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Editorial
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Editorial

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In compiling this editorial for the June issue of *Geotechnical Engineering*, I was delighted to see the truly international nature of this issue of the Journal. The seven papers and one discussion have authors based in 11 countries on three continents, reflecting the truly global nature of current geotechnical research.

The seven papers cover a wide variety of topics from those directly related to the practice of geotechnical engineering to those with a more theoretical bias. The first two papers reflect the difficulties geotechnical engineers face in working with unusual soils. Den Haan and Feddema (2013) investigate the prediction of the behaviour of dykes founded on soft Dutch soils using a viscous Cam-clay model. The organic peat soils on which many of these dykes are founded can exhibit very high friction angles under triaxial conditions, which are not mobilised fully in the field, making conventional effective stress design potentially unconservative. Methods of design to avoid these problems have been developed in the past by Dutch engineers, but this paper proposes a method by which the parameters needed for the model can be easily determined from a constant strain-rate oedometer test. The capabilities of the model are investigated based on two case histories of embankment performance and the model is shown to adequately represent the deformation and failure of embankments founded on these materials.

The second paper, by Lees *et al.* (2013), presents data from cone penetrometer (CPT) testing in carbonate sands during the construction of Palm Jumeirah, Dubai. The project involved the construction of artificial islands using hydraulic fill, which were subjected to vibro-compaction in order to enhance their liquefaction resistance. CPT testing was widely carried out both pre- and post-compaction in order to assess the efficacy of the compaction technique in increasing the fill density. Crushable carbonate sands often display very different behaviour from that of silica sands, but the lack of guidance on the derivation of engineering properties for design often leaves engineers with no choice but to use correlations that are known to be poor. This well-documented case history makes some inroads into providing data that can be used to improve the reliability and efficiency of designs on these crushable materials.

The third paper, by Liu *et al.* (2013a), considers the problem of predicting the ultimate capacity of jacked piles from the data acquired during their installation. The ability to do this would be of great use in the application of performance-based design to jacked precast pipe piles, which are becoming a widely used foundation option in China owing to the minimal noise and vibration caused during the installation process. While the force required to cause pile installation gives an estimate of the final pile capacity, set-up during dissipation of the pore-pressures induced during the installation process can cause this to be a considerable underestimate. This paper studies a database of 1228 pile installations and static loading tests in a variety of ground conditions to derive correlations between the ratio of long-term pile capacity and installation force.

The fourth paper, by Papakonstantinou *et al.* (2013), presents field data from ground freezing works during construction of stations on the Naples metro. The conduction of heat through the ground was modelled using a finite-element (FE) code in order to match the observed data. The thermal properties of the soils concerned were strong functions of temperature, changing markedly owing both to the freezing of pore water and the mineralogy of the soils themselves. This case history can provide valuable data for the future evolution of the performance of thermal FE codes.

The remaining three papers in this issue have a more theoretical focus, but their results should still have practical applications. Ramesh and Prathap Kumar (2013) present the results of a series of experiments investigating the dynamic stiffness of sand strata of finite thickness under vertical vibrations. They show that the influence of an underlying stiff stratum becomes negligible when the depth of the stratum exceeds twice the foundation width.

Li *et al.* (2013) consider how to evaluate the behaviour of soils that do not fall into the conventional categories, being either cohesive or cohesionless, having particle sizes across several orders of magnitude. They present data on the behaviour of artificial soils manufactured from a mixture of glass beads and kaolin clay. While the behaviour of both fine and coarse materals is widely studied, real soils that contain the entire spectrum of particle sizes might behave somewhat differently to that predicted by classical theories. The behaviour of these soil mixtures under a wide range of strain rates and stresses is presented.

Finally, Liu *et al.* (2013b) propose a new mathematical function to fit the S-shaped relationships that are often seen in geotechnics. The four-parameter model is capable of accurately reflecting, for example, the reduction of shear modulus from G_0 with increasing shear strain. The paper demonstrates, using a variety of examples, the ability of this family of functions to fit a variety of soil mechanics phenomena.

The issue concludes with a discussion (Gallage *et al.*, 2013) on the failure of pipes in expansive soils. The contributor points out that the behaviour of pipeline networks may vary significantly

dependent on the type of pipe used, historic cast-iron networks being significantly more susceptible to damage than modern polyethylene ones.

At *Geotechnical Engineering*, we are putting a great deal of effort into both rapid review and rapid online publication. Rapid online publication is achieved through our Ahead of Print (AOP) service, which allows access to accepted papers prior to print publication. At the time of writing there are 43 articles available AOP, including a newly posted paper presenting field load-test results on base resistance for non-displacement piles by Gavin *et al.* (2013). To view the AOP papers, please follow the link from the journal's homepage or visit www.icevirtuallibrary.com/content/serial/geng/fasttrack.

I hope that you enjoy this issue of *Geotechnical Engineering* and that it will provoke further discussion on the issues raised.

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