language skills.

Candidates must meet all MSCA DC eligibility requirements, including the Mobility Rule. The mobility rule implies that researchers must not have resided or carried out their main activity (e.g., work, studies) in the country of the recruiting beneficiary for more than 12 months in the 36 months immediately before their recruitment date.

Benefits:

Successful candidates will receive a highly competitive salary in accordance with MSCA regulations for Doctoral Candidates. The salary includes living allowance, a mobility allowance, and a family allowance (if applicable). DC employment is expected for a period of 36 months.

Information and application

Please submit your application before **February 28, 2024** via the following application link:

https://utwentecareers.nl/en/vacancies/1606/13-phd-positions-on-the-eu-horizon-2020-marie-skiodowska-curie-project-poseidon/

Submission must include:

- **Cover Letter:** A maximum of two A4 pages, highlighting your specific interest in the position, your qualifications, and motivations for applying. This letter should clearly articulate how your background and experiences align with the requirements of this project
- **Detailed Curriculum Vitae (CV):** The CV, should include, if applicable, a list of publications;
- **Bachelor and Master transcripts**;

- **Contact Details of Referees:** Provide the names and contact information of individuals who can professionally vouch for your qualifications and suitability for this position.

For general inquiries on the application procedures and the consortium please contact: info@poseidon-dn.eu

Details about the position can be requested at Zhongqiang.Liu@ngi.no