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桥梁钻孔灌注桩施工中高温冻土地基温度场动态监测与研究

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摘要 通过对钻孔灌注桩地基温度变化进程进行为期1 a的监测，掌握了施工扰动下高温冻土地基温度场的变化规律。研究结果表明，采用冲击钻成孔工艺的混凝土灌注桩施工，对地基温度场的热扰动较大；寒季大气降温仅对浅层地基具有直接冷冻作用，而发生在深层自下而上冻结过程和桩侧土体由外向内的冻结过程却十分缓慢，温度降低幅度有限。高温多年冻土地段钻孔灌注桩群桩基础周围土体的温度，在有限的施工期内不能回冻到初始温度状况。

关键词 土力学；高温冻土；钻孔灌注桩；地温；冻土融化温度；回冻

分类号

STUDY ON THERMAL REGIME OF HIGH-TEMPERATURE FROZEN SOIL WHILE CONSTRUCTION OF CAST-IN-PLACE PILE

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Abstract

The thermal regime of larger diameter cast-in-place pile in group in high-temperature permafrost regions has seldom been reported. Field observation shows that the heat from circulating slurry and concrete pile rather disturb the thermal regime of the frozen ground during the percussion drilling process and the cement hydration period. The increasing rate of temperature in different layers of frozen soil varies with the ice content and the initial temperature in frozen soil. At the end of the cement hydration exothermic period，the raising temperature of the frozen soil and the decreasing temperature of the concrete pile tend to be the same value-the thawing temperature of frozen soil. After 180 day increasing，the temperature of frozen soil begins to drop slowly at the rate of 0.02 ℃/(60 d). Although the upper layer soil can be cooled down directly in the following winter，it is warmed up again afterwards while pit is excavated and the low built base slab of abutment is cast in warm weather. In the layer beyond the direct affect of the air temperature，the temperature decreasing (refreezing) process is quite slow，so it is difficult for the thawing high

temperature permafrost around the cast-in-place pile in group to refreeze in the short construction period.
Key words soil mechanics；high-temperature frozen soil；cast-in-place pile；temperature of frozen soil；thawing temperature；refreezing of subsoil

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