

Young Members Column

Investigation on offshore pile foundation subjected to coupled marine environmental factors

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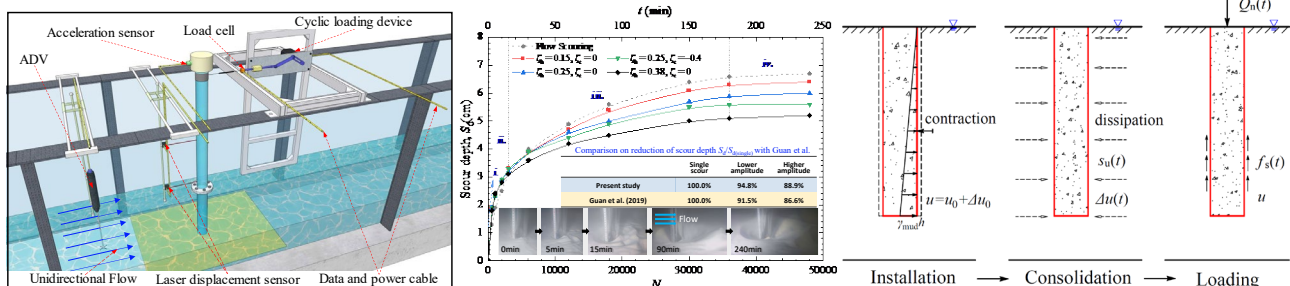
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I obtained my bachelor's degree in mining engineering from Central South University in 2019 and became to a postgraduate student by recommendation. I applied a successive postgraduate and doctoral program in 2021 and and I am currently a third-year Ph.D. student at Tongji University, Department of Geotechnical Engineering. The institute is mainly oriented to solving problems encountered in civil engineering practice, such as the mechanical behavior of pile foundations for offshore wind turbines, scour phenomenon around hydraulic structures, and seismic response of pile foundation. I have gained much experience in the field for the past three years since I joined this institute at Tongji University. I have also learned how to critically analyze experimental data and convert it into abstract physical laws that can be applied in engineering practice. I joined the International Press-in Association (IPA) on Nov 28, 2019, as a young researcher.



With an increase in the demand for renewable energy and the maturity of offshore construction technology, offshore wind farms have been rapidly constructed and have flourished worldwide over the past decade. As one of the most popular supporting structures used for offshore wind turbines (OWTs), monopile foundations accounted for 81% of the installed OWT substructures in Europe. My current research work focuses on the long-term cyclic response and bearing capacity of offshore wind turbines foundation considering local scour effect. Monopile-supported OWTs are subjected to a complex combination of environmental loadings when deployed in extreme marine environments, including extreme wind and wave loads due to typhoons and storm surges as well as the removal of soil due to scour, which necessitates formidable requirements for the ultimate bearing capacity of the monopile foundations. I interested in the mechanical response of OWT system under the combined effect of cyclic loading and scour, such as the cumulative rotation evolution, natural frequency migration, ultimate bearing capacity reduction. The main research methods interest me including the flume model tests and the numerical investigation through advanced constitutive models

In addition, I have some previous works focused on theoretical analysis during the installation process of pile foundations, such as a spherical cavity drained expansion solution for overconsolidated soils, and a theoretical method on the time-varying capacity of a cast-in-place pile based on cavity contraction theory. I interested in the application of advanced soil constitutive models in above studies. I understand that the International Press-in Association (IPA) serves as an exceptional platform, fostering collaboration among engineers and researchers hailing from diverse organizations and institutions. Through this remarkable platform, they can exchange invaluable experiences and share groundbreaking findings, ultimately contributing to the development of innovative technologies that aim to enhance and uplift society as a whole. By facilitating this exchange of knowledge and expertise, the IPA plays a pivotal role in driving progress and fostering a brighter future for our global community.



- ✓ Zhang, H., Zheng, H. B., Wang, C., & Liang, F. (2022). Coupled effects of long-term cyclic loading and scour on the mechanical responses of monopile-supported offshore wind turbines. *Ocean Engineering*, 265, 112556.
- ✓ Liang, F., Zheng, H. B., & Zhang, H. (2021). Theoretical Analysis of Postconstruction Load-Carrying Capacity of a Cast-in-Place Pile Installed in K0-Consolidated Anisotropic Clayey Soil. *International Journal of Geomechanics*, 21(9), 04021166.