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论文

基于有限元强度折减法的复式抗滑桩内力计算及桩土作用机理分析

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摘要：

在边坡、滑坡防治工程中已得到广泛应用的“Π”形、“h”形等复合式抗滑桩,由于其多属于复杂的超静定结构,受力形式或荷载分配方式仍存在较大争议,桩土相互作用关系复杂,传统方法在求解其内力时往往面临较大困难。有限单元法和强度折减法的结合为解决这类问题提供了一条可行的途径,该方法求解这一类问题时不需要假定抗滑桩系统的结构类型以及岩土体作用在抗滑桩上的荷载分布形式,因此获得的计算结果往往更符合实际情况。本文以某隧道进口岸坡的“Π”形抗滑桩为例,在详细分析岸坡稳定性状况以及可能失稳模式的基础上,采用有限元强度折减法对桩身内力、桩土作用关系以及治理效果进行计算和分析,结果表明利用有限元强度折减法求解这类具有复杂超静定结构抗滑桩系统的内力是一条有效的途径,计算结果对该治理工程的设计具有一定的应用参考意义。

关键词： 复合抗滑桩〓有限元强度折减法〓桩身内力〓桩土作用机理

STRENGTH REDUCTION FINITE ELEMENT ANALYSIS OF INTERAL FORCE IN COMPLEXE ANTI SLIDE PILE AND MECHANISM OF SOIL PILE INTERACTION

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Abstract:

The complex anti slide piles whose shapes like “Π” or “h” have been applied to many slope protections. But it is difficult for many traditional methods to calculate the internal force of the pile,because the pile structures are statically indeterminate,the load distributions which acts on the piles are unkwown and the interaction between soil and pile is complicated. It s a feasible way for calculating the internal force of complex anti slide pile using strength reduction finite element method. The assumed structure type and load distributoin are not necessary. So the results got with the method are authentic normally. In this paper,a complex anti slide pile,whose shape likes “Π”,located in a tunnel entrance slope was taken as a example. In the base of studying the slope stability,the pile internal force was calculated using the strength reduction finite element method. The interaction relationship between pile and soil and engineering control effect were evaluated. The results show that it s an effective way using the strength reduction finite element method for calculating the pile internal force. Some results have reference values for protection design.

Keywords: Complex anti slide pile,Strength reduction finite element method,Soil pile