

## 基于GIS的甘肃北山花岗岩裂隙密度地质统计分析

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## GIS BASED GEOSTATISTICAL ANALYSIS OF FRACTURE DENSITY OF GRANITE ROCK IN BEISHAN AREA GANSU PROVINCE

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- 摘要
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全文: PDF (3987 KB) HTML ( KB) 输出: BibTeX | EndNote (RIS) 背景资料

摘要 以甘肃北山花岗岩中发育的构造裂隙(主要指节理)为研究对象,采用高精度GPS、罗盘等对其进行现场测量,获取裂隙的迹长及产状信息,并将信息导入ArcGIS平台建立裂隙属性数据库;进而应用地质统计分析理论,以裂隙面密度 $P_{21}$ 为地质统计分析的区域性变量,探索花岗岩岩体裂隙空间分布特征;然后借助ArcGIS软件平台建立变异函数模型,利用地质统计学的普通克里金插值方法得到整个区域的面密度预测分布图。结果表明:芨芨槽块段所测某区域裂隙面密度值的半变异函数变程值在20~30m之间,NS和EW方向有明显差异,由此知该区域裂隙面密度分布具有显著空间自相关性,但分布特征不均匀;此结论对北山花岗岩裂隙空间分布特征的深入研究以及三维裂隙网络建模具有重要参考价值。

关键词: 裂隙面密度 $P_{21}$  空间变异性 半变异函数 地质统计分析 克里金插值

Abstract: Geometrical parameters of fractures such as joints in natural rocks are important parameters in fluid dynamics of fracture systems, and are also mainly considered factors for the stability analysis of large-scale projects during construction. Therefore, the importance of these parameters has been fully recognized by engineering scientists. The Jijicao block of the Beishan area in Gansu province is chosen as the studied area in this paper. It is a candidate area for high level waste repository in China. The paper chooses the rock mass fracture system of the granite in Jijicao block as the study object. The trace lengths of fracture system are measured by GPS-RTK technique in detail. The occurrence of the bedrock outcrop fractures is surveyed with compass. Then the ArcGIS software is used in the data statistics and calculation and also applied to studying fracture density in the granite area in the Jijicao block. Finally, geostatistical analysis is used to study the spatial autocorrelation and variability of fracture density. By this way the spatial distribution characteristics of fracture can be recognized. The research results indicate that the fracture density has a strong spatial autocorrelation. Variogram analysis demonstrates that  $P_{21}$  values become antocorrelated at a step of about 20~30m. The difference between the ranges of NS and EW demonstrates that there is heterogeneity in the spatial distribution of fractures. At last the prediction map of  $P_{21}$  value is obtained with the method of ordinary kriging interpolation method.

Key words: Fracture density  $P_{21}$  Spatial variability Geostatistical analysis Semivariogram Kriging interpolation

收稿日期: 2012-02-28;

基金资助:

国防科技重点项目(科工二司[2012]491号,科工二司[2012]492号)和国防科工委"十一五"项目(科工计[2007]825号)

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引用本文:





. 基于GIS的甘肃北山花岗岩裂隙密度地质统计分析[J]. 工程地质学报, 2013, 21(1): 115-122.

. GIS BASED GEOSTATISTICAL ANALYSIS OF FRACTURE DENSITY OF GRANITE ROCK IN BEISHAN AREA GANSU PROVINCE[J]. Journal of Engineering Geology, 2013, 21(1): 115-122.

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