具彈簧支撐之樑結構承受等速移動負荷之振動分析

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摘 要

本研究是利用理論數值分析之方法，其目的在探討具彈簧支 撐之樑結構受等速移動負荷作用時之動態響應。首先，應用 Euler-Bernoulli 樑理論推導出樑系統之運動方程式，並利用轉移 矩陣法(transfer matrix method)建立具單一彈簧支撐之簡支樑系 統之矩陣形式，由此可以計算出樑結構系統的特徵解(自然頻率 及振型)。然後，針對受移動負荷作用之彈簧支撐樑進行分析， 建立具移動負荷與彈簧支撐樑完整之運動方程式，並運用擴充原 理與模態函數之正交性關係，求得此樑結構系統之動態響應。 由結果顯示，具移動負荷與彈簧支撐之樑結構，其振動的位 移量有效地被降低。且不同支撐彈簧與支撐位置對其樑結構系統 之動態響應會有不同的影響。本文除了分析探討樑結構系統的 靜、動態特性外，同時藉由實驗方法對此理論模式加以驗證。

關鍵詞 : Euler-Bernoulli、轉移矩陣、特徵值、擴充原理、模態函數、正交性

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