

Probabilistic Analyses of slope with finite difference method

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Abstract: Most of the parameters used in slope stability analysis, in particular the mechanical soil properties, are uncertain. Probability theory and reliability analysis can provide a rational framework for dealing with uncertainties. In this paper, most common probabilistic methods Monte Carlo Simulation (MCS), First Order Second Moment (FOSM) method and Point Estimate Method (PEM) for slope reliability analysis are discussed and applied based on Strength Reduction Method (SRM). For different type of random variables, the accuracy and feasibility of these methods are illustrated using a homogeneous slope example. It is shown that the combination of the probabilistic methods with RSM not only can simulate the failure mechanism of the slopes, but also can get the probability of failure. This study improved the slope stability analysis method.

Keywords: Slope stability analysis; Monte Carlo Simulation; First Order Second Moment method; Point Estimate Method; Strength Reduce Method