

AI-based back analysis of multiphysics processes in geotechnical practice

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ABSTRACT: Multiphysics processes have been commonly identified in geotechnical engineering practice. Researchers and field engineers often carry out multiphysics simulations to understand the complex engineering responses. In field practice, a back analysis is typically required along with the simulations to calibrate the most representative model parameters. This would intensify the problem as it requires further simulations to assess the parameter sensitivity. Therefore, an efficient back analysis for multiphysics processes still remains a challenge in practice due to the numerical complexity and the low computational efficiency. With recent advances in AI techniques, opportunities have opened up for meta-model development for problems involving multiphysics processes associated a large number of properties. This study proposes an AI-based meta model, which is capable of reproducing outputs of heavy computation of the multiphysics processes and thus performs back analysis greatly efficiently. The uncertainty in data can be also be efficiently assessed through sensitivity study.