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Editorial

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It is my great pleasure to introduce the third issue of 2026 of the *International Journal of Physical Modelling in Geotechnics*, a journal widely recognised and committed to publishing high-quality experimental research covering a broad spectrum of geotechnical engineering challenges, spanning conventional themes to emerging global concerns such as climate change, clean energy, and sustainable development. As an editor, I have been greatly privileged to work alongside the editorial team and engage with numerous submitted manuscripts. I am consistently impressed and fascinated by the quality and originality of the contributions in each issue – be it innovative testing apparatuses, advanced instrumentation, sophisticated modelling methodologies, rigorous derivation of scaling laws, or in-depth insights into underlying mechanisms. These works are profoundly enlightening and of significant reference value to the geotechnical community. I also fully endorse the views shared by my colleagues – for example, Tessari (2024) and Kong (2025) – in previous editorials: even in an era featured by the rapid advancement of numerical simulation and data-driven approaches – including large generative AI models – physical modelling remains indispensable and plays an irreplaceable role in validating theoretical frameworks, reproducing complex geotechnical failure mechanisms, and generating reliable, high-fidelity experimental data.

This issue is no exception, showcasing the vitality of physical modelling through four innovative contributions covering slope stabilisation, dam seepage failure, and the performance of offshore bucket foundations, all set against the broader backdrop of disaster mitigation and clean energy development. The first paper by Tiwari *et al*. (2026) deals with iron ore tailings stability by examining rate effects on penetration resistance in centrifuge tests, with a focus on the remoulded resistance of a clayey iron ore tailings through cyclic tests across two depth ranges. A series of miniature CPTu, T-bar, and ball penetrometer tests were conducted at varying penetration rates. The results highlight a strong rate dependency of remoulded resistance, reflecting the coupled effects of partial drainage at slow rates (leading to increased resistance) and viscous behaviour at high rates. The authors also compare penetrometer-derived strengths with in situ vane shear data and clarify how drainage conditions influence measured strength. This study is highly valuable for improving test interpretation and in situ characterisation of tailings materials, where rate effects are often overlooked but critically important.

While tailings dam/embankment failures do occur and can trigger severe disasters, soil slope failures are far more prevalent and thus demand effective mitigation countermeasures. The second paper, by Qin *et al*. (2026), presents a series of centrifuge model tests on soil slopes reinforced by micropile–anchor composite structures (MACS). Based on a real highway slope prototype, the authors compare the performance of double-row micropiles, single-row micropile–anchor systems, and double-row micropile–anchor systems. The study reveals that anchor cables actively redistribute earth pressures, significantly reduce pile bending moments, and restrain slope deformation and crack propagation. The double-row MACS configuration delivers the most effective restraint and preserves slope integrity without the development of continuous slip surfaces. This work offers valuable insights into the reinforcement mechanisms of composite micropile systems, which are increasingly adopted in rapid, cost-effective slope stabilisation projects.

The third paper in this issue, by Yang *et al*. (2026), further addresses failure mitigation for earth dams. The authors report centrifuge model tests on the seepage failure of geotextile-reinforced earth dams with weak interlayers. Adopting a novel salt-based method to simulate weak layers, the authors investigate the influences of geotextile width, layer number and placement on piping development and dam breach behaviour. The test results indicate that geotextiles effectively support the overlying soil and facilitate stable progression of piping channels; wider and more densely arranged geotextiles can notably delay the failure time. The overall failure mode is governed by the relative position between weak layers and geotextiles, and a stepwise collapse may occur under multi-layer reinforcement. These findings provide direct guidance for seepage safety assessment and reinforcement design of earth dams with potential internal defects.

As the development of clean energy infrastructure serves as an effective strategy to mitigate global warming, offshore wind turbines have undergone rapid construction in recent years. Research on supporting foundation systems has remained a prominent topic for this journal, with bucket foundations standing as a mainstream solution and the focal theme of the fourth paper by Liu *et al*. (2026). Through a series of 1g model tests, the authors investigate the installation behaviour and long-term vertical uplift performance of bucket foundations in clay. By distinguishing between vented and sealed conditions, they quantify the effects of soil reconsolidation, skirt friction, reverse end bearing and suction development. The results reveal that reconsolidation markedly increases skirt friction under sustained long-term loading, while suction contributes substantially to uplift resistance. A critical sustained loading threshold ($T_{sus}/T_{peak} \approx 0.5$) is proposed to ensure stable operation, providing a practical engineering design implication. This study offers essential data and engineering implication for the design and performance assessment of suction bucket foundations widely adopted in offshore wind projects.

Collectively, the four papers in this issue exemplify the diversity, depth, and engineering relevance of physical modelling in geotechnics, providing valuable insights into slope stabilisation, tailings management, earth dam safety, and offshore renewable energy foundations. I would like to express my sincere gratitude to the authors for their contributions, the reviewers for their rigorous feedback, and the editorial team for their professional support. I encourage readers to explore the full papers for detailed experimental data, innovative methods, and practical implications. I hope this issue will continue to inspire further research and collaboration across the physical modelling community.

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