

论文

单轴压缩下煤体表面电流试验研究

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摘要:

试验研究了在单轴压缩条件下煤体受压产生电流的性质及变化规律, 并对产生这种电流变化的原因进行了分析。实验表明, 煤在受载破坏过程中, 表面有微电流产生。在加载初期, 电流产生不明显。当载荷 $\delta c \approx 0.75\delta_{max}$ 时, 电流开始出现较快增长, 并且和载荷的相关系数达0.8~0.9以上, 呈高度相关。载荷发生突变或卸压时有较强电流信号出现。根据电流和载荷的对应关系, 可以用电流信号来反映煤体受载程度, 从而为煤岩体稳定性监测提供一种新的思路。

关键词: 单轴压缩; 煤体; 表面电流; 受载程度

Experimental study on surface current of coal under uniaxial compression

Abstract:

An investigation was conducted on the characteristics of surface current induced by coal under uniaxial compression. An interpretation of the mechanisms governing the electrical behavior of the coal structures under uniaxial stress tests was presented in this paper. The experimental results show that the current signal is generated during the deformation and fracture process of coal samples. When the load is applied, the electric current makes its initial appearance and increases rapidly after a considerable time lag at  $\delta c$ , until after the stress reaches a value  $\delta c \approx 0.75\delta_{max}$  where  $\delta_{max}$  is the maximum applied stress before sample fracture. There is a good correlativity between the current and the load, and the correlation coefficient between them can reach up to 0.8 to 0.9. The current peaks occur under sudden loading and unloading. It suggests that the current is closely related to the loading. The status of coal loading level may be determined by the current signal. The intensive study on coal surface current can provide a way for monitoring the stability of coal and rock.

Keywords: uniaxial compression; coal; surface current; loading level

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