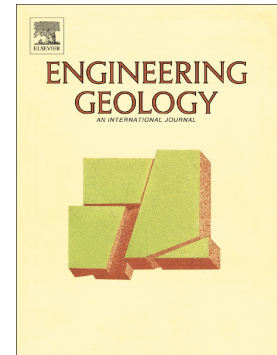


## Accepted Manuscript

Three-dimensional reliability analysis of seismic slopes using the copula-based sampling method

Zhao-Xia Xu, Xiao-Ping Zhou



PII: S0013-7952(18)30172-8  
DOI: [doi:10.1016/j.enggeo.2018.05.020](https://doi.org/10.1016/j.enggeo.2018.05.020)  
Reference: ENGEO 4852  
To appear in: *Engineering Geology*  
Received date: 30 January 2018  
Revised date: 29 April 2018  
Accepted date: 23 May 2018

Please cite this article as: Zhao-Xia Xu, Xiao-Ping Zhou , Three-dimensional reliability analysis of seismic slopes using the copula-based sampling method. *Engineering Geology* (2017), doi:[10.1016/j.enggeo.2018.05.020](https://doi.org/10.1016/j.enggeo.2018.05.020)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# Three-dimensional Reliability Analysis of Seismic Slopes using the Copula-based Sampling Method

Zhao-Xia Xu<sup>a,b,c</sup>; Xiao-Ping Zhou<sup>a,b,c,\*</sup> xiao\_ping\_zhou@126.com

<sup>a</sup>School of Civil Engineering, Chongqing University, Chongqing 400045, China;

<sup>b</sup>State Key Laboratory of Coal Mine Disaster Dynamics and Control, Chongqing University, Chongqing 400044, China;

<sup>c</sup>Key Laboratory of New Technology for Construction of Cities in Mountain Area, Chongqing University, Chongqing 400045, PR China

\*Corresponding author at: School of Civil Engineering, Chongqing University, Chongqing 400045, PR China

**Abstract:** Geotechnical parameters are often considered to be independent variables in the reliability analysis of slopes, however, some variables are correlated. In this study, the copula-based sampling method is first applied to study 3D reliability of seismic slopes as well as the cross correlation between the geotechnical parameters. The safety factors and the failure probability of seismic slopes are investigated using the copula-based sampling method in the framework of the 3D rigorous limit equilibrium method. Moreover, the effects of geotechnical parameters on reliability analysis of seismic slopes are studied. Two cases are considered to illustrate the efficiency of the copula-based sampling method. It is found that the results obtained using the copula-based sampling method are in good agreement with those obtained by a Monte Carlo simulation.

**Keywords:** Copula-based sampling method; Reliability analysis; Probability of failure; 3D rigorous limit equilibrium method; Seismic slope.

## 1. Introduction

Slope reliability analysis is a popular problem in geotechnical engineering and also plays an important role in engineering decision-making. It has been strongly proven that slope failure leads

---

\*Corresponding author: School of Civil Engineering, Chongqing University, Chongqing 400045, PR China

Email address: xiao\_ping\_zhou@126.com; Tel./Fax. +86-23-6512-3511

Download English Version:

<https://daneshyari.com/en/article/8915826>

Download Persian Version:

<https://daneshyari.com/article/8915826>

[Daneshyari.com](https://daneshyari.com)