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论文

煤炭地下气化过程中温度-应力耦合作用下燃空区覆岩裂隙演化规律

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摘要：

进行了高温下泥岩和砂岩的热物理性质实验和单轴压缩实验，获得了不同温度下岩石比热容、导热系数、弹性模量和单轴抗压强度等基本物理力学参数。基于热力学与弹性力学理论，建立了考虑岩石损伤演化的温度-应力耦合作用控制方程，并以某煤炭地下气化现场的工程地质条件为背景，对温度-应力耦合条件下燃空区覆岩温度场和裂隙场的演化规律进行了数值模拟研究。最后，采用现场钻孔观测试验法对燃空区覆岩断裂带发育高度进行了探测。现场探测结果与数值模拟结果基本吻合，证明了数值计算模型及预测结果的合理性。

关键词： 煤炭地下气化；温度-应力耦合；燃空区；覆岩；温度场；裂隙场

Fracture evolution of overlying strata over combustion cavity under thermal mechanical interaction during underground coal gasification

Abstract:

The thermo physical properties and uniaxial compression experiments of mudstone and sandstone under high temperature were conducted to obtain the basic physical and mechanical parameters at varying temperatures.The governing equations of thermal mechanical coupling incorporating the evolution of rock damage were established based on the thermodynamics and elastic mechanics.With the background of an underground coal gasification field，the combustion cavity growth under the thermal mechanical interaction was modeled and the characteristics of temperature and fracture distribution of overlying strata were analyzed.Finally，the bore hole survey method was employed to test the height of fractured zones of overlying strata.The field test results agree with the numerical simulation results，which verify the rationality of the numerical model.

Keywords: underground coal gasification；thermal mechanical coupling；combustion cavity；overlying strata；temperature field；fracture field

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