

边坡块状结构岩体模糊随机可靠性分析

杨 坤1, 周创兵1, 张 昕2, 李华晔2

(1. 武汉大学 水利水电学院, 湖北 武汉 430072; 2. 华北水利水电学院, 河南 郑州 450011)

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摘要 边坡稳定性评价中包含有很多的不确定性因素, 这些不确定因素既具有随机性也具有模糊性。基于块体理论和模糊分析理论, 提出了边坡块状结构岩体模糊随机可靠性分析的点估计法, 并运用该方法对三峡永久船闸某边坡块体的可靠性进行分析, 同时将其与模糊概率测度分析方法进行对比分析。结果表明, 模糊概率测度分析方法只是对分析模型进行模糊化, 但没有考虑到各个力学参数的模糊性。而模糊点估计法为解决这个问题提供一个有效的途径, 它对影响边坡稳定的各个力学参数都进行模糊处理, 因而更具有实际指导意义。

关键词 [岩石力学; 块状岩体; 矢量分析; 模糊随机可靠性; 模糊点估计](#)

分类号

FUZZY-RANDOM RELIABILITY ANALYSIS OF BLOCKY ROCK MASS IN SLOPES

YANG Kun1, ZHOU Chuang-bing1, ZHANG Xin2, LI Hua-ye2

(1. School of Water Resources and Hydropower, Wuhan University, Wuhan, Hubei 430072, China;

2. North China Institute of Water Conservancy and Hydroelectric Power, Zhengzhou, Henan 450011, China)

Abstract

Slope stability assessment is a difficult geotechnical problem because of the uncertainty involved. These uncertainties possess both randomness and fuzziness. Historically, all uncertainties were assumed to follow the characteristics of random ones. However, some uncertainties, especially those based on incomplete information, cannot be handled satisfactorily by the classical random analysis; and in this case, using a fuzzy number to reflect the uncertainty is reasonable. In this paper, a fuzzy point estimate method is presented for the reliability analysis of rock block incorporating block theory and fuzzy sets. As a typical example, it is applied to the stability analysis of a key block in high slope of the permanent shiplock of the Three Gorges Project. Furthermore, it is compared with the fuzzy possibility approach showing that the results by the two methods are essentially consistent. However, the fuzzy possibility method only considers the ambiguity of limit state function and doesn't take into account the fuzziness of mechanical parameters. The fuzzy point estimate method provides an effective approach to solve this problem and it can reflect the real situation better because it uses fuzzy-based disposal to every mechanical parameters.

Key words [rock mechanics; blocky rock mass; vector analysis; fuzzy-random reliability; fuzzy point estimate](#)

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