

Announcement: Award-winning papers in 2022

Papers published in *Géotechnique* are eligible for awards from the Institution of Civil Engineers. Papers from any of the ICE journals can be nominated for several awards. In addition, each journal has awards dedicated to their specific subject area.

On Friday 13 October 2023, ICE president Keith Howells presented awards to the following papers published in *Géotechnique* in 2022. The editorial panel nominated their best papers and an awards committee chaired by Tim Broyd allocated the awards.

The Telford Gold Medal, awarded to the best overall paper, was awarded to Nagula *et al.* (2022).

ABSTRACT

Vibroflotation is an established ground improvement technique for granular materials. It densifies loose sands by means of shear and compressive deformation processes imparted by the horizontal vibrations of a vibrator probe at the required soil depth. The field experience and empirical relations used for the design of vibroflotation processes prompt further study and analysis. Numerical simulations of the method help provide insight into the process. A coupled Eulerian–Lagrangian framework was used to model the compaction process. The compaction process was modelled based on the pilgrim step method for a depth range from 25 m to 10 m. A hypoplastic constitutive model was used to characterise the stress–strain behaviour of the fine sand. Numerical results were validated against in-field cone penetration test measurements made before and after the compaction of fine sand in east Germany. The validation was followed by a parametric study in which the following were evaluated in terms of their effects on the extent and degree of compaction: frequency, relative density, shape of vibrator,

spacing of compaction points, nature of compaction process and type of sand.

The Charles Manby Prize, presented to the best paper that covers information and communications technology/geographic information systems/building information modelling in its broadest sense, was awarded to Acikgoz *et al.* (2022).

ABSTRACT

Heritage masonry structures require detailed monitoring during nearby underground construction, to address the concerns of building owners and mitigate uncertainties relating to the soil–structure system. This paper discusses innovative displacement and strain monitoring of a listed masonry church undergoing ground movements due to nearby tunnelling in London Clay. In addition to conventional surveying and tilt monitoring, laser scan displacement monitoring and fibre optic strain sensing was conducted. Prior to construction, point clouds of the structure were used to map pre-existing geometric distortions in the structure. During construction, detailed monitoring of displacements and strains was conducted across the building facades and the tower. The same techniques were also used to monitor the painted dome of the church where conventional displacement monitoring was not feasible. With a focus on the new engineering insight provided by the innovative monitoring techniques, the impact of the underground construction activities on the church is discussed in this paper. The proposed sensing techniques provide new data on the influence of pre-existing damage and tunnel advance on soil–structure interaction.



Telford Gold Medal winner Sparsha Nagula with ICE president Keith Howells



Charles Manby prize winners (from second left) Lord Robert Mair, Antonio Luciano, Mark Dewhirst and Sinan Acikgoz with ICE president Keith Howells

The Geotechnical Research Medal, presented for the best paper on geotechnical research, was awarded to Davidson *et al.* (2022).

ABSTRACT

Screw piles potentially offer quieter installation and enhanced axial tensile capacity over straight-shafted driven piles. As such, they have been suggested as a possible foundation solution for offshore jacket-supported wind turbines in deeper water. To investigate the feasibility of their use in this setting, centrifuge testing of six model screw piles of different designs was conducted to measure the installation requirements

and ultimate axial capacity of the piles in very dense and medium-dense sand. The screw piles were designed to sustain loads generated by an extreme design scenario using published axial capacity and torque prediction formulae. Single- and double-helix designs, including an optimised design, intended to minimise installation requirements, with reduced geometry were installed and tested in-flight. Piles in the medium-dense sand, for example, had significant installation requirements of up to 18.4 MNm (torque) and 28.8 MN (vertical force), which were accurately predicted using correlations with cone resistance data (cone penetration test). Existing axial capacity design methods did not perform well for these large-scale screw piles, overestimating compressive and tensile capacities. Revised analytical methods for installation and axial capacity estimates are proposed here based on the centrifuge test results.

REFERENCES

- Acikgoz, S., Luciano, A., Dewhirst, M., DeJong, M. J. & Mair, R. (2022). Innovative monitoring of the response of a heritage masonry building to nearby tunnelling in London Clay. *Geotechnique* **72**, No. 3, 200–215, <https://doi.org/10.1680/jgeot.19.P243>.
- Davidson, C., Brown, M. J., Cerfontaine, B., Al-Baghdadi, T., Knappett, J., Brennan, A., Augarde, C., Coombs, W., Wang, L., Blake, A., Richards, D. & Ball, J. D. (2022). Physical modelling to demonstrate the feasibility of screw piles for offshore jacket-supported wind energy structures. *Geotechnique* **72**, No. 2, 108–126, <https://doi.org/10.1680/jgeot.18.P311>.
- Nagula, S., Nguyen, M., Grabe, J., Kardel, J. & Bahl, T. (2022). Field measurements and numerical analysis of vibroflotation of sand. *Geotechnique* **72**, No. 10, 882–898, <https://doi.org/10.1680/jgeot.20.P195>.



ICE president Keith Howells with winners of the Geotechnical Research Medal