

目次

青藏高原多年冻土区冷却路基技术现场实效监测研究

马巍, 余邵水, 吴青柏, 张鲁新

中国科学院 寒区旱区环境与工程研究所冻土工程国家重点实验室, 甘肃 兰州 730000

收稿日期 2004-10-18 修回日期 2005-2-21 网络版发布日期 2006-12-15 接受日期

摘要 以青藏铁路现场实体工程为背景, 选用块石路堤、块石护坡和通风管路堤主动冷却措施进行现场实体工程试验, 通过对路基内温度场的监测, 研究这些措施对保护冻土的作用及效果。分析结果表明, 2个冻融周期后, 块石护坡路基、通风管路基和块石路基均具有一定的调节降温作用, 有利于下覆多年冻土的保护。但是冻土上限的抬升需要消耗下部土体的冷能来实现, 说明冻土路基温度场还处于不稳定阶段。

关键词 [土力学](#) [冷却路基措施](#) [多年冻土区](#) [青藏高原](#)

分类号

STUDY ON IN-SITU MONITORING TECHNOLOGY OF COOLING ROADBED IN PERMAFROST REGIONS OF QINGHAI—TIBET PLATEAU

MA Wei, YU Shao-shui, WU Qing-bai, ZHANG Lu-xin

State Key Laboratory of Frozen Soil Engineering, Cold and Arid Regions Environmental and Engineering Research Institute, Chinese Academy of Sciences, Lanzhou, Gansu 730000, China

Abstract

Qinghai—Tibet railway crosses 550 km continuous permafrost regions and 82 km discontinuous permafrost regions, where high temperature regions(annual average ground temperature is above $-1.0\text{ }^{\circ}\text{C}$) occupy 275 km, ice-rich regions cover 221 km, overlapped sections of high temperature and ice-rich occupy about 134 km. As a result of the influences of both global climate warming and railway engineering on the permafrost degradation, design and construction of roadbed in permafrost regions are faced with quite great difficulties. As the natural thermal state and underground ice are the important factors influencing the roadbed stability, the choice of roadbed structure to protect permafrost is the leading principle of engineering design. Therefore, many measures are put forward and adopted including crushed rock slope protection, crushed rock embankment, embankment of heat pipe, embankment of awning, thermal-insulation treatment embankment, widened and heightened embankment and duct-ventilated embankment, etc. The crushed rock slope protection, crushed rock embankment, embankment of heat pipe, embankment of awning, and duct-ventilated embankment are all actively protective technologies. The embankment of crushed rock slope protection, crushed rock embankment and duct-ventilated embankment are chosen to study the protective effects of the three kinds of embankments on the permafrost based on the in-situ monitoring results of the roadbeds in Qinghai—Tibet railway. The basic data of actively adjusting and cooling roadbed measures in permafrost regions have been obtained and analyzed. Results show that all of the three measures have certain effects on adjusting and cooling roadbed, and are advantageous to protect permafrost under the roadbed. However, the rising of artificial permafrost table needs to consume the cold energy of soil below ground, which indicates that the temperature fields of permafrost foundation are in instable phase.

Key words [soil mechanics](#) [cooling roadbed measures](#) [permafrost regions](#) [Qinghai—Tibet Plateau](#)

DOI:

通讯作者

扩展功能

本文信息

- ▶ [Supporting info](#)
- ▶ [PDF\(505KB\)](#)
- ▶ [\[HTML全文\]\(0KB\)](#)
- ▶ [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“土力学”的相关文章](#)
- ▶ [本文作者相关文章](#)

- [马巍](#)
- [余邵水](#)
- [吴青柏](#)
- [张鲁新](#)