

## Reliability-Based Design of an Earth Slope Taking into Account Unsaturated Soil Properties

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**Abstract :** This paper shows how accurately and efficiently reliability analyses of geotechnical installations can be performed by directly coupling geotechnical software with a reliability solver. An earth slope is used as the study object. The limit equilibrium method of Morgenstern-Price is used to calculate factors of safety and find the critical slip surface. The deterministic software package Seep/W and Slope/W is coupled with the StRAnD reliability software. Reliability indexes of critical probabilistic surfaces are evaluated by the first-order reliability methods (FORM). By means of sensitivity analysis, the effective cohesion ( $c'$ ) is found to be the most relevant uncertain geotechnical parameter for slope equilibrium. The slope was tested using different geometries, taking into account unsaturated soil properties. Finally, a critical slip surface, identified in terms of minimum factor of safety, is shown here not to be the critical surface in terms of reliability index.

**Keywords :** slope, unsaturated, reliability, safety, seepage

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