

单轴压缩条件下岩盐应力 - 溶解耦合效应的细观力学试验分析

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摘要 通过大量的单轴压缩条件下岩盐应力 - 溶解耦合效应的细观力学试验, 发现在应力作用下岩盐的溶解特性会发生显著的变化。采用溶解质量(即宏观溶解速率)与轴向塑性应变和溶解时间之间的关系来定量描述应力作用下岩盐溶解速率的变化, 在试验结果的基础上得到溶解质量与轴向塑性应变和溶解时间之间的变化规律; 通过不同阶段的裂纹溶解之后形态上的变化, 对不同轴向塑性应变下岩盐宏观溶解速率发生变化的机制进行分析。发现在溶蚀作用下, 岩盐的力学性质会发生变化。通过对溶解阶段应力随着溶解时间的变化关系的研究, 得出溶蚀作用下岩盐力学性质发生变化的机制在于岩盐发生溶解从而使得岩盐裂纹的临界应力强度因子降低。研究成果为进一步研究岩盐的应力 - 溶解耦合机制奠定了试验依据以及理论基础。

关键词 [岩石力学](#); [岩盐](#); [应力 - 溶解耦合效应](#); [轴向塑性应变](#); [宏观溶解速率](#); [裂纹](#)

分类号

ANALYSIS OF MESOMECHANICAL TEST OF ROCK SALT CONSIDERING COUPLED STRESS-DISSOLVING EFFECTS UNDER UNIAXIAL COMPRESSION

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Abstract

Through a large number of mesomechanical tests of rock salts under uniaxial compression considering coupled stress-dissolving effect, the differences of dissolving action on rock salts with/without considering stress are found; and the variation of dissolving action on rock salts considering stress can be described quantitatively with the relationship of dissolved masses. It can also be expressed with macro-dissolving velocity, axial plastic strain, and dissolving time with analyzing the data of the tests. Through analyzing the difference of crack shapes under different crack expansion phases after dissolution, the mechanism of variation of macro-dissolving velocity under different axial plastic strains is studied. Difference of mechanical properties of rock salts with/without considering the dissolving effect has also been achieved. With the gained relationship between stress and dissolving time upon the dissolution stage, the mechanism of variation of mechanical properties of rock salt considering dissolving effect, which is shown as critical stress intensity factor(SIF) of crack that is decreased because of dissolving, has been concluded. The achieved results can provide a foundation for the further analysis of coupled stress-dissolving mechanism of rock salt.

Key words [rock mechanics](#); [rock salt](#); [coupled stress-dissolving effect](#); [axial plastic strain](#); [macro-dissolving velocity](#); [crack](#)

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