

Risk Analysis of the Slope Stability of Embankment Dam Using Three Different Approaches

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Abstract

Safety management is an essential part of dam industry in order to ensure that the safety of the structure has been satisfied. Dam safety management involves risk related problems and subsequently taking decisions under uncertain situations. Vulnerability of people lives, properties and lifelines due to dam failure always has been an important challenging issue to dam owners. Conventional approaches do not take into account many threatening risks to dam safety, and their focus is to obtain a safety factor which concludes to rules and regulations leading to unclear indication of dam safety level. Nowadays, risk evaluation methods are widely used to determine the safety level of dams which provide this opportunity for engineers to consider many uncertain input data for dam safety decisions. Monte Carlo simulation method is one of the risk assessment tools for slope stability evaluation. In this method a repeated deterministic analysis of slope stability with respect to the probability distribution of input parameters leads to the appropriate solutions of the selected case. In the present paper, it is attempted to illustrate the application of Monte Carlo method as a powerful tool to analyze the slope stability of an embankment dam. In this regard, upstream slope of Doosti dam located in Iran has been considered as a case study. The analysis has been done using Mohr-Coulomb constitutive model by SLOPE/W software, version 6.02. Bishop, Janbu and Spencer methods are employed to compute the reliability index of upstream slope of dam. The results of risk analysis indicate that Bishop approach has the lowest reliability index among the selected methods with a reliability index of 5.991.

Keywords: *Embankment Dam, Monte Carlo Simulation, Risk Analysis, Safety Management, Slope Stability, Doosti dam.*