

軌道行車對鄰近開挖擋土支撐之影響分析

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摘 要

隨著國內鐵路地下化過程須於市區內進行地下開挖，同時又必需維持鐵路交通順暢，因此於施工期間發難免會發生鐵路列車緊鄰於連續壁旁邊行駛之情況。本文針對鐵路列車行駛於連續壁旁邊，對於連續壁及擋土支撐受力影響，以及鐵路列車行駛對於鄰近地盤之振動影響提出探討，由於連續壁，擋土支撐及周遭環境等構成相當複雜之幾何條件，故須建立三維有限元素法數值分析模型，以瞭解鐵路列車行駛之振動影響。本文根據國內外學者之研究成果及相關資料建立數值分析方法，並利用ANSYS有限元素法程式探討本問題，其中採用K-18鐵路列車以移動載重型式，探討列車行駛振動之暫態時間域分析對於連續壁，擋土支撐及周遭環境之影響，以提供工程界參考。

關鍵字：ANSYS、地盤振動、移動載重。

A Study on the Influence of the Moving Train in Proximity of Diaphragm Wall and Steel Support

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Abstract

The ground has to be excavated when the railway is buried underground. Consequently, during this excavation period, it will be unavoidable to prevent the train from moving close to the diaphragm wall while keeping the railway traffic running smoothly. This article will study the increasing stress derived from the moving train in proximity of the diaphragm wall and steel support as well as the ground vibration caused by the moving train. The geometry, including the (1) diaphragm wall, (2) steel supporting facilities and (3) surrounding environment is so complicated that a 3D FEM built on the ANASYS must be employed in order to probe into the ground vibration. In this study, the influence of K-18 moving train on the ground vibration is based on the time domain transient analysis. It is expected that the conclusion described in this paper would be helpful for engineers in gaining the ability of the analysis so that a more effective design can be developed for such problems in the future.

KEY WORDS : ANSYS, ground vibration, moving load.

一、前 言

運輸量大且快速係鐵路運輸系統最大優點，也是國內交通網不可或缺的一部份。由於鐵路列車車體較重且速度快，相對而言其所造成之地表振動以及噪音之衝擊遠比一般道路系統來

得大。因此鐵路列車行駛於開挖工區旁邊，車輪振動對於連續壁及擋土支撐受力之影響，是大地工程界常感到棘手且經常被忽視的問題。此外，列車行駛振動透過地盤傳播到鄰近建築物，是否會對建築物造成損傷或公害亦是常常發生糾紛的原因之一。傳統大地工程相關問題習於採用平面應變分析因應，但對於如本文所要探討之鐵路