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论文

锦屏二级水电站施工排水洞岩爆数值模拟

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摘要:

岩爆是一种极为复杂的动力失稳现象.在深埋隧洞的勘察设计和施工过程中,高地应力及其诱发的频繁岩爆,是影响隧道洞室稳定的重要因素之一.作为四川雅砻江锦屏二级水电站的重要的临时工程,施工排水洞在进入埋深1600m后就发生多次岩爆,严重制约了工程的进展,为了研究岩爆发生机理与高地应力之间的关系以及更好地预测岩爆在隧洞内发生的位置,运用渐进破坏过程数值分析软件RFPA(realistic failure process analysis)对施工排水洞进行初步的应力分析,得出与现场实测相吻合的初始地应力拟合曲线.同时,隧洞开挖引起应力重分布而产生的围岩破坏的数值模拟也很好的印证了现场发生的岩爆情况,表明基于渐进破坏过程数值分析的RFPA可以真实地模拟高地应力下岩爆机理.

关键词: 锦屏二级水电站;围岩;岩爆;应力分布;数值模拟

Numerical simulation of rockburst on the drain tunnel in the Jinping Second Level Hydropower Station

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Abstract:

Rock-burst is a very complicated dynamical instability phenomenon. High ground stress and its induced frequent rockbursts are major influences of tunnel instability during the survey and design and construction stages. As an important and casual construction of the Jinping Second Level Hydropower Station on the Yalongjiang River, Sichuan Province, when the drain tunnel was excavated at the depth of 1600m, there frequently occurred plenty of rock bursts, which restricted the development of construction. Aiming to investigate the relationship between the rock-burst mechanism and high ground stress, and to effectively predict the location of rock-bursts in the drain tunnel, a progressive failure progress numerical analysis code-RFPA was used to analyze the stress, and the fitting curves of the initial stress were obtained corresponding to the site measurement. Meanwhile, on the basis of RFPA simulation, the disturbed zones in the surrounding rock mass induced by stress redistribution resulting from excavation agreed with the rock-burst fields, which indicated that RFPA can virtually simulate the mechanism of rock-burst.

Keywords: Jinping second level hydropower station; surroundingrock; rockburst; stress distribution; numerical simulation

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