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受载煤体变形破裂微波辐射前兆规律的实验研究

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Experimental study on the microwave radiation precursor laws of loading coal in deformation and fracture process

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摘要

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摘要 对煤体在单轴压缩条件下的微波辐射效应和规律进行了实验研究. 实验结果表明, 受载煤体具有微波辐射效应, 在煤体的变形破裂过程中伴随有6.6 GHz微波辐射信号产生, 其前兆规律具有3种类型. 基于电介质物理学对实验现象进行了解释. 在单轴压缩实验中, 煤体的亮温最大变化值为1.9~2.7 K, 这表明煤体的微波辐射特性明显优于红外辐射特性. 运用微波遥感基本原理的理论知识, 分析了受载煤体变形破裂过程中微波辐射特性的影响因素. 利用受载煤体变形破坏过程中的微波辐射前兆特性预报煤岩动力灾害具有广泛的应用前景.

关键词: 煤体 煤岩动力灾害 微波辐射 微波遥感

Abstract: The effect and laws of microwave radiation of coal samples under uniaxial compression are experimentally studied and theoretically analyzed. Experiment results show that loading coal samples have the microwave radiation effect under the condition of uniaxial compression and accordingly in the frequency band of 6.6 GHz, and the microwave radiation precursors indicating the failure of loading coal have 3 types. Based on the dielectric physics the phenomena in the experiment are explained scientifically and rationally. The brightness temperature vary maximum value of the coal under the uniaxial compression condition is 1.9 to 2.7 K, which shows that the microwave radiation effect is superior to the infrared radiation effect. With principles of microwave remote sensing, the influent factors on the microwave emission effects of the loading coal samples are analyzed. Study results show that the microwave radiation precursor laws of loading coal make the microwave remote technology have a more widespread application prospect to predict the dynamic catastrophe of coal.

Keywords: Coal Dynamic catastrophe of coal and rock Microwave radiation Microwave remote sense

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