

[1]鲁光银,朱自强,韩旭理,等.高精度地质雷达在隧道地质灾害治理中的应用[J].自然灾害学报,2008,04:118-123.

LU Guang-yin,ZHU Zi-qiang,HAN Xu-li,et al.Application of ground penetrating radar to control of geological hazards of road tunnel[J].,2008,04:118-123.

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## 高精度地质雷达在隧道地质灾害治理中的应用

《自然灾害学报》[ISSN:/CN:23-1324/X] 期数: 2008年04期 页码: 118-123 栏目: 出版日期: 1900-01-01

Title: Application of ground penetrating radar to control of geological hazards of road tunnel

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关键词: [高精度地质雷达](#); [地质灾害](#); [隧道](#); [治理](#); [评价](#)

Keywords: [ground penetrating rada](#); [rgeological disaste](#); [rtunnel](#); [control](#); [evaluation](#)

分类号: TV600.7

DOI: -

文献标识码: -

摘要: 公路隧道穿越复杂地质条件的山体时,经常会遇到断层、暗河、岩性软弱带等不良地质体,极易造成塌方、突水、突泥、岩暴等突发性地质灾害,不仅妨碍了隧道的正常施工,还可能延误工期,造成经济损失甚至人员伤亡.因此,如何采取有效的工程措施和合理的技术手段对这类地质灾害进行处理与评估,已成为目前隧道施工中迫切需要解决的技术问题.以常德—吉首高速公路度龙田隧道ZK207+330~255坍塌地质灾害整治为例,在综合分析隧道工程地质条件和坍塌灾害治理情况的基础上,详细探讨了高精度地质雷达在公路隧道坍塌灾害整治效果检测中的应用.采用高精度地质雷达,可以准确查清塌方处理中注浆饱满度的情况,检查塌腔内是否仍存在危害隧道安全的空洞;同时,对塌方地段加密的钢拱架数量与间距也可进行准确的检测与评价.工程实践表明:结合工程地质调查和现场施工记录,高精度地质雷达可以快速、准确、无损地检测隧道地质灾害的治理效果和整治质量,这对于评价整治效果、减少工程隐患、确保工

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程质量都具有重要的工程应用价值和现实意义.

Abstract: During the construction of road tunnel in complex geological condition with badly geology-body such as fault, underground water, weak rocks, deleterious gas, paroxysmal geological hazards all ways encounter which include collapse, water-bursting, mud-bursting, rock-blasting and gas explosion. These hazards not only bring a lot of difficulty in tunnel construction, but also induce personnel casualties, time delay and huge economic expense. So how to take efficient measures and reasonable technology to evaluate and control these geological hazards is an urgent task during highway tunnel construction. Based on the example of collapse disaster of Dulongtian Tunnel in Changde-Jishou Highway in Hunan, this paper discusses the application of the ground penetrating radar (GPR) technology in monitoring of tunnel collapse disaster. It is shown that GPR combined with local construction records can detect the control effect of the