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深部开挖洞室围岩分层断裂破坏机制模型试验研究

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摘要 根据对深部岩体的地应力特征分析和对洞室围岩受力变形特点的分析, 提出深部开挖洞室围岩分层断裂破坏机制: 由于深部开挖工程中岩体地应力数值较大, 且最大地应力方向可能与洞室轴线平行, 从而使洞室围岩在较大的轴向压应力作用下产生较大的朝洞内的膨胀变形, 并在围岩内产生较大的径向拉应变。该拉应变的分布特征是在洞壁处较小, 在介质内较大, 当洞壁介质内的拉应变值达到其极限值时, 那里的围岩便发生断裂, 这种断裂可以产生一层或多层, 决定于轴向压应力数值的大小。上述认识采用洞室模型试验结果作了验证。研究结果不仅对民用深部开挖工程具有重大指导意义, 对国防工程中的某些方面, 如导弹发射井等也有重要启示作用。

关键词

[岩石力学; 深部岩体工程; 围岩分层断裂机制; 模型试验](#)

分类号

MODEL TEST STUDY ON MECHANISM OF LAYERED FRACTURE WITHIN SURROUNDING ROCK OF TUNNELS IN DEEP STRATUM

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Abstract

Based on the study of the geostress state and the deformation characteristic of surrounding rock of tunnels in deep stratum, the mechanism of the layered fracture within the surrounding rock is put forward. The mechanism is as following. For the geostress in deep stratum is very high and the orientation of the maximum stress is possibly parallel to the axes of the tunnel, the radial tensile strain within surrounding rock of tunnels will occur under higher axial compressive stress, and the value of this tensile strain is smaller at the wall of tunnels but higher in rock mass at some distances from the wall of tunnels. The tensile failure of rock mass around tunnels is created when the tensile strain exceeds its ultimate value. Consequently one or more layered fractures are created within rock mass around tunnels; and the range of layered fractures is determined by the magnitude of the axial compressive stress. According to the results of the model test of circular and upright-arch tunnels, the above viewpoints are proven. The study on the layered fractures within surrounding rock of tunnels in deep stratum is very important to deep excavation engineering and some national defense works.

Key words [rock mechanics; rock mass engineering in deep stratum; mechanism of layered fracture of surrounding rock; model test](#)

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