Probability Analysis of Slope Stability Analysis

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Abstract

The aim of this paper is to present a probability analysis using the Monte Carlo simulation method of uncertainty (MCSM). The results of this method will be compared to all recognized method of slope stability such as Bishop simplified, Fellenuis, Janbu simplified and corrected, Spencer and Lowe-Karafiath which are in general in limit equilibrium. This study has been done by a normal frequency distribution relative for all the parameters taken in considerations. From the mean values and the standard deviations of the pore water pressure, cohesion and the internal angle of friction with the correlation relation between these parameters, a set of random values of pore water pressure, cohesion and internal angle of friction where generated by computing a Critical Probabilistic Slip Surface. The analysis of the obtained results indicates that the failure probability is affected by the standard deviation of the pore water pressure, cohesion, internal angle of friction and correlation coefficient. However, all methods of equilibrium limit are affecting the failure probability by taking in account one of these parameters following each case. Nevertheless the probability of failure is not significantly affected by the standard deviation of the unit weight for all methods.

Keywords: Probability, slope stability, Monte Carlo simulation, Latin hypercube, Factor of safety