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不同含水岩石蠕变试验电磁辐射频谱分析

荣 耀1，许锡宾2，靖洪文1，赵明阶2

(1. 同济大学 地下建筑与工程系，上海 200092；2. 重庆交通学院，重庆 400074)

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摘要 通过研究饱水、自然、干燥状态的岩石在荷载作用下与电磁辐射强度频谱之间的关系、加载环境下岩石蠕变变形破坏孕育、发生、发展过程中的电磁辐射效应及规律，获得岩石蠕变断裂的电磁辐射信息特征，确定不同含水状态及应力变化与电磁辐射强度频谱间的关系。可有效预测岩体的状态，对预测预报岩体的动力灾害提供有效的预测手段。

关键词 岩石力学；岩石蠕变；电磁辐射；频谱分析

分类号

SPECTRUM ANALYSIS OF ELECTROMAGNETIC RADIATION FOR CREEP TEST OF ROCK WITH DIFFERENT WATER CONTENTS

RONG Yao1，XU Xi-bin2，JING Hong-wen1，ZHAO Ming-jie2

(1. Department of Geotechnical Engineering，Tongji University，Shanghai 200092，China；
2. Chongqing Jiaotong University，Chongqing 400074，China)

Abstract

On the basis of studying the relation of the load applied on the rocks with different water contents and electromagnetic radiation spectrum，and the relation of the rock electromagnetic radiation effect and regularity during the procedures from the beginning of rock creep distortion to failure，the electromagnetic radiation message characteristics of rock creep break are obtained. The monitoring electromagnetic radiation strength by test system is performed，which includes servo-added load system，receiving antenna and sonic emission sensor，A-ER acousto-electric data collecting systems，and shied system and etc.. The relations between the load applied on the rock with different water contents and electromagnetic radiation strength，and the curves of electromagnetic radiation strength with time of electromagnetic radiation strength spectrum curves，are obtained. Thus，the relationship of different water contents and different stress levels of the electromagnetic radiation spectrum are achieved. The study shows that，with different stresses，the frequency domains of electromagnetic radiation are clear with the main range of 0.0 - 0.2 kHz，and the frequency electromagnetic radiations of rock dry- nature-saturation are exhibited from low to high. Different water contents have different effects on the physical mechanical quality of rock，and the water on the rock surface can lower the total energy with rock strength and deteriorated elastic modulus，which drive the electromagnetic radiation low. Thereafter，the method discussed is useful to predict the stability of rock mass and it proves to be feasible to forecast the rock dynamic disasters.

Key words rock mechanics；rock creep；electromagnetic radiation；spectrum analysis

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