捷運固定閉塞區間與移動閉塞區間運能比較之研究

研究生：蔡青峰　　指導教授：黃台生 教授

國立交通大學交通運輸研究所碩士班

摘要

本研究主要探討固定式閉塞區間號誌系統（Fixed Block Signaling System,以下簡稱 FBS）與移動式閉塞區間號誌系統（Moving Block Signaling System,以下簡稱 MBS）控制方式下，相關因素（區間長度、最高速限、警戒速限、曲率半徑、信標位置及停站時間等）對運能之影響關係。

本研究藉由文獻回顧及資料收集瞭解捷運 FBS 與 MBS 之控制方式與運作原理。隨後以台北捷運高運量圓山至劍潭路段為模擬系統基礎，利用 Java Script 程式語言開發 FBS 模擬模式與 MBS 模擬模式，透過所開發之模擬模式分別進行影響 FBS 與 MBS 最小班距相關因素模擬實驗，並將最小班距轉換為最大運能後，比較 FBS 與 MBS 之運能差異，最後透過 SPSS 10.0 分析並建立其迴歸方程式。

模擬實驗結果顯示，MBS 最小班距較一般 FBS 最小班距縮短 20 秒，路線運能每單位小時可提升 12 列車單位；本研究實驗之相關影響因素中，僅區間長度、最高速限、曲率半徑及停站時間對 FBS 運能影響較為顯著，僅停站時間對 MBS 運能影響較為顯著。

關鍵字：捷運、固定式閉塞區間、移動式閉塞區間、最小班距、運能

A Comparison of Line Capacity for Mass Rapid Transit System between Fixed Block System and Moving Block System

Student：Ching-Feng Tsai Advisor：Dr. Tai-Sheng Huang

Institute of Traffic and Transportation
National Chiao Tung University

ABSTRACT

The study discussed the effects on the factors which were related to the line capacity (including block length, maximum speed, caution speed, curvature radius, beacon location and dwell time) under fixed block signaling system (FBS) and moving block signaling system (MBS).

The study stated the control methods and operation principles of FBS and MBS, FBS simulation model and MBS simulation model, minimum headway and maximum line capacity of FBS and MBS, regression formulas of FBS and MBS. The control methods and operation principles of FBS and MBS via paper review and data collection; FBS simulation model and MBS simulation model were developed by java script programming language, and the simulation system was based on Taipei MRT heavy-capacity transit system Yuanshan to Jiantan section of Danshui line; The minimum headway was gained via simulation model application, and was transferred to maximum line capacity, then compared the MBS line capacity to FBS; Regression formulas were analyzed and constructed by SPSS v10th.

The results revealed that MBS shortened 20 seconds minimum headway and increased 12 train units per hour; the factors in the study only block length, maximum speed, curvature radius and dwell time were notable on FBS line capacity; and only dwell time was notable on MBS line capacity.

Keywords：MRT, Fixed Block, Moving Block, Minimum Headway, Line Capacity