Digital Twins in Engineering, DTE 2027
March 8-12, 2027, Yokohama, Japan

DIGITAL TWIN FOR GEOMECHANICS AND GEOENGINEERING

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ABSTRACT

Digital twin technology is emerging as a transformative framework for the monitoring, prediction, and management of engineering infrastructure. While digital twins have seen rapid development in manufacturing, aerospace, and structural engineering, their applications in geomechanics and geoengineering remain comparatively underdeveloped due to the complexity of geomaterials, multiphysics coupling, and substantial uncertainties. Recent advances in computational geomechanics, monitoring technologies, artificial intelligence, and physics-informed learning provide new opportunities to overcome these challenges. By integrating physics-based numerical modelling, field monitoring, data assimilation, and machine learning, digital twins offer the potential to continuously update predictions of infrastructure performance and support adaptive, risk-informed decision-making throughout the infrastructure lifecycle.

This mini-symposium aims to bring together researchers and practitioners working on digital twin technologies for geomechanics and geoengineering applications. Contributions are invited on the development of physics- and data-driven frameworks, coupled multi-physics modelling, uncertainty quantification, monitoring integration, and intelligent predictive systems for geotechnical infrastructure. Both methodological developments and practical engineering applications are welcome.

Topics of Interest

Topics include, but are not limited to:
Digital twin frameworks for geotechnical infrastructure;
Physics-informed and data-driven modelling;
Machine learning-assisted computational geomechanics;
Monitoring data assimilation and model updating;
Uncertainty quantification and probabilistic prediction;
Surrogate and reduced-order modelling
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