



FLOW Research Fellow (Post-Doc position) Numerical modelling of impact and vibratory driven offshore piles with MPM

Duration : 12 months, starting at 1 December 2014 (or as soon as possible)

Location : Deltaires, Delft, The Netherlands

Introduction

A consortium of energy utilities, contractors, consultants and universities has initiated a research project (VIBRO-project¹) to investigate the feasibility of using vibratory installation of monopiles for offshore wind turbines instead of impact driven installation methods. In the VIBRO-project field tests are performed in a sandpit in Cuxhaven comparing both types of installation methods, and in particular the resulting lateral capacity and stiffness (eigenfrequency) of the monopiles. CPTs are performed before and after installation to assess the installation effects. Based on current knowledge and experience it is known that the initial soil density plays an important role for the axial pile capacity. For lateral capacity and lateral system stiffness this dependency is unknown yet. Therefore a subsequent project is set-up by Deltaires and funded by the Dutch FLOW foundation² to address these aspects. The main goal of this FLOW-project is to generalise field test results of the VIBRO-project to sites with other initial densities and pile diameters.

The approach of the Deltaires FLOW-project is to develop a numerical modelling tool based on the material point method (MPM). Goal is to combine and extend various existing models into a single tool to model the installation process of impact and vibratory driven piles and to capture the interaction of the pile structure under lateral loading. The model will be validated using the field data of the Cuxhaven test site of the VIBRO-project. A key deliverable of the Deltaires FLOW-project is a database which specifies the resulting lateral capacity depending on the pile diameter, installation method and initial soil density.

Required skills

- strong background in soil mechanics, continuum mechanics and constitutive modelling
- background in soil-structure interaction
- expertise in (computational) geomechanics, FEM and experience with material point method (MPM)
- experience in software development, programming with Fortran 2008, experience with ParaView
- doctoral degree in the field of civil engineering (preferably specialisation in geotechnical engineering)

Main activities

- Extension of a numerical modelling technique (material point method or MPM) which is capable to model the installation process of both, impact and vibratory driven piles, with subsequent lateral load test to determine the lateral capacity and stiffness. Substantial programming work is involved and executed by the successful candidate based on the existing code structure at Deltaires and in close cooperation with numerical experts.
- Application of MPM to the site specific conditions in Cuxhaven to validate the method in collaboration with other researchers and consultants of Deltaires.
- Application of MPM for different initial soil conditions to translate VIBRO-results to other sites in collaboration with other researchers and consultants of Deltaires.
- Presentation of the work on the code and applications in regular project meetings, and in more detail in written (intermediate) reports and in a final workshop.
- The work will be reported in the form of an engineering manual.
- A scientific publication in a journal paper and/or conference proceeding is foreseen.

¹ more information on the VIBRO project: <http://www.offshorewindindustry.com/news/vibration-instead-ramming>

² more information on FLOW (Far and Large Offshore Wind): <http://flow-offshore.nl>

What we offer

Deltares is a leading, independent, Netherlands-based research institute and specialist consultancy for matters relating to water, underground and infrastructure. We apply our advanced expertise worldwide, to help people live safely and sustainably in delta areas, coastal zones and river basins. The position offers:

- 12 months full-time contract (40 hours per week) with full social security
- full involvement in FLOW-project NS-VIP (P201406-002-DEL)
- working in a vital environment and cooperation with several doctoral students, Post-Docs, researchers and consultants at Deltares Delft and associated academic partners.

Are you interested?

Informal enquiries about this post may be addressed to Alexander Rohe (alex.rohe@deltares.nl) or Harm Aantjes (harm.aantjes@deltares.nl).

If interested, please send your covering letter and CV to reach us not later than 15 November 2014 by e-mail to: application@deltares.nl.