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软岩地区喷射混凝土边坡变形分析——温度场与应力场的耦合效应

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Title: Coupling analysis of temperature and stress fields of shotcrete slope in soft rock area

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关键词: 道路工程; 边坡; 喷射混凝土; 温度应力; 耦合分析

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摘要: 由于混凝土材料与岩土材料的热传导系数、比热容与热膨胀系数的差异,使得喷射混凝土边坡在温度的循环变化下,容易在喷层与岩土层的结合面处产生应力集中而开裂.提出考虑地应力与温度应力耦合作用的有限元分析方法,分析了不同边界温度作用下,边坡喷层面水平位移、垂直位移的规律;指出在温度应力与地应力的共同作用下,喷射混凝土边坡的坡顶与坡脚都是容易发生破坏的部位,通常坡顶的破坏形式为拉张破坏而坡脚则为剪切破坏.当温度变化剧烈时,边坡的防护必须考虑温度应力的影响.

Abstract: The difference of heat conduction coefficient, specific heat coefficient and heat expansion coefficient between the concrete material and rock soil material makes the shotconcrete slope, in the condition of cyclical change of the temperature, stress concentration and crack in the combination surface bewteen the spurting layer and the rock mass.This article applies finite element method to study the coupling action between the crustal stress and temperature stress; analyzes the horizontal displacement and vertical displacement of the spurting concrete layer of the slope and the distribution law of the shear stress at the interface of the spurt ing concrete layer and rock mass under the actions of different boundary temperatures; points out that both the top and foot of the spurting concrete slope are easy to be destroyed under

the common action of temperature stress and crustal stress, usually, the destruction form of the slope top reflects stretching destruction and the destruction form of the slope foot reflects shearing destruction.The research result shows that the attention must be paid to the in fluence of temperature stress in the slope protection when the temperature changes violently.

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