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论文

粉砂岩三轴压缩条件下细观损伤特征的定量研究

李晓娟，倪骁慧，孙斌祥，朱珍德，杜时贵

1.绍兴文理学院 土木工程系，浙江 绍兴312000；
2.河海大学 岩土工程科学研究所，江苏 南京210098；
3.岩土力学与堤坝工程教育部重点实验室，江苏 南京210098

摘要：

首先利用RMT-150B岩石伺服试验系统，以不同围压(2，4，6，8，10 MPa)分别对大坦沙工程粉砂岩试样进行三轴压缩试验。然后，利用扫描电镜(SEM)拍摄得到的大量细观损伤图片，运用数字图像技术获取微裂纹的细观几何信息，从方位角、长度、宽度、面积和数量对不同围压条件相应的粉砂岩细观尺度微损伤特征进行统计分析。研究结果表明：三轴压缩条件下粉砂岩微裂纹的方位角、长度和宽度基本服从广义极限分布；微裂纹的方位角主要集中在与σ 1作用方向成35°附近；随着围压的增长，仅有小部分微裂纹在长度尺寸上出现较大幅度的增长，而绝大部分微裂纹在宽度尺寸上基本不发育；经历三轴压缩试验的粉砂岩试样的能量耗散方式，主要以数量和长度两个方式进行。

关键词： 粉砂岩；三轴压缩；微裂纹

Quantitative study on meso-damage characteristics of siltstone under triaxial compression

Abstract:

The triaxial compression tests on siltstone from Datansha of Guangzhou City were done by the RMT 150B multi function automatic rigid rock servo material testing machine.The loads with five different values of 2，4，6，8，10 MPa were adopted as confining pressures.A great deal of mesostructural images of Datansha siltstone were obtained by means of scanning electron microscopy(SEM).The mesostructural images of siltstone were processed by regional growing theory based on the image processing technique.The meso damage information of siltstone microcracks were obtained from SEM images.The mesostructural information of microcracks was analyzed by statistical theory and the distribution regularities of microcrack parameters including angle，length，width，area and number were proposed.It is concluded that the azimuth angle，length and width of Datansha siltstone's microcracks under triaxial compression obey the regularity of generalized extreme value distribution of variable parameters.The azimuth of microcracks mainly focuses on the angle of approximate 35°.With the confining pressure increasing，there is only a substantial growth along the length of the microcracks，while no development on the width.The energy dissipation approach of siltstone samples under triaxial compression has two ways which are the growth of the number and length of microcracks.

Keywords: siltstone；triaxial compression；microcracks

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通讯作者: 李晓娟

作者简介: 李晓娟(1978—)，女，河北临西人，讲师

作者Email: xiaojuanli2007@163.com

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