

## PhD Position in Experimental Soil Mechanics

**Faculty/department** Civil Engineering and Geosciences/ Geoscience and Engineering

**Level** Master degree

**Maximum employment** 36-40 hours per week (1 FTE)

**Duration of contract** 4 years

**Salary scale** €2541 to €3247 per month gross

### Project motivation

Organic soils are extremely vulnerable to climate change as increased temperatures accelerate drying, shrinkage and decomposition of the organic matter. Gases such as  $\text{CH}_4$  and  $\text{CO}_2$  produced by the decomposition of the organic matter saturate the pore fluid and can eventually be exsolved as bubbles by temperature increase, atmospheric pressure decrease, and unloading. Gas bubbles in soils can compromise the performance and safety of structures and infrastructure with irreversible deformations and reduction of resistance. Research on the effects of gas bubbles on the response of organic soils is still at an early stage and a comprehensive geotechnical model for the effects of gas in organic soils is still lagging behind. The project aims at deepening the understanding and modelling of the hydro-mechanical behaviour of organic soils containing gas bubbles to mitigate the impact of climate-related hazards in natural organic soils.

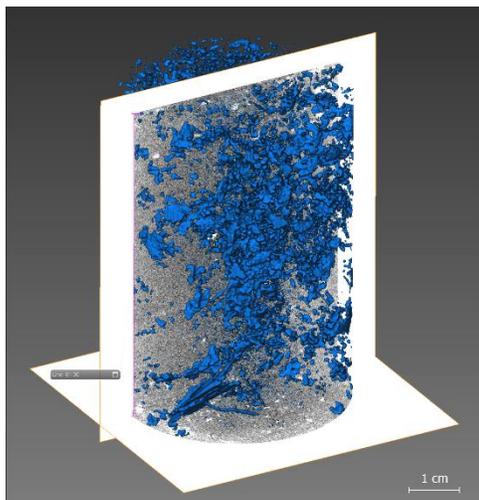


Figure 1. 3D visualization of gas bubbles in organic soils

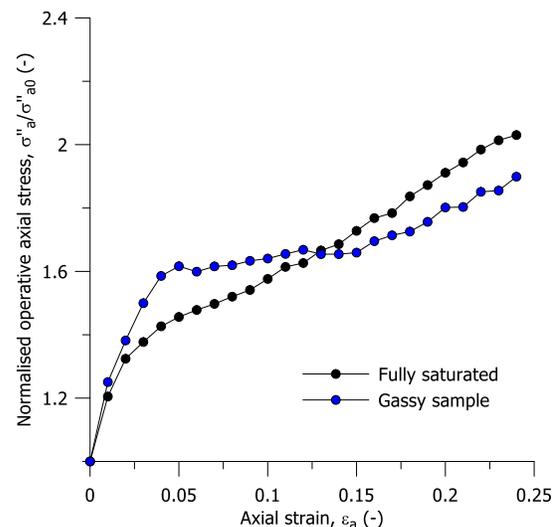


Figure 2. Stress-strain response of saturated and gassy samples

### Job description

The twofold aim of the PhD project is:

- To experimentally investigate the coupled hydro-mechanical behaviour of organic soils containing gas bubbles both at the micro- and the macro-scale with advanced image analysis techniques and element testing.
- To enhance existing constitutive models for organic soils in order to include the effects of gas in the prediction of their geotechnical behaviour.

The selected candidate will collaborate in a research team with ongoing research activities in experimental soil mechanics at TU Delft. The PhD candidate will benefit from advanced experimental laboratory facilities including triaxial apparatuses, geotechnical centrifuge and X-ray micro-CT already available in the Faculty of Civil Engineering and Geosciences of TU Delft and partner institutions, and the support of experienced technical staff.

### Requirements

Applicants should possess an MSc in Civil Engineering or related disciplines. Some experience in experimental soil mechanics is needed, as well as an aptitude for theoretical and numerical development. Communication skills are relevant, and applicants should have a high level of proficiency in written and spoken English. The minimum requirement of a TOEFL score of 100 or IELTS of 7.0 per sub-skill (writing, reading, listening, speaking) applies to all candidates wanting to pursue a PhD at TU Delft (for more details please check the [PhD Admission \(tudelft.nl\)](#)).

### Conditions of employment

Doctoral candidates will be offered a 4-year period of employment in the form of 2 employment contracts. An initial 1,5 year contract with an official go/no go progress assessment within 15 months. Followed by an additional contract for the remaining 2,5 years assuming everything goes well and performance requirements are met. Salary and benefits are in accordance with the Collective Labour Agreement for Dutch Universities, increasing from € 2541 per month in the first year to € 3247 in the fourth year. As a PhD candidate, you will be enrolled in the TU Delft Graduate School. The TU Delft offers a customisable compensation package, discounts on health insurance and sports memberships, and a monthly work costs contribution. Flexible work schedules can be arranged. For international applicants, we offer the Coming to Delft Service and Partner Career Advice to assist you with your relocation.

### Department of Geoscience and Engineering

The Department of Geoscience and Engineering resides within the Faculty of Civil Engineering and Geosciences and encompasses 5 sections: Applied Geology; Applied Petrophysics and Geophysics; Geo-Engineering; Resource Engineering; and Reservoir Engineering. Current collaborations between Geo-Engineering and the wider Faculty include the Section of Offshore Engineering, and the Departments of Structural Engineering, Hydraulic Engineering, and Geoscience and Remote Sensing. The Section of Geo-Engineering has 12 full-time and 6 part-time academic staff, and ~40 PhD and Post-Doctoral researchers. Areas of expertise include soil mechanics, dykes and embankments, foundation engineering, underground space technology, engineering geology, and geo-environmental engineering. There are extensive experimental laboratory facilities, including advanced triaxial apparatuses, large-scale soil-structure interaction testing facilities and a geotechnical centrifuge, as well as excellent computing facilities including access to national High-Performance Computing networks.

### Additional information

For more information about the position and informal discussion please contact:

- Dr. Stefano Muraro [S.Muraro@tudelft.nl](mailto:S.Muraro@tudelft.nl)
- Prof. Dr. Cristina Jommi [C.Jommi@tudelft.nl](mailto:C.Jommi@tudelft.nl).

### Application procedure

Are you interested in this vacancy? Please apply before **22nd August 2022** via the TU Delft website ([Job details \(tudelft.nl\)](#)) and upload:

- a detailed CV;
- a motivation letter (1 page maximum);
- contact details of 2 referees.