

节理岩体中隧道开挖与地震作用下围岩的稳定性

刘君, 孔宪京

(大连理工大学 土木水利学院工程抗震研究所, 辽宁 大连 116024)

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摘要 节理、断层等不连续面的存在造成岩体变形的不连续性并且这些不连续面对岩体变形、应力等力学行为造成重要的影响。在地震的作用下节理面可能张开、滑移。在有临空面时, 节理岩体将表现出显著的几何非线性和大变形。对已有的非连续变形分析程序进行了改进, 应用改进的程序模拟了节理岩体中隧洞开挖的过程以及地震荷载作用下隧道围岩的动力响应, 并模拟了围岩的失稳和破坏过程, 这有助于了解节理岩体中隧道围岩的变形和破坏机制。从计算结果可以看出, 非连续变形分析方法可很好地模拟节理岩体中的隧道开挖过程以及地震荷载作用下围岩从稳定、失稳到破坏的全过程。

关键词 [隧道工程](#); [节理岩体](#); [开挖](#); [地震荷载](#); [非连续变形分析](#)

分类号

STABILITY OF TUNNEL IN JOINTED ROCK MASSES DURING EXCAVATION AND UNDER EARTHQUAKE LOAD

LIU Jun, KONG Xian-jing

(School of Civil and Hydraulic Engineering, Dalian University of Technology, Dalian 116024, China)

Abstract

The mechanical properties of jointed rock masses are dominantly controlled by the joints. The joints may slip or open subjected to seismic load. When there exists a free surface, jointed rock masses will behave highly nonlinear with large deformation. Under ground excavation, the surrounding rock mass may be under stable condition in the environment of in-situ stress, but it may lose its stability when subjected to seismic load. The mechanical behaviors of the inclined jointed rock masses during excavation and under earthquake load are simulated by using discontinuous deformation analysis(DDA). Two improvements for excavation and lining are developed and implemented into the original DDA program, and the process of the tunnel excavation and earthquake response are simulated by using the advanced program. The whole failure process of the surrounding rock mass is simulated, which is of help to understand the mechanism of deformation and failure of underground excavation in jointed rock masses. These results suggest that the advanced DDA can be applied to the process simulation of the tunnel excavation and the failure process of the surrounding rock mass under earthquake load.

Key words

[tunneling engineering](#); [jointed rock masses](#); [excavation](#); [earthquake](#); [discontinuous deformation analysis](#)

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