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温度压力耦合作用下的岩石屈服破坏研究

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摘要 以深部开采为背景，讨论了温度和压力对深部岩石变形和破坏规律的影响。将岩石的屈服破坏过程视为能量释放和能量耗散的过程，根据最小耗能原理导出了温度和压力耦合作用下的深部岩石屈服破坏准则。该准则具有明确的物理意义，即当岩石的塑性耗散能及温度梯度引起热传导的耗散能累积耗散到一定程度时，岩石就会发生破坏失稳。

关键词 岩石力学；温度压力耦合作用；深部开采；最小耗能原理；能量耗散；屈服破坏准则

分类号

STUDY ON FAILURE BEHAVIOR OF ROCK UNDER COUPLING EFFECTS OF TEMPERATURE AND CONFINING PRESSURE

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Abstract

Based on the background of deep mining，some conclusions related to effects of temperature and confining pressure on behaviors of deformation and failure of rocks at depth are reviewed. Regarding the process of rock yield deformation and failure as a process of energy release and energy dissipation，a failure criterion of deep rocks subjected to coupling effects of confining pressure and temperature is proposed according to the principle of least energy consumption. With a clear physical meaning，this failure criterion shows that if both the plastic dissipation energy and heat conduction dissipation energy caused by temperature gradient in rocks reach to a critical value，the rock will lose its load carrying ability.

Key words rock mechanics；coupling effects

of temperature and confining pressure；deep mining；principle of least energy consumption；energy dissipation；yield failure criterion

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