



WORKSHOP ON NUMERICAL MODELING IN GEOTECHNICAL ENGINEERING

BARCELONA, APRIL 10, 2025 FROM 9:00 AM TO 4:00 PM



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WORKSHOP OBJECTIVES

This intensive workshop will provide the needed theory and practical background required to confidently utilize numerical modeling and modern analysis software to achieve practical solutions to challenging geotechnical engineering problems. The workshop includes two modeling modules: Finite Element/Finite Difference and Artificial Intelligence/Machine Learning.

WORKSHOP CONTENT

FINITE ELEMENT/FINITE DIFFERENCE MODELING

- *Introduction to geotechnical modeling using FEM/FDM.*
- *Nonlinear constitutive models:* commonly used yield functions for soils; determination of model parameters.
- *Treatment of soil-structure interface:* contact elements; uplift, sliding.
- *Solution strategy:* buildup of FEM/FDM models, mesh sizes, initialization, boundary conditions.
- *Hands-on Session:* Problems on Tunnels/Culverts/Piles.

ARTIFICIAL INTELLIGENCE/MACHINE LARNING MODELING

- *Introduction and overview of AI/ML modeling.*
- *Development of AI/ML models:* determination of model inputs; data division; data preparation; model validation; model robustness; model transparency and knowledge extraction; model extrapolation; model uncertainty.
- *Use of artificial neural networks in geotechnical engineering applications.*
- *Hands-on Session:* Problems on Shallow and Deep Foundations.



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