Postdoctoral Researcher in Offshore Pile Load & Displacement Analysis

Project: SLOOP (Stochastic Loads on Offshore Piles)	Duration: 12 Months (start as soon as possible)
Location: Nantes University (Saint-Nazaire, France)	Salary: 2950 €/month (Gross)

The SLOOP project, funded by the ORACLE LabEx, addresses critical challenges in offshore wind turbine (OWT) design: the transition from deterministic to stochastic modelling. As OWTs move into deeper waters and larger scales, standard design methods struggle to capture the complex, long-term cumulative displacements caused by stochastic, multidirectional marine environments. SLOOP aims to bridge the gap by integrating advanced aero-hydrodynamic load simulation with high-fidelity geotechnical response modelling.

As a core member of the SLOOP research team, the Postdoctoral Researcher will contribute to Work Package #2, focusing on the soil-pile interaction under realistic offshore loading conditions. Key tasks include:

- **Offshore Monopile Loading Analysis:** Integrate aero-hydrodynamic load time series generated at École Centrale de Nantes using Morison's equations, potential-flow theory, and OpenFAST into the geotechnical modelling workflow.
- **3D Finite Element Modelling:** Develop, calibrate, and refine high-fidelity ABAQUS models of monopile–sand interaction. Use geotechnical centrifuge data from Gustave Eiffel University to calibrate advanced soil constitutive models (Hypoplastic, SANISAND). Simulate monotonic, unidirectional cyclic, and multidirectional loading conditions.
- **Design Tool Development:** Develop simplified or macro-element models for cyclic loading. Contribute to improved P–y curves, stiffness-degradation laws, and long-term displacement prediction.
- **Collaboration and Dissemination:** Participate in co-supervision of MSc interns. Work closely with hydrodynamics experts (ECN) and centrifuge specialists (UGE). Contribute to project deliverables and progress meeting. Prepare journal papers and conference contributions.

Candidates should hold a PhD in Geotechnical Engineering, Civil/Ocean Engineering, or a related field. They should have strong experience in finite element modelling, preferably with ABAQUS, and familiar with soil constitutive models. Background knowledge in cyclic loading, soil-pile interaction, offshore geotechnics or hydrodynamics is highly desirable. Experience in laboratory, field testing, or centrifuge data interpretation is an asset. Candidates should be proficient in English, MATLAB or Python, have a solid publication record, and be able to work effectively in an interdisciplinary team.

We offer a highly collaborative research ecosystem that connects three leading laboratories: GeM at Nantes Université, providing advanced expertise in soil mechanics; LHEEA at École Centrale de Nantes, a world-class center for hydrodynamics modelling; and the Geotechnical Centrifuge Laboratory at Gustave Eiffel University, home to France's national centrifuge testing facility. We provide access to high-quality experimental and numerical datasets from major offshore geotechnical projects—including SOLCYP, SOLCYP+, MUTANC, and SLOOP. We provide new personal workstation and access to high-performance computing resources for numerical simulation. We support publication in top journals and participation in international conferences. We foster an interdisciplinary research collaboration within the ORACLE LabEx network, linking geotechnics, hydrodynamics, and offshore renewable energy.

Interested applicants should submit a single PDF including:
- CV with full publication list
- One-page cover letter outlining your research background and fit for the position
- Two representative publications
- Contact details of two or three referees

Please send applications to:
- Dr. ZhongSen LI: zhongsen.li@univ-nantes.fr
- Dr. Seung-Yoon HAN: seung-yoon.han@ec-nantes.fr
- Dr. Christelle ABADIE: christelle.abadie@univ-eiffel.fr

Applications will be reviewed on a rolling basis until the position is filled. Informal inquiries are welcome.