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青藏铁路北麓河试验段地温分布对比分析研究

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摘要 考虑相变和全球气温升高的影响，利用数值分析方法，对青藏铁路目前惟一的L型支挡结构的温度场进行了数值模拟。通过建立路基温度场有限元模型，选取适当的边界条件、初始条件及热学计算参数，计算北麓河试验路基断面10 a内的地温变化情况，并与2 a的地温实际测试资料进行对比分析。冻土融化深度数值计算和实测数据吻合较好，反映地温对气温变化的滞后响应特性，表明计算模型是可信的，计算结果可供参考。未来10 a的数值计算结果表明：最大融深(或冻土上限)没有下降，表明冻土已经形成新的平衡，冻土上限稳定。可以预见该土工结构最终会达到一个稳定的热平衡状态，表明L型这种柔性支挡结构应用于多年冻土地区是适宜的。

关键词 土力学；数值分析；地温；冻土；融化深度

分类号

STUDY ON COMPARATIVE ANALYSIS OF GROUND TEMPERATURE DISTRIBUTION OF BEILU RIVER TEST SECTION IN QINGHAI—TIBET RAILWAY

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Abstract

Considering the phase-change and influence of the global temperature rising，the computed simulation of the temperature field of the L-typed retaining wall only in Qinghai—Tibet Railway has been carried out using numerical calculation method. Through establishing finite element model of subgrade temperature field，the suitable boundary condition，the initial condition and the heat computation parameter are selected；and the variation situations of ground temperature during the future 10 years in Beilu River test section are analyzed and they are compared with monitored two-year actual ground temperature. The calculated thawing depth and the measured data are basically consistent. The result shows that the characteristics of ground temperature response lagging to the temperature change. It also displays that the proposed model is reliable. The computed result can be adopted by other engineering practices. Future 10-year computed results indicate that the maximum thawing depth(or permafrost table) is not developed. It is explained that the frozen soil has already formed to a new balance；and permafrost table is stable. This result can be considered for Qinghai—Tibet Railway. It is forecast that the ground will finally be of stable thermal equilibrium condition. It indicates that the kind of flexible L-typed retaining wall applied to permafrost region is acceptable.

Key words soil mechanics；numerical analysis；ground temperature；frozen soil；thawing depth

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