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### 论文

## 煤与瓦斯共采中煤层增透率理论与模型研究

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### 摘要:

地下开采中瓦斯抽采的针对性与有效性是煤与瓦斯共采的关键问题, 其核心是在理论和技术上对采动引起的裂隙网络所形成的增透性进行定义和分析。在综合考虑煤体在不同开采方式形成的支承压力、孔隙压力和瓦斯吸附膨胀耦合作用对损伤裂隙煤体体积改变的影响的基础上, 定义了一个新力学量——增透率, 来反映单位体积改变下煤体渗透率的变化, 推导了4种增透率的理论表达式, 并对工程实例进行数值分析, 定量描述了开采过程中覆岩和煤层中增透率的分布和演化, 结果表明增透率能够反映开采扰动对煤岩体裂隙网络渗透性的影响, 为煤与瓦斯共采工程中的煤层增透效果评价提供定量指标和科学方法。

关键词: 煤与瓦斯共采; 增透率; 渗透性; 支承压力; 体积应变

## On theoretical and modeling approach to mining enhanced permeability for simultaneous exploitation of coal and gas

### Abstract:

The pertinence and effectiveness of gas pumping for underground coal mining is an important issue for simultaneous exploitation of coal and gas. Its core is the definition and analysis of mining enhanced permeability of mining induced fracture network from the view point of science and technology. In this paper, considering the volumetric change of damage coal with cracks induced by coupling of the abutment pressure under different mining conditions, pore pressure, expansion caused by gas adsorption, the mechanical definition of a new word of mining enhanced permeability was obtained. The word means the change in permeability by volumetric change of coal and four kinds of theoretical models were derived. Then an engineering example was studied based on the numerical calculation of the mining enhanced permeability in the overburden rock and coal seam. The result shows that the mining enhanced permeability is able to represent the quantitative influence on permeability of coal caused by the evolution of the cracks, and can be the scientific method and strong support for quantitative evaluation of effect on permeability of coal.

Keywords: simultaneous exploitation of coal and gas; mining enhanced permeability; permeability; abutment pressure; volumetric strain

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