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多年冻土区铁路路基阴阳坡面热状况差异分析

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摘要 对于多年冻土地区的工程建设而言，人类活动所诱发的局部多年冻土环境的改变远甚于气候变暖的效应。整体而言，路基阳面的沉降变形普遍大于路基阴面，预示着阳面多年冻土的融化更为剧烈。基于青藏铁路北麓河试验场的现场监测资料，分析了路基阴阳坡面热状况的差异。结果表明，路基阳坡面年平均温度比路基阴坡面可以高出3℃以上，冬季路基阳坡面温度较高对阳坡面整体高温贡献较大。路基阴阳坡面、路基顶面的温度年较差均比天然地表高，预示着路基填土表面地气热交换周转量比天然地表大。路基阴阳坡面热状况的差异会导致路基下伏土层温度场的不对称性，由此可能引起路基横向的不均匀变形。

关键词 土力学；路基；温度；阴坡面；阳坡面

分类号

ANALYSIS OF DIFFERENCE IN THERMAL STATE BETWEEN SOUTH FACED SLOPE AND NORTH FACED SLOPE OF RAILWAY EMBANKMENT IN PERMAFROST REGION

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Abstract

As for the engineering construction in permafrost regions，the change of local permafrost environment，induced by human events，influences permafrost much more than the climate warming. The settlement on south faced slope is usually more than that on north faced slope，as indicated that the thawing of permafrost under south faced slope is acuter. Based on observed data in Beiluhe test site of Qinghai-Tibet Railway，the difference in thermal state between south faced slope and north faced slope was analyzed. The results indicate that the difference of ground-atmosphere heat transfers between south faced slope and north faced slope is very obvious and the annual mean temperature at a 0.5 m depth on south faced slope could be higher than that on north faced slope by over 3℃. The higher temperature on south faced slope is greatly attributed to high temperature during winter time. The fact that the annual ranges of ground temperatures near embankment surfaces are all greater than those near nature ground surface shows that the ground-atmosphere heat exchange of embankment surface is beyond that of nature ground surface. This kind of difference in thermal state may result in asymmetric thermal regime in embankment，and underlying soil as well. As a result，possible unevenly transverse deformation may appear.

Key words soil mechanics；embankment；temperature；south faced slope；north faced slope

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