Editorial

Anand Puppala PhD, PE

Professor, University of Texas at Arlington, TX, USA

I welcome the opportunity to write the first editorial of 2016 and also wish all our readers, editorial board and ICE staff members a happy new year. This opening issue of 2016 covers several engaging topics of interest to the ground improvement community. The topics covered include stabilising techniques such as plastic tube cast-in-place concrete (TC) piles, low pressure grouting, calcite in situ precipitation system (CIPS), deep soil mixing (DSM), as well as modelling soil–nail interface using finite difference method. It covers investigations on research topics such as jet grouting technology and describes a few important learning lessons from forensic examinations of past vibro stone column failures. The wide variety of topics covered by authors from different parts of the world deal with local issues that concern ground improvement, thus making this issue an important knowledge resource to our readers.

The first paper (Serridge, 2016) is a briefing paper and describes valuable lessons learned from historical case studies on failures or poor performance of vibro stone column reinforced soils. This paper provides a forensic examination of various published case studies and then details the causes of unsatisfactory performance or failures, covering excessive total and differential settlement issues. Topics ranging from stone column penetration length, pore pressure dissipation, quality control issues during construction to field observational (monitoring) method in relation to failures are discussed in detail. A nice flow chart that describes important steps for a successful implementation of vibro ground improvement technique with a focus on risk management is provided.

In the paper by Qi *et al.* (2016) the authors discuss plastic TC piles as an economically viable ground improvement technique for the support of embankments with soft, weak soils, especially in southeast coastal regions in China. The authors gathered data on load-settlement response, axial load transfer mechanisms, and both shaft and base resistances from systematic instrumented field tests, and then they modelled the load settlement of individual plastic tube piles. Their research efforts highlights TC piles as a better alternative to prefabricated or cast-in-place piles under comparable conditions.

In the paper by Chew and Bharati (2016), a new predictive model based on comprehensive laboratory experimental study of the soil treatment with grouted column under low grouting pressure is presented. Performance of the novel ‘low pressure grouting’ model was evaluated and tested by studying the effect of key factors such as injection pressure, nozzle diameter,

viscosity ratio, and undrained shear strength of clay and their influence on radius of grouted column. This study proves the efficacy of proposed model as an effective approach to arrest the settlement of a soft clay layer, a major local concern in Singapore site conditions.

The paper by Palmén *et al.* (2016) describes an experimental study to test suitability of using permeation grouting system such as CIPS or CIPS at lower temperatures, thus making it a possible stabiliser option for ground improvement under Scandinavian climate conditions. There are concerns about the chemical reaction of CIPS being affected by ground temperature, thereby possibly affecting the increase in strength. Unconfined compressive strength tests on CIPS-saturated specimens that were cured for different time periods and dried at two different temperatures indicated no effect on strength increase, thus concluding its usefulness in climates that have an average ground temperature of around 10 and 20°C.

Another paper by Modoni *et al.* (2016) investigates the effectiveness of jet grouting technology by studying the complex mechanisms involved in the diffusion of turbulent jets, implementing a numerical finite-volume model; results of which are further compared with previous experimental data. The authors have also derived a mathematical formulation that is capable of modelling the velocity distribution, allowing them to further conduct a parametric study on the effect of nozzle diameter, inlet velocity and grout composition on erosive power of single-fluid jet grouting. Based on these studies, the principles of double- and triple-fluid jet grouting system are also explained. This paper is a valuable contribution towards improvement on the topic of jet grouting technology and a relevant premise on which future studies could be planned.

The paper by Bryson *et al.* (2016) discusses studies that were aimed at providing and improving guidelines for preliminary design of land reclamation and similar ground improvement projects constructed on problematic soft clay treated with a DSM technique, using an example project in Canada. A theoretical model that was modified using key design variables was implemented to conduct extensive parametric studies to evaluate the effect of strength, width and location of mass soil stabilisation on the global factor of safety against failure of DSM-enhanced slopes and vertical earth-retaining structures. These studies could lead to future optimised guidelines on designing land reclamation projects.

The paper by Hajjalilue-Bonab and Razavi (2016) details results of simulations aimed at investigating soil-nailed wall behavior under limit states based on the finite difference method. Numerical modelling was carried using the Flac 3D programme, and collapse behaviour was accounted for using the load collapse method and strength reduction method to study the shape of failure slip surface in cohesive and granular soil. Interestingly, the shape of failure slip surface (circular) is similar for cohesive soils while it is different (trilinear and bilinear) for granular soils. The length, location and bending stiffness of nail on stability of soil-nailed wall is also investigated. These numerical studies provide critical insight into the much needed key parameter; soil-nail interface resistance, a controlling factor in design, deformation and stability assessment of soil-nailed structures.

The current issue combines decent breadth and depth of research and practical efforts made towards enhancing ground improvement practices. The information provided in these papers will potentially lead better practical tools and also new research ideas and efforts to further understand certain stabilisation mechanisms to improve the current state of practice. We encourage readers to provide constructive comments, suggestions and discussions on the published articles.

Last but not least, I would like to take this opportunity to wish all the best to a colleague, Margaret Tomlinson of ICE Publishing, in her future endeavours. Margaret has been a great helping hand to many of us on the editorial board in our journal duties and we thank her for many years of service to the journal. Thanks Margaret!

REFERENCES

- Bryson SL, El Naggar H and Valsangkar AJ (2016) Optimising deep mixed soil zones in land reclamation projects. *Proceedings of the Institution of Civil Engineers – Ground Improvement* **169**(1): 54–63, <http://dx.doi.org/10.1680/jgrim.14.00016>.
- Chew SH and Bharati SK (2016) Arresting settlement of clay using low-pressure grouting. *Proceedings of the Institution of Civil Engineers – Ground Improvement* **169**(1): 22–35, <http://dx.doi.org/10.1680/jgrim.14.00006>.
- Hajjalilue-Bonab M and Razavi SK (2016) A study of soil-nailed wall behaviour at limit states. *Proceedings of the Institution of Civil Engineers – Ground Improvement* **169**(1): 64–76, <http://dx.doi.org/10.1680/jgrim.14.00021>.
- Modoni G, Wanik L, Giovinco G, Bzówka J and Leopardi A (2016) Numerical analysis of submerged flows for jet grouting. *Proceedings of the Institution of Civil Engineers – Ground Improvement* **169**(1): 42–53, <http://dx.doi.org/10.1680/jgrim.14.00012>.
- Palmén A, Price G, Axelsson M and Larsson S (2016) Low-temperature calcite precipitation in sand using CIPS. *Proceedings of the Institution of Civil Engineers – Ground Improvement* **169**(1): 36–41, <http://dx.doi.org/10.1680/jgrim.14.00009>.
- Qi CG, Chen YH and Iskander M (2016) Field load tests on plastic tube cast-in-place concrete piles. *Proceedings of the Institution of Civil Engineers – Ground Improvement* **169**(1): 9–21, <http://dx.doi.org/10.1680/jgrim.13.00053>.
- Serridge CJ (2016) Briefing: Learning from vibro stone column failures. *Proceedings of the Institution of Civil Engineers – Ground Improvement* **169**(1): 3–8, <http://dx.doi.org/10.1680/jgrim.15.00012>.