

目次

冻土地区一种新型抛石护坡路基的研究

全晓娟1, 李 宁1, 2, 李国玉1

(1. 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; 2. 西安理工大学 岩土工程研究所, 陕西 西安 710048)

收稿日期 2005-3-11 修回日期 2005-6-27 网络版发布日期 2006-12-15 接受日期

摘要 通常认为青藏铁路抛石护坡具有热二极管效应, 可保护路基下的冻土。而实际情况是, 在青藏高原昼夜温差比较大及高原强风的条件下, 抛石护坡内发生的强迫对流将使传统抛石护坡的热二极管效应减弱或消失。应用数值仿真手段在理论上研究这种发生在抛石护坡内的强迫对流对4种传统护坡温度场的影响, 即普通路基(边坡上只覆盖砂土层, 无碎石层)、开放型抛石护坡、封闭护坡(碎石护坡上使用绝热材料), 以及保温护坡路基(碎石护坡上加保温材料并以砂土覆盖)。研究结果表明: 传统抛石护坡在高原强风的情况下, 已基本失去通过主动降温来保护冻土的效果。就此, 在研究中提出一种新型抛石护坡路基, 即遮阳挡风型抛石护坡。经过数值仿真研究发现, 这种新型路基不仅可很好地冷却地基, 也可解决风砂填埋护坡和太阳辐射引起的阴阳坡问题。

关键词 [基础工程](#) [抛石路基](#) [热二极管效应](#) [降温效果](#) [新型抛石护坡](#)

分类号

STUDY ON EMBANKMENT WITH NEW-TYPE ROCK REVETMENT IN PERMAFROST REGIONS

QUAN Xiaojuan1, LI Ning1, 2, LI Guoyu1

(1. State Key Laboratory of Frozen Soil Engineering, Cold and Arid Regions Environmental Engineering Research Institute, Chinese Academy of Sciences, Lanzhou, Gansu 730000, China; 2. Institute of Geotechnical Engineering, Xi'an University of Technology, Xi'an, Shaanxi 710048, China)

Abstract

In the last researches, it is usually considered that rock revetment and cracked rock embankments have the thermal diode effects, which can protect the frozen soil beneath the embankments from thawing in high temperature regions. But this is not the case completely, the effect of the larger diurnal-nocturnal air temperature difference, and the strong wind in Qinghai—Tibet Plateau will weaken or vanish the thermal diode effects, which are mainly caused by the forced convection in slope. To study the heat transfer mechanism and the cooling effects on the permafrost of the ripraped embankment under different boundary conditions, four kinds of embankments are studied with numerical simulation as follows: (1) normal embankment, consisting of sandy soil without crushed rock layer; (2) open rock revetment; (3) insulation slope being covered with insulation material; and (4) enclosed embankment. It is concluded that the traditional rock revetment can not take the advantages of the thermal diode effects to the full extension, and it is not satisfactory in maintaining the permafrost. This kind of temperature field effect caused by forced convection through numerical method is proposed; and a new type rock revetment is put forward, which can also be called sunshade-blocking-wind rock revetment. Through the numerical simulation, it is found that the new kind of crushed embankment has a better cooling effect; at the same time, the sand blocking problem and the temperature difference of the south and north slopes caused by solar radiation are properly solved.

Key words [foundation engineering](#) [ripraped embankment](#) [thermal diode effect](#) [cooling effect](#) [new-type rock revetment](#)

DOI:

通讯作者

扩展功能

本文信息

- ▶ [Supporting info](#)
- ▶ [PDF\(293KB\)](#)
- ▶ [\[HTML全文\]\(0KB\)](#)
- ▶ [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“基础工程”的相关文章](#)
- ▶ [本文作者相关文章](#)

- [全晓娟](#)
- [李 宁](#)
- 
- [李国玉](#)