

花岗岩介质中爆炸回填堵塞的数值模拟

王海兵, 张海波, 田宙, 郝保田

(西北核技术研究所, 陕西 西安 710024)

收稿日期 2005-4-2 修回日期 2005-6-20 网络版发布日期 2008-3-18 接受日期 2005-4-2

摘要 采用显式动力学有限元程序LS-DYNA3D, 对花岗岩介质中带拐弯坑道回填堵塞的化爆试验进行数值模拟。介绍了计算所用的材料模型, 并给出经过大量数值试验验证的材料参数; 计算了自由场的力学参数, 给出了围岩和堵塞物的力学破坏情况和破坏分区; 分析比较围岩和坑道中的应力波走时, 并与试验结果进行对比。计算结果与试验结果符合较好。本研究工作是模拟岩石中爆炸的基础, 可为填实化爆、直坑道和带拐弯坑道堵塞的试验研究提供借鉴和参考。

关键词 [数值模拟](#); [爆炸](#); [坑道](#); [堵塞](#); [材料模型](#); [花岗岩](#)

分类号

NUMERICAL SIMULATION OF HIGH-EXPLOSIVE EXPLOSION WITH A BACKFILLED TUNNEL IN GRANITE

WANG Hai-bing, ZHANG Hai-bo, TIAN Zhou, HAO Bao-tian

(Northwest Institute of Nuclear Technology, Xi'an 710024, China)

Abstract

The dynamics finite element program LS-DYNA3D is employed to simulate the high-explosive explosion experiment in granite, which has a crooked tunnel that is backfilled with concrete stemming. The appropriate material models and its parameters are important in numerical simulation. Together with the results of high-explosive explosion experiments, the computational methods, physical models, constitutive models, and their parameters that used for calculation are established and validated by large numbers of numerical tests. Elastic-plastic-hydro material model is used for granite, and the JHC model is used to describe the dynamic response of concrete. The equation of state(EOS) of JWL is used to determine the pressure of detonation products of high-explosive. Free field parameters and the failure regions are calculated. The reach time of stress wave in wall rock and tunnel is analyzed and compared. The simulated results agree well with the experiments results. This work can be regarded as the basement for numerical simulation of the explosion in granite and can be used for such experimental studies.

Key words

[numerical simulation](#); [explosion](#); [tunnel](#); [stem](#); [material model](#); [granite](#)

DOI:

通讯作者

扩展功能

本文信息

- ▶ [Supporting info](#)
- ▶ [PDF\(343KB\)](#)
- ▶ [\[HTML全文\]\(0KB\)](#)
- ▶ [参考文献](#)

服务与反馈

- ▶ [把本文推荐给朋友](#)
- ▶ [加入我的书架](#)
- ▶ [加入引用管理器](#)
- ▶ [复制索引](#)
- ▶ [Email Alert](#)
- ▶ [文章反馈](#)
- ▶ [浏览反馈信息](#)

相关信息

- ▶ [本刊中 包含 “数值模拟; 爆炸; 坑道; 堵塞; 材料模型; 花岗岩” 的相关文章](#)
- ▶ [本文作者相关文章](#)

- [王海兵](#)
- [张海波](#)
- [田宙](#)
- [郝保田](#)