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Editorial

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Editorial

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On behalf of the Editorial Board of *Geotechnical Research*, we welcome our readers to the first issue of volume 7 (2020). This issue includes one briefing, five papers and one discussion. A ‘briefing’ is an article to provide short (not comprehensive) authoritative updates of relevant technical, regulatory and professional developments. ‘Papers’, on the other hand, include research, case study or project papers. A research paper is a conventional academic research article with original findings from an investigation, whereas a case study looks at the effects of the implementation of, for example, a system and analyses it, in the context of the situation. A ‘discussion’ allows the reader to comment on a previously published paper in *Geotechnical Research* and gives authors the right to reply under a peer-reviewing process by a member of the Editorial Board. The growing number and the diversity of contributions, covering both academia and industry, in *Geotechnical Research* indicates its strong commitment and high accomplishment to the geotechnical profession. We would like to thank our readers, authors, reviewers and panel members for their contribution.

The briefing in this issue by Al-Jabban *et al.* (2020) presents common laboratory procedures to prepare and cure soil–binder mixtures for soil stabilisation. They review homogenisation of the natural soil, mixing type and duration, mould type, moulding techniques and curing time and condition, which may help many construction projects.

Xu *et al.* (2020) performed a series of direct shear tests on the interface of fibre-reinforced cemented backfill of silica and zinc tailings and granitic rock to assess the optimum strength capacity as a function of fibre content, curing time, the chemistry of pore water within the tailings and magnitude of applied normal stress. The shear strength and residue strength both show improved results due to the addition of fibre but the improvement will tend to reach threshold fibre content values of about 0.2% for silica tailings and 0.5% for zinc tailings, after which limited improvement is observed. With increased curing time and confining pressures, strength gain is expected due to an increase in hydration products and greater surface contacts, respectively. The development of strength can be quantified confidently by way of the Mohr–Coulomb failure criterion.

Constitutive modelling is an integral part of understanding soil behaviour as a continuum medium, and *Geotechnical Research*

encourages new development in modelling. In this issue, Osman *et al.* (2020) present a new model which is capable of capturing the secondary and tertiary creep observed in soft rocks. The authors claim the novelty of their work comes through combining the continuum damage approach within the framework of hyperplasticity for rate-dependent materials, thus encompassing viscoplasticity and damage within a single theory. The attractive feature of this model is that the model parameter can be derived from conventional laboratory testing.

Shiau and Hassan (2020) investigated the traditional trapdoor problem utilising three numerical techniques – namely, the finite-difference method as well as the upper- and lower-bound finite-element limit analyses – in order to determine the corresponding factor of safety of a problem in hand considering Broms and Bennermark’s method (typically linked to undrained analysis only) but modified to include drained analyses as well, thus increasing the practical application of this concept – for example, in a sinkhole problem. A broad range of stability numbers and depth ratios have been investigated in order to broadly cover phenomena such as (cavity) collapse and (tunnel) blowout. Design charts were successfully produced, with a design methodology proposed as well.

Arulrajah *et al.* (2020) conducted repeated load triaxial (RLT) and wheel tracker (WT) tests on mixtures of tyre-derived aggregates (TDA) and recycled concrete aggregates (RCA) to investigate rut resistance on flexible pavements when subject to simulated traffic loadings (up to 40 000 cycles). Results showed that addition of up to 3% TDA by weight or 10% by volume generates viable geomaterials for pavement subbase applications, which has the potential of replacing traditional quarried materials, thus making such road pavements more sustainable and environmentally friendly. The study clearly identifies the limitation of existing WT technology as it only considers performance limited to just 300 mm of pavement thickness (either base/subbase or asphalt) and with no application of overburden stress. Therefore, the study recommends that a full-scale WT test be considered in future to accurately capture soil–structure interaction effects derived from repeated wheel loads and the entire pavement system comprising surface, base, subbase and subgrade.

The grading entropy framework provides a convenient means of presenting and interpreting the gradation characteristics of various

soils. O’Kelly and Nogal (2020) present the grading entropy approach for predicting the permeability coefficient of coarse-grained soils. They used published data sets for permeability coefficient for saturated compacted silty sand, sand and gravel materials to evaluate the influence of gradation parameters and the void ratio (e) on permeability coefficient. They suggest separate models for well-graded and poorly graded materials for better regression correlation.

Svinkin *et al.* (2020) discuss the challenges faced when interpreting dynamic and static pile load tests from a collection of nearly 200 pile tests over a period of more than 20 years, as well as their performance-based design with reference to standard pile design and acceptance criteria. Indeed, time-dependent soil–structure interaction and its associated behaviour are real-life phenomena and can be complex. If not captured accurately with full understanding, comparison analyses could not match up, thus creating a case of ‘confusion’ (not necessarily that different is wrong!). The important discussion points include (a) interpretation of static and dynamic pile load testing using differing methods, (b) effect of time on pile load test outcomes and (c) variation of hammer energy in mobilising pile carry capacities.

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