PREFACE

In the past few decades, numerical methods have emerged as a key tool in the geotechnical engineering. Even though it is now state-of-the-art to deepen our understanding of soil mechanics and soil-structure interaction, there remains a pressing need for further development. With that in mind, I wish to outline three areas that I believe needs further investigation and development.

1. Artifical intelligence in geotechnics

AI is changing our world in numerous fields, and geotechnics is no exception. It provides an opportunity to improve or potentially replace the constitutive models, geotechnical designs and procedures.

2. Deformation based design

The traditional geotechnical design relies on limit state analysis and safety factors. However, most of the structures fail not because of reaching the limit state, but because of unacceptable deformations or settlements, for example. The FEM is well-suited for the prediction of such deformations under serviceability limits, so why is it not used routinely in geotechnical designs? Perhaps, it is time to reconsider our design philosophy.

3. Numerical optimization

Geotechnical design and construction are largely driven by experience and trial-and-error. This process can be optimized by the application of mathematics and control methods, which in turn leads to a reduction of costs, CO_2 emissions and time duration of the project.

The workshop aims to contribute to these three topics, stimulate geotechnical research, and integrate sustainable solutions into routine practice.

ORGANIZATION

Hamburg University of Technology
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VENUE

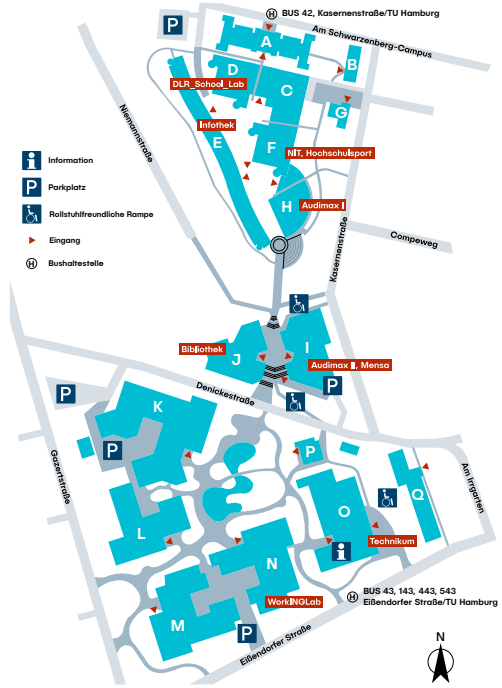
Hamburg University of Technology
Am Schwarzenberg-Campus • 21073 Hamburg
Karl H. Ditze Hörsaal (0.16), Building H

