Editorial

Michael Law PhD, PE, GE

Senior Associate, Mueser Rutledge Consulting Engineers, New York,
NY, USA

On behalf of the Editorial Board, welcome to the fourth issue of volume 172 of *Geotechnical Engineering*. Twenty-nine authors from ten different countries contributed a total of eight papers and one discussion in this issue. While various topics are covered in this issue, it is astonishing to see that all are pertinent challenges that I have faced in my nearly two decades of experience in the industry.

We begin with a paper on a salient subject: risk management in geotechnical design. Prästings *et al.* (2019) first present how uncertainties in geotechnical properties are managed in Eurocode 7 (CEN, 2004). The authors then argue that the lack of harmonisation between reliability-based design and the partial factor method in Eurocode 7 is a reason why a risk-based design concept has not been widely adopted in the industry. Prästings *et al.* (2019) further discuss that a small sample size of geotechnical data should not deter the performance of reliability-based design. The authors also provide suggestions on how the partial factor method can be redefined for a risk-based design concept.

Yang *et al.* (2019) analyse the stability and failure mechanisms of unlined elliptical tunnels subjected to surcharge loading using the upper-bound finite-element method with rigid translatory moving elements. The analysis results reveal that the failure mechanisms of unlined elliptical tunnels are composed of mutual movement of rigid blocks and two major slip surfaces. The effect of soil dilatancy is also evaluated. Yang *et al.* (2019) caution that the stability of an unlined elliptical tunnel can be overestimated in high friction angle soils, if associated flow rule is assumed.

Selçuk and Şeker (2019) performed a study using ultrasonic pulse velocity that correlates the compression wave velocity to the estimated California bearing ratio (CBR) of compacted soils. This study includes data from 25 soil samples, consisting of CH, MH, CL, SC, and SM soil groups as per the Unified Soil Classification System. The correlations developed by the authors provide practicing engineers a reliable method to estimate CBR.

MacRobert *et al.* (2019) performed a study to evaluate shear strength of soils that are susceptible to internal erosion. The laboratory tests performed involves adding water-soluble salt to soil samples to represent erodible particles.

MacRobert *et al.* (2019) identify two distinct microstructures in soils when internal erosion occurs, in which the non-erodible coarse fraction can remain densely packed or can become loose, with the latter resulting in reduction in shear strength. The authors conclude that the proportion of the erodible particles in the soil skeleton, whether it is lower or higher than the transitional finer fraction, dictates the behaviour.

Oreste *et al.* (2019) performed a numerical study to assess the creep behaviour of shotcrete tunnel linings in rock. The numerical method developed is based on the convergence-confinement and hyperstatic reaction methods. The Voigt–Kelvin model was used to account for the creep effect. Oreste *et al.* (2019) conclude that for the case where the rock mass quality is good, the creep behaviour of shotcrete would result in reduction in stresses in the lining. The same reduction was not observed for the case with lower quality rock mass.

Dehkordi *et al.* (2019) present a study on the stochastic bearing capacity of two parallel strip footings supported on a layer of sand with a rigid bottom boundary. The authors first developed the evaluation method based on a single footing, then extended the analysis to the two footings case using Monte Carlo simulations. Dehkordi *et al.* (2019) provide design plots that can be used in practice.

Conrado-Palafox *et al.* (2019) performed a numerical study to analyse the effect of a specific type of karsticity in limestone. A typical highway embankment was analyzed in Plaxis 2D, in which the cavities are explicitly modelled. The analysis results allow Conrado-Palafox *et al.* (2019) to develop stress paths in the limestone when the cavities are developed. The authors also provide additional insights on surface subsidence caused by karsticity.

Lastly, Liu *et al.* (2019a) develop a mathematical model that evaluates horizontal earth pressure at the tunnel face of an earth pressure balance shielded tunnel-boring machine. The model accounts for three-dimensional soil arching effect. The authors conclude that the internal friction angle of soils has a more significant influence on the earth pressure at the tunnel face than cohesion. Liu *et al.* (2019a) also discuss a fascinating case history in China that involves an unstable tunnel face that resulted in a sinkhole. This paper is immediately followed by

the discussion (Liu *et al.*, 2019b), which include additional details of the case history.

We hope you will enjoy this issue of *Geotechnical Engineering*.

REFERENCES

- CEN (European Committee for Standardization) (2004) EN 1997-1:2004: Eurocode 7. Geotechnical design – part 1: general rules. CEN, Brussels, Belgium.
- Conrado-Palafox AL, Equihua-Anguiano LN, Orozco-Calderón M and Arreygue-Rocha E (2019) Numerical simulation of karst environments to study subsidence. *Proceedings of the Institution of Civil Engineers – Geotechnical Engineering* **172**(4): 365–376, <https://doi.org/10.1680/jgeen.18.00161>.
- Dehkordi PF, Karim UFA, Ghazavi M and Ganjian N (2019) Stochastic analysis of the capacity of two parallel footings on a thin sand layer. *Proceedings of the Institution of Civil Engineers – Geotechnical Engineering* **172**(4): 355–364, <https://doi.org/10.1680/jgeen.18.00094>.
- Liu K, Ding W, Zhang Q, Shi P and Yan C (2019a) Stability analysis of earth pressure balance shield tunnel face considering soil arching. *Proceedings of the Institution of Civil Engineers – Geotechnical Engineering* **172**(4): 377–389, <https://doi.org/10.1680/jgeen.18.00052>.
- Liu K, Ding W, Zhang Q *et al.* (2019b) Discussion: Stability analysis of earth pressure balance shield tunnel face considering soil arching. *Proceedings of the Institution of Civil Engineers – Geotechnical Engineering* **172**(4): 390–392, <https://doi.org/10.1680/jgeen.19.00027>.
- MacRobert CJ, Day PW and Luker I (2019) Strength changes during internal erosion of gap-graded soils. *Proceedings of the Institution of Civil Engineers – Geotechnical Engineering* **172**(4): 331–343, <https://doi.org/10.1680/jgeen.18.00064>.
- Oreste P, Spagnoli G and Ceravalo LA (2019) A numerical model to assess the creep of shotcrete linings. *Proceedings of the Institution of Civil Engineers – Geotechnical Engineering* **172**(4): 344–354, <https://doi.org/10.1680/jgeen.18.00089>.
- Prästings A, Spross J and Larsson S (2019) Characteristic values of geotechnical parameters in Eurocode 7. *Proceedings of the Institution of Civil Engineers – Geotechnical Engineering* **172**(4): 301–311, <https://doi.org/10.1680/jgeen.18.00057>.
- Selçuk L and Şeker V (2019) Predicting California bearing ratio of foundation soil using ultrasonic pulse velocity. *Proceedings of the Institution of Civil Engineers – Geotechnical Engineering* **172**(4): 320–330, <https://doi.org/10.1680/jgeen.18.00053>.
- Yang F, Sun X, Zou J and Zheng X (2019) Analysis of an elliptical tunnel affected by surcharge loading. *Proceedings of the Institution of Civil Engineers – Geotechnical Engineering* **172**(4): 312–319, <https://doi.org/10.1680/jgeen.16.00122>.