

论文

采动煤岩体瓦斯通道形成机制及演化规律

张勇, 许力峰, 刘珂铭, 李艳君, 张保, 李伟斌

中国矿业大学(北京) 资源与安全工程学院, 北京 100083

摘要:

为了研究采动煤岩体瓦斯通道形成机制及其演化规律, 运用断裂力学和岩石力学相关理论, 结合煤岩体裂隙发育特征将工作面前方煤岩体瓦斯通道分为孤立通道区、张裂破坏区、剪切破坏区及支承压力峰值后破坏区, 提出前3区域属于微观流动通道, 第4区域属于宏观流动通道; 研究了采动过程中煤体顶板变形受力特征、裂隙发育规律及通道导通特性, 进行了顶板宏观瓦斯通道的分区: 瓦斯紊流通道区、瓦斯过渡流通道区和瓦斯渗流通道区, 结合实验室模拟分析了上覆煤(岩)层瓦斯通道发展变化过程, 其经历了卸压、失稳、起裂、突变张裂、吻合缩小、加速闭合、通道维持、再次加速闭合直至完全被压实闭合的过程。

关键词: 采动煤岩体; 瓦斯流动通道; 形成机制; 裂隙发育过程

Formation mechanism and evolution laws of gas flow channel in mining coal and rock

Abstract:

In order to study the formation mechanism and evolution laws of gas flow channel in mining coal and rock, using relevant theories of fracture mechanics and rock mechanics with combinations of mining coal and rock's crack development characteristics, the gas flow channels in mining coal and rock ahead of working face were divided into isolated channel area, tensile fracture failure area, shear failure area, and failure area after abutment pressure peak. And according to the developmental process of crack in mining coal and rock and formation mechanism of gas channel in different areas, it's concluded that the first three areas belong to mesoscopic channels, and the fourth area belong to macroscopic channels. According to the relevant theories of material mechanics and deformation and mechanics characteristics of coal roof, crack developmental process and channel conduction property during mining process, roof macroscopic gas channels were divided into three areas from above to below: gas turbulent channel area, gas transition flow channel area and gas seepage channel area, and combined with simulation in laboratory, the development process of gas channel in overlying coal (rock) seams were analysed, which experienced the process of decompression, instability, crack initiation, mutation splitting, anastomosis contraction, accelerated closed, channel preservation, accelerated closed again and compaction closed completely.

Keywords: mining coal and rock; gas flow channel; formation mechanism; crack development process

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通讯作者: 张勇

作者简介: 张勇(1968—), 男, 北京人, 副教授, 硕士生导师

作者Email: johnzy68@163.com

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