Editorial

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Energy geotechnics has received growing interest by institutions, academics and practitioners, understandably due to our society's pressing needs on new forms of energy or on optimising existing supply technologies, be it nuclear, conventional and unconventional hydrocarbons fuels, thermo-active geo-structures, tidal wave or wind. Our geotechnical engineering community has taken up these challenges via a number of effective communication channels (e.g., local and international conferences, journals, seminars and symposiums, Rankine Lectures) and grouping experts to form specialist committee (e.g., ISSMGE TC308), working on and achieving significant results over the last decade. To further advance this understanding, we are pleased to present a themed issue on geotechnics in energy provision. The issue has eight papers in total, grouped into two main topics; thermo-mechanical properties of soil and structures, and innovation in offshore renewables foundations. A wide range of research approaches and new contributions, using laboratory element testing, small- and large-scale physical modelling and advanced numerical modelling are adopted. Their findings illustrate notable recent developments in this field.

In the first topic on thermo-mechanical properties of soil and structures, Low *et al.* (2017) quantify the potential error of soil thermal conductivity measurements from thermal cells that had inadequate thermal insulation characteristics. Their study suggests that the lump capacitance method as a means of calculating the power is unlikely to be applicable for determining realistic soil thermal conductivities. In the second paper, Gawecka *et al.* (2017) detail a fully coupled thermo-hydro-mechanical finite-element (FE) model for predicting the thermo-mechanical responses of a thermo-active pile in ground conditions typical of the London Basin. This study highlights the importance of considering transient phenomena that account for heat transfer, consolidation and their interaction on the pile's stress transfer to more correctly capture the thermally-induced stress changes around the pile. In the next paper, Wang *et al.* (2017) describe a series of large-scale physical model tests on thermo-active single piles in dry sand, studying their thermo-mechanical behaviour with three different heat circulation pipe configurations (U-shaped, spiral and W-shaped) normally employed in current practice. The model tests show that the W-shaped configuration has the highest heat transfer efficiency to the surrounding soil among the three. The fourth paper (Di Donna *et al.*, 2017) presents a series of parametric FE thermal analyses to evaluate the

heat transfer efficiency of a thermo-active reinforced-concrete diaphragm wall. They study the effects of various major design parameters on the theoretical performance of the wall immediately after construction, as well as during medium- and long-term operations. The modelling results may be later employed to compare with small- and large-scale tests, potentially leading to future improvements and savings in practice.

In the second topic on recent innovations in renewable energy, Nanda *et al.* (2017) report a database of results from large-scale physical model tests on a model offshore wind turbine supported by a mono-pile under both uni- and multi-directional lateral cyclic loading conditions. It is a popular topic amongst researchers and practitioners, and we anticipate a lively discussion of the paper's findings following up at the symposium to be hosted at the University of Dundee, UK in June this year. Similar interests are expected on the following paper by Al-Baghdadi *et al.* (2017), who present a three-dimensional FE analysis of the load-deformation responses of a screw pile in sand under combined vertical and horizontal loads. They find that the axial load has a pronounced effect on the lateral capacity of both straight-shafted and screw piles, especially the latter due to the presence of helical plates. In the penultimate paper, Cox and Bhattacharya (2017) present a series of small-scale physical model tests to study the serviceability performance of an offshore structure supported by a suction caisson founded in loose sand, establishing useful relationships between the permanent rotation of the suction caisson to the number of cyclic loading cycles and the relative directionality of the loading applied. In the last paper, Ziogos *et al.* (2017) present results from their investigation on the chalk-steel interface shearing properties, which provide new insights to the design of gravity-based foundations in chalk.

In closing, we would like to thank all the authors, reviewers and our Editorial Advisory Panel members who have contributed greatly to the success of this themed issue. We hope that you enjoy reading the papers and will provide additional discussions and responses for the benefit of advancing the geotechnical knowledge. By working together, we serve the needs of future energy requirements worldwide. In addition, we show the ability of geotechnical engineers from the UK and overseas to solve complex and challenging engineering problems, achieving practical solutions based on sound understanding, suitable experience and reliable database.

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