Editorial: Insights in geotechnical engineering: 2021

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Editorial on the Research Topic
[Insights in Geotechnical Engineering: 2021]

The special Research Topic, *Insights in Geotechnical Engineering: 2021,* published by the Journal of Frontiers in Built Environment, is to showcase some recent advances in geotechnical engineering in different countries. The geotechnical engineering field has witnessed significant advancements in theories and practices in recent years. Rapidly increased computation power has enabled researchers and engineers to apply advanced numerical simulation methods to solve complicated problems in the practice. The geotechnical engineering community has also adopted artificial intelligence (AI) to better tackle with uncertainties in geotechnical problems. Researchers and engineers have adopted more analytical tools to study unsaturated soil and multiphase flow problems and introduced more new and smart materials to improve soil/rock properties and geosystems. The geotechnical engineering research has become more interdisciplinary, such as bio-inspired technologies. These are just few examples reflecting the evolution of Geotechnical Engineering in recent years. To showcase some recent advancements in geotechnical engineering, this Research Topic includes five papers covering earth structures, soil-structure interactions, advanced numerical methods, artificial intelligence, and case studies. A brief summary of each published paper in this Research Topic is presented below.

Damians et al. proposed a parameter determination method for zero-thickness elements using equivalent interface property values in the finite element method and the finite difference method to achieve equivalent numerical outcomes (e.g., similar computed loads transferred from soil to structure) to those when continuum elements are used at the interfaces. This study demonstrated that continuum elements with equivalent interface properties may be used instead of zero-thickness interface elements when they are not available in numerical software.

Ding et al. adopted a machine-learning method using a general regression neural network under the Bayesian framework to intelligently select features related to the tunneling-induced ground settlement based on measured data and develop a robust non-

parametric model for predicting maximum ground settlement induced by tunneling in soft soils. This model was validated by comparing the measured data from the testing dataset with the performance on a new dataset.

Liu et al. assessed the state of knowledge and recent advances in understanding the behavior of integral bridge abutments (IBAs) in response to temperature changes, including abutment movement, pile response, and horizontal earth pressure behind the abutment, examines the effect of bridge skew on the IBA behavior, and discusses possible measures to mitigate temperature change-induced problems for IBAs, for example, the use of geosynthetics.

Junqi et al. adopted the disc fracture hypothesis to generate a fracture network in rock using the Monte-Carlo method and the hypothesis of water flow in rock fractures to simplify the three-dimensional fracture network into a spatial one-dimensional pipe element model with an equivalent pipe diameter linearly related to the fracture width. The proposed multi-parameter model better characterized the permeability tensor than the single-parameter model.

Ubay-Anongphouth and Alfaro studied the mechanisms of delayed slope instability of an earth fill dam. They found that the finite element analysis considering time-dependent soil creep could predict the time-dependent movements or instabilities of the earth fill dam. This study highlighted the importance of identifying the key mechanisms of instability prior to developing sound and practical remedial measures.

These papers have only provided some insights in geotechnical engineering. Clearly, there are many other insights in geotechnical engineering to be revealed in the future, for example, smart geo-materials, soil/rock laboratory and field testing, earthworks and ground improvement technologies, geotechnical sensing and monitoring technologies, and geo-hazard/environmental impacts and mitigation. Researchers and engineers are encouraged to submit their manuscripts to this Research Topic and provide more insights in geotechnical engineering in the future.

The guest editors would like to thank all the authors for their valuable contributions to this Research Topic and appreciate all the reviewers for their time and comments that helped improve the quality of these papers.

Author contributions

Conflict of interest

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