

岩体节理体积频率的计算方法及工程应用

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ASSESSMENT OF JOINT VOLUME FREQUENCY IN ROCK MASS AND ITS APPLICATION IN ENGINEERING

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- 摘要
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摘要 利用Monte-Carlo原理进行三维结构面网络模拟是研究岩体内节理面发育规律最常用的技术手段,节理体积频率(λ_v)则是影响结构面网络模拟正确与否的关键参数之一,需要根据野外实测节理线频率(λ)进行换算。利用三维结构面网络模拟程序,提出了基于线频率反演节理体积频率的新思路。首先赋给某组节理一个初始体积频率,利用三维结构面网络模拟程序,生成只包含该组节理的三维网络模型样本,计算此模型中该组节理在测线方向上的线频率,不同体积频率(λ_v)对应不同线频率(λ),进而可建立两者的函数关系,最后将测线方向上该组节理的线频率带入该函数即可确定其体积频率。以贵州省息烽县鱼筒河水库坝址区岩体为例,按照上述思路根据测线法统计数据计算了节理体积频率,结果表明 λ_v 与 λ 之间呈现出高度的线性关系。当节理圆盘半径服从对数正态分布时, λ_v 与 λ_{\max} 的比值约为0.4~1.0,而当节理圆盘半径服从负指数分布时, λ_v 与 λ_{\max} 的比值约为1.3~3.5。最后依据《工程岩体分级标准(GB50218-94)》表3.3.1、表3.4.3和表3.4.4,分别基于线频率和体积频率对鱼筒河水库坝址区岩体完整性进行了评价,结果表明,后者评价结果的可信度比前者高。

关键词: 节理岩体 体积频率 线频率 三维结构面网络模拟 岩体完整性

Abstract: The 3D joint surface network simulation is based on Monte-Carlo theory. It is the most common method to study growth regulation of rock mass joints, and joint volume frequency, λ_v , λ_v is determined by λ that is measured in the field. It is one of the key parameters which affect the result of joint network simulation. Using the 3D joint surface network simulation program, a new method is promoted to determine λ_v . This method is based on the back analysis from line frequency to volume frequency. A value to a joint set is given as the initial joint volume frequency. the 3D joint surface network simulation program is adopted to generate a 3D network model which just contains the joint set. Then line frequency along the survey line's trend of the model can be calculated. Therefore, a series line frequency (λ_v) can be got from the series volume frequency λ . Then the functional relationship can be built up between the line frequency and the volume frequency. Lastly, the actual volume frequency can be determined using the line frequency measured in survey line trend. This paper further takes the rock mass of Yujianhe dam site in Xifeng county, Guizhou province as an example. The results show that there are a good linear relation between λ_v and λ . The ratio between λ_v and λ_{\max} is 0.4~1.0 when the joint radius obeys to the lognormal distribution. The ratio is about 1.3~3.5 when the radius does negative index distribution. Eventually, the rock mass integrality at the Yujianhe dam site is appraised using λ and λ_v respectively. The result shows that the latter is more precise than the former.

Key words: Jointed rock mass Volume frequency Line frequency 3D joint network simulation Rock mass integrity

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