Editorial

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Deposit of waste materials is the main topic of this issue. A modern waste deposition facility is usually comprised of the waste material, the bottom liner system and the cover system. Municipal solid waste (MSW) is one of the most challenging materials for landfill due to the significant degradation of the organic substances and the generation of leachate and landfill gases. The decomposition of solid skeleton will induce the change of the engineering properties of the waste and make this problem more complicated.

In the landfill body the coupled thermo-hydro-mechanical-chemical-biological processes can take place. Chen *et al.* (2018) introduced a theory to analyse the coupled processes and the stabilization behaviour of the MSW landfill. This theory is applied to several MSW landfill projects for stability evaluation of the landfill body, design of the liner and the cover system to prevent the breakthrough of the contaminated leachate and the landfill gases.

In this issue, readers can find papers related to different topics of the landfill, such as the mechanical behaviour of landfilled MSW, the performance of liner and cover systems, and the reclamation or reuse of waste soil.

The stress–strain behaviour of MSW needs to be considered when analysing the development of the settlement, deformation and slope stability of landfills, which have great impact on landfill design and management. In most cases, MSW shows hardening and dilatancy behaviour. It is a challenge to represent such behaviour with as simple a model as possible. Ke *et al.* (2019) introduced a non-linear elastic constitutive model with four parameters to capture the hardening and dilatancy behaviour. This paper proposes a model to simulate several laboratory triaxial consolidation drain tests. The calculated results are in agreement with the measurements. The newly developed model is easy to use and is indeed worth further improving so that we can take the ageing effect of MSW into consideration.

Landfilled solid waste can be used as a resource if it reaches certain ecologic and engineering requirements. The most common way to use landfilled solid waste is as an admixture combined with regular soils. Oluremi *et al.* (2019) reported the plasticity characteristics and cation-exchange capacity of local lateritic soil admixed with iron ore tailing and waste wood ash. They reported a dry weight up to 10% with these

admixture and regression analyses are also introduced. Using the treated soil with an optimal blend of both additives is recommended.

The sedimentation behaviours of materials deposited as slurry in ore mine tailings need to be well predicted and assessed. Monroy and McCarter (2019) demonstrated a simple technique to characterise the sedimentation processes by monitoring electrical properties in a laboratory experiment. They found increased electrical resistivity during sedimentation when porosity is decreased. In combination with oedometers, this technique can be applied to investigate the consolidation behaviour of a large-scale or in situ experiment.

The cover layer of a landfill prevents rainwater infiltration and controls leachate migration into the ground water. Hosney and Rowe (2019) reported the hydraulic and chemical properties of a polymer-enhanced bentonite-sand mixture covered with calcium-rich soil in laboratory experiments after 9, 21 and 48 months of elapsed time. Two cases were investigated in this study, the polymer-enhanced bentonite-sand mixture layer covered by an intact geomembrane and the same layer but covered by soil with a lower calcium ion concentration. The results indicate that the hydraulic conductivity of the polymer-enhanced bentonite-sand mixture layer is practically low enough to prevent significant water infiltration after four years.

For both capping and liner systems, the less the leakage, the better the landfill management. Müller and Wöhlecke (2019) achieved ‘zero leakage’ using a high-quality high-density polyethylene geomembrane. Installation free of waves and wrinkles, intimate contact with a low-permeability compacted or geosynthetic clay liner, a qualified third-party controlled installer and a protection layer work together to ensure that the system has no long-term leakage. Results are verified by measurements of more than 30 landfills. This paper can inspire readers to realize a ‘zero leakage’ liner and capping system in practice.

The soil cover layer is an efficient structure for the reclamation of lean oil sand overburden. Understanding the gas migration processes in the soil cover can help us design a reliable structure for the cover layer. Scale and Fleming (2019) reported an in situ experiment to study the depth, advection and diffusion flux of gases. Eight treatments of different soil cover structures are demonstrated, using peat, litter, fabric and humic materials, and subsoil. The direct

measurements and analysed data in this paper provide readers with useful information to help them understand the pore–gas dynamics in the overburden and in the soil cover of MSW landfills.

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