煤炭学报 2013, 38(S1) 82-87 DOI: ISSN: 0253-9993 CN: 11-2190

论文

二级新型悬臂式挡土墙主动土压力计算方法

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摘要：

基于土的塑性极限分析理论，考虑滑裂面上填土黏聚力及填土与二级新型悬臂式挡土墙墙背接触面上的黏着力，研究了挡土墙土压力受力分析模式，取墙后滑动土体的水平薄层单元进行受力分析，建立极限状态下悬臂式挡土墙主动土压力的一阶微分方程，给出了土压力强度、土压力合力、土压力作用点的理论计算公式。研究结果表明，二级新型悬臂式挡墙上墙应力分布呈抛物线形状；下墙的应力分布类似于梯形分布，最大值出现在挡墙的底部，最小值出现在挡墙的中部。通过有限元数值分析法研究其受力变形特点，数值分析表明：二级挡土墙卸荷作用比较明显，且土自重在二级挡墙中得到了充分的利用；挡土墙主动土压力分布与模拟结果基本一致。

关键词： 二级悬臂式挡土墙；主动土压力；计算方法；有限元；极限状态

Active earth pressure calculation method of two level new structure of cantilever retaining wall

Abstract:

Based on soil plasticity and limit analysis theory，the consideration of the cohesion force on the sliding plane，the adhesive force on the interface of between soil and two level structure of cantilever retaining wall，the model of earth pressure was studied.After forcing analysis to horizontal slice element of sliding soil behind the retaining wall，the first order differential equations for active earth pressure on the retaining wall were set up under limit state，then the strength of the limit state earth pressure for retaining wall with mode of translation，the resultant force of earth pressure and its application point were obtained.The results show that the stress distribution of upper and lower part of two level new structure of cantilever retaining wall are observed to present a parabola style and trapezium distribution separately.The maximum and minimum respectively occurred in the bottom and middle of retaining wall.Then，the deformations of retaining back and stresses of backfill were analyzed by elastoplastic numerical calculation model to simulate construction conditions.The numerical analysis results indicate that unloading effect about two level new structure of cantilever retaining wall is obvious.It is also proved that the gravitational stress is fully utilized and the stress distribution under limit state has a satisfying agreement with the simulation numerical.

Keywords: two level structure of cantilever retaining wall；active earth pressure；calculation method；FEM；limit state

收稿日期 2011-12-29 修回日期 2012-08-06 网络版发布日期 2013-04-24

DOI:

基金项目:

中央高校基本科研业务费科研专项自然科学类资助项目（CDJZR10248801）

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