

论文

煤体瓦斯吸附渗流过程及声发射特性实验研究

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摘要:

对原煤试样瓦斯吸附渗流过程的声发射信号进行了监测, 并基于声发射信号特征, 分析了煤体损伤演化及瓦斯吸附渗流的动态特征。实验发现, 在吸附过程的初期, 声发射强度最大, 而且随着吸附量的逐渐增加, 声发射信号逐渐减弱; 吸附过程中声发射信号在时域上呈现阵发性, 即密集段与间歇段相连的特征。实验结果表明: 瓦斯是由煤体最外层开始逐层向内部吸附渗流的; 在瓦斯逐层渗流过程中, 当瓦斯压力梯度大于可导致煤体局部微观结构破坏的临界压力梯度时, 瓦斯表现为具有动力效应的破坏式渗流, 对应着声发射的密集段; 煤体受到破坏后, 渗流阵面的压力急剧降低, 瓦斯表现为无破坏能力的渗流, 同时也进入蓄能阶段, 对应着声发射间歇段; 随着煤体内部瓦斯压力的增大, 吸附过程趋于平衡, 煤体内产生的声发射信号也逐渐减弱。

关键词: 吸附渗流; 声发射; 阵发性; 损伤演化; 逐层渗流

Methane sorption and seepage in coal and characteristics of acoustic emission

Abstract:

Acoustic emission signals generated in process of methane sorption and seepage in coal were observed, and the dynamic characteristic of damage evolution and the seepage process were analyzed based on the characteristic of acoustic emission. The experiments indicated that the strength of acoustic emission decreased with the adsorbed methane increase. And the acoustic emission showed paroxysmal in time domain. The results give implication that the methane seepage in coal layer by layer. In its seepage process, methane shows destructive seepage while the gas pressure gradient was bigger than the threshold value. Then, pressure of the seepage face decreased and the methane shows undestructive seepage. Sorption process tends to equilibrium with the gas pressure increase.

Keywords: sorption and seepage; acoustic emission; paroxysmal; damage evolution; seepage by layer

收稿日期 2011-11-22 修回日期 2012-02-04 网络版发布日期 2012-04-20

DOI:

基金项目:

国家自然科学基金资助项目(40804070); 教育部新世纪优秀人才支持计划资助项目(NCET-10-0768); 煤炭资源与安全开采国家重点实验室(中国矿业大学)自主研究项目(SKLCRSM09X01)

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