岩石力学与工程学报 2007 26 (02): 217 ISSN: 1000-6915 CN: 42-1397/O3

岩溶裂隙水与不良地质情况超前预报研究

李术才1，李树忱1，张庆松1，薛翊国1，丁万涛1，钟世航1，何发亮2，林玉山3
(1. 山东大学 岩土与结构工程研究中心，山东 济南 250012；2. 中铁西南科学研究院，四川 成都 610031；
3. 中国地质科学院 岩溶地质研究所，广西 桂林 541004)

收稿日期 2006-2-15 修回日期 2006-3-26 网络版发布日期 2007-2-13 接受日期 2006-2-15

摘要 在岩溶地区隧道施工过程中，经常遇到突水、突泥等无法预料的地质灾害，给施工安全带来了重大灾难和无法估计的经济损失。为了保证岩溶隧道施工安全，对岩溶裂隙水与不良地质体的发育情况进行准确及时的超前预报，是当前岩溶地区隧道设计与施工中亟待研究与解决的关键问题。首先，对隧道建设过程中岩溶裂隙水与不良地质情况超前预报和综合预报体系的研究现状进行详细的介绍，指出岩溶裂隙水与不良地质情况超前预报中存在的主要问题，总结隧道建设过程中地质缺陷超前勘探方法和高压大流量岩溶裂隙水超前预报方法；然后，重点介绍TSP超前地质预报系统探测溶洞、陆地声纳法探测断层、地质雷达探测地下水和红外探水法探测岩溶裂隙水等工程实例。最后，总结预报各种不同地质体的有效方法和将要开展的研究热点和难点，并对下一步所要开展的工作进行深入探讨，对我国在岩溶裂隙水和不良地质体探查的理论和技术创新方面给予一定的帮助和指导。

关键词 工程地质；岩溶裂隙水；不良地质体；隧道地震预报；陆地声纳；地质雷达；红外探水法

分类号

FORECAST OF KARST-FRACTURED GROUNDWATER AND DEFECTIVE GEOLOGICAL CONDITIONS

LI Shucai1，LI Shuchen1，ZHANG Qingsong1，XUE Yiguo1，DING Wantao1，
ZHONG Shihang1，HE Faliang2，LIN Yushan3
(1. Geotechnical and Structural Engineering Research Center，Shandong University，Jinan，Shandong 250012，China；
2. Southwest Research Institute，China Railway Engineering Group Co.，Ltd.，Chengdu，Sichuan 610031，China；
3. Institute of Karst Geology，Chinese Academy of Geological Sciences，Guilin，Guangxi 541004，China)

Abstract

The unknown geological disasters such as water and slurry often gush in karst area during construction of tunnel，which brings momentous disaster and unestimated economic loss to construction safety. The precise and immediate advance forecast to the development of karst is the key problem to be researched and solved currently in tunnel design and construction in the karst areas，which brings important theoretical significance and practical value. A recent development of the forecast and the integration system of the forecast about the karst-fractured groundwater and the defective geological conditions are first introduced in detail. The key issues of karst-fractured groundwater and the defective geological condition in prediction are derived，then the method of forecasting defective geological condition and the karst-fractured groundwater with high pressure and large flow discharge are summarized. The engineering examples such as tunnel seismic prediction(TSP) prospecting karst cave，landsonar prospecting fault，geological radar prospecting underground water and infrared water detecting method prospecting karst-fractured groundwater are introduced emphatically. At last，the effective methods of forecasting all kinds of the defective geological conditions and some study ideas and difficult technology are given；and the next stage of work to be undertaken is discussed deeply. The theory and technology initiative has help and positive guides in the fields of the forecast of the karst-fractured groundwater and the defective geological condition.

Key words engineering geology；karst-fractured groundwater；defective geology；tunnel seismic prediction (TSP)；landsonar；geological radar；infrared water detecting method

DOI:

通讯作者