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The limit state function of slope stability analysis using Latin-Hypercube method with Janbu simplification

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Abstract

This paper provides reliability analysis and outlines its possible use in landslide analysis. The study site comprises steep slopes composed of alternating clay, sand and silty layers, at Lake Balaton (Hungary). Using the Slide2 version of the Rocscience software, we were able to detect deep circular slip surfaces that has a lower probability than the one obtained from Plaxis and Geo5 software modelling. The calculated safety factors are between 1.27 and 1.4, which only partly satisfy the requirements of Eurocode 7. These results were obtained with probabilistic calculation using Latin-Hypercube method and Janbu simplification.

Keywords: landslide, high bank, probabilistic analysis, reliability, limit state function

1 Introduction

The purpose of this work is to extend our knowledge on the stability of a slope that is located at the eastern shore of Lake Balaton. In the first phase traditional Limite Equilibrium and Finite Element Methods [1] were applied. Using these approaches and applying Plaxis and Geo5 models several failure mechanisms with different geometries [2] were identified, but when applying probabilistic calculations several new slip surfaces were obtained, showing all possible failure scenarios. Based on this, this paper focuses on the analysis, whether there is a chance of further slope failure that is significantly different from the previous results. This is important because at