REGISTRATION

Deadline
03. Sept. 2026

Please register at
https://express.converia.de/frontend/index.php?page_id=52988

Event fee 375,-Euro

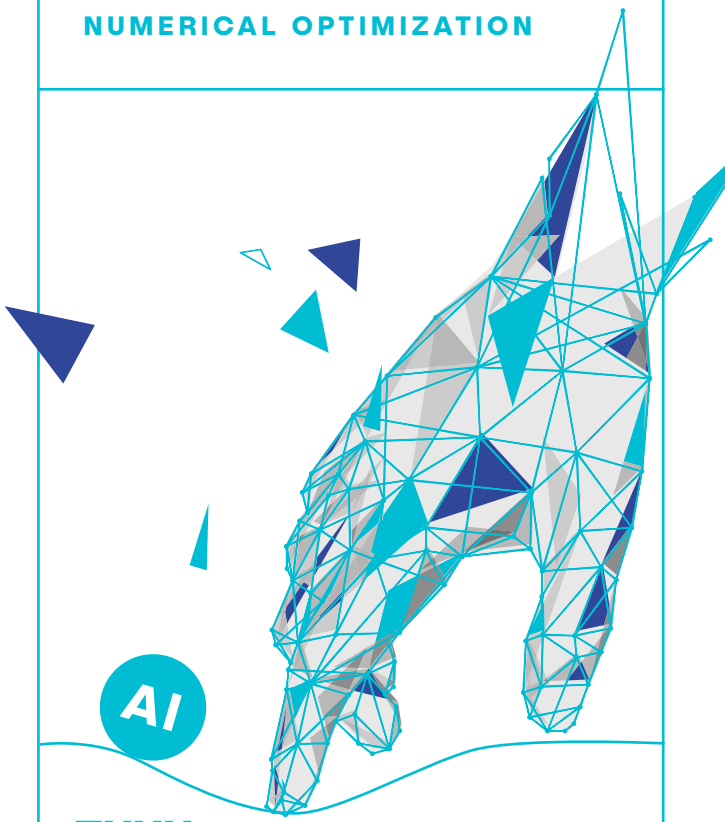


17. – 18. SEPTEMBER 2026

WORKSHOP

Numerical Methods in Geotechnics

AI IN GEOTECHNICS, DEFORMATION BASED DESIGN, NUMERICAL OPTIMIZATION



TUHH
Technische
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Hamburg

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17. SEPTEMBER 2026

14.00 START

SESSION 1

AI in Geotechnics
Moderation: Jürgen Grabe

14.10 **Keynote**
Geomechanics-informed artificial neural network for high-cyclic soil response
Merita Tafili, RUB

14.40 **Data and thermodynamics are all you need: discovery of constitutive models from hard constraints**
Filippo Masi, INRIA,
University Grenoble Alpes, France

15.00 **Insights into soil nonlinearity using surrogate models-based back analyses of geotechnical structures**
David Taborda, Imperial College

15.25 COFFEE BREAK

16.00 **AI-based prediction of soil behaviour using triaxial and oedometer data**
Mohamed Abdennadher, TUHH

16.25 **Smarter geotechnical coding with AI**
Patrick Staubach, Uni Weimar

16.50 **An approach of BIM2FEM-coupling to support automation in geotechnical engineering**
Sascha Henke, HSU

17.15 **Parametric finite element analyses incorporating stochastic ground models for uncertainty propagation**
Tobias Peterstorfer, Johannes Leo,
Franz Tschuchnigg, TU Graz

17.40 CONCLUSION

19.30 DINNER
Rickmer-Rickmers from 20.00 till 23.00

18. SEPTEMBER 2026

9.00 START

SESSION 2

Deformation Based Design
Moderation: Sascha Henke

9.10 **Keynote**
CLARION: Advancing numerical digital twins via full-scale field testing of smart quay wall
Alfred Roubos, Port of Rotterdam

9.40 **A comparative study of analytical and numerical based design approaches for rigid inclusions**
Christopher Tinat, Menard GmbH,
Prerana Krishnaraj, TUHH

10.05 **Installation method influence on the prediction of long-term monopile deformations**
Dr. Viet Hung Le, Frank Rackwitz, TU Berlin

10.30 COFFEE BREAK

11.00 **Data-driven back-analysis and forward prediction of quay wall behaviour under tidal influence**
Kacper Cerek, Jürgen Grabe, TUHH

11.25 **On the use of surrogate modelling in parameter optimization**
Ronald Brinkgreve, TU Delft

11.50 **Numerical study on the influence of mesh dependency on shear planes in Finite Element Models**
Tim Pucker, Mazdak Atri, HCU

12.15 **From data to design: insights from the SAGE-SAND and EXCALIBUR projects and a Class A blind prediction test**
Stijn Francois, KU Leuven

12.40 CONCLUSION

12.50 LUNCH BREAK

SESSION 3

Numerical Optimization
Moderation: Tim Pucker

13.50 **Keynote**
Linking numerical modelling to construction work: challenges and opportunities
Raul Fuentes, RWTH Aachen

14.20 **Generative design with Plaxis**
Dr. Jia Lin, Strabag Wien, Technisches Büro

14.45 **Saving time and money with mathematical optimization - applied optimization in geotechnical engineering**
Jörg Meier, Gruner AG

15.10 **Surrogate modeling for a deep excavation problem with increasing feature and target complexity**
Johannes Leo, Thomas Elmer, Franz Martin Rohrhorfer, Franz Tschuchnigg, TU Graz

15.35 COFFEE BREAK

16.05 **A data-driven perspective on the vibrodriving process: Modeling, optimization, and control**
Francisco Williams-Riquer, Mechthild Cramer, TUHH

16.30 **Physics enhanced and data driven modeling applied to structural and wave dynamics**
Norbert Hoffmann, TUHH

16.55 **Application of the phase-field method for resource-efficient ground improvement through shear band strengthening**
Elnaz Hadjiloo, TUHH

17.20 CONCLUSION

17.30 CLOSURE