

CYPRUS UNIVERSITY OF TECHNOLOGY  
SCHOOL OF MECHANICS AND TECHNOLOGY



## **Dissertation**

Tension crack in stability analysis of soil slopes

Constantinos Efstratiou

Limassol 2013

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DEPARTMENT OF CIVIL ENGINEERING AND GEOMATICS

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APPROVAL FORM

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# **Tension crack in stability analysis of soil slopes**

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## **ABSTRACT**

It is a well-known fact that a slope can fail resulting to considerable damages. What is not widespread is that slope failures are often accompanied by the formation of tension crack on the slope crest. The formation of a tension crack is a major problem in the stability of slopes since the stability is reduced and thereby the possibility for a slope failure is increased. Hence, it is essential to investigate the location and depth of the tension crack in order to obtain the factor of safety and successfully deal with a stability analysis. The aim of this project was to develop a detailed understanding of the formation of tension crack in slopes. Methods of slope stability analysis, various methods of slices and finite element analysis were considered in order to take tension crack into account. Three different tools, the CFS, SLIDE<sup>TM</sup> and PHASE2<sup>TM</sup> were used for methods of slope stability analysis, various methods of slices and finite element respectively. A comprehensive literature review was undertaken which established a thorough understanding of the topic under consideration. This understanding allowed underpinning the development of a strategy that linked the three different methods in order to investigate how tension crack is taken into account. Significant information was gathered through computations of different tools, the CFS, SLIDE<sup>TM</sup> and PHASE2<sup>TM</sup> whilst a new method was proposed to take tension crack into account. Findings obtained from the three different tools were compared and it was proved that all methods are ideal to take tension crack into account.