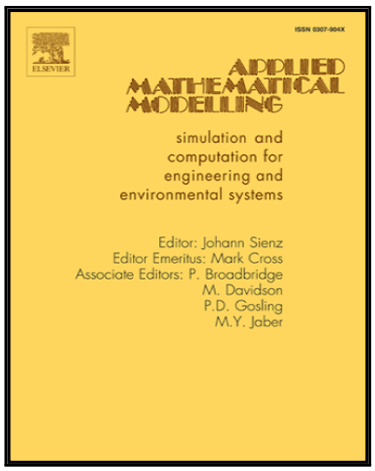
Accepted Manuscript



Rescheduling subway trains by a discrete event model considering service balance performance

Xiaoming Xu , Keping Li, Lixing Yang

PII: S0307-904X(15)00441-2
DOI: 10.1016/j.apm.2015.06.031
Reference: APM 10660

To appear in: *Applied Mathematical Modelling*

Received date: 30 October 2013
Revised date: 20 February 2015
Accepted date: 28 June 2015

Please cite this article as: Xiaoming Xu , Keping Li, Lixing Yang, Rescheduling subway trains by a discrete event model considering service balance performance, *Applied Mathematical Modelling* (2015), doi: 10.1016/j.apm.2015.06.031

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

ACCEPTED MANUSCRIPT

Rescheduling subway trains by a discrete event model considering service balance performance

Xiaoming Xu[a], Keping Li[a,b], Lixing Yang[a*]

[a]State Key Laboratory of Rail Traffic Control and Safety, Beijing Jiaotong University, Beijing 100044, China

[b] Beijing Laboratory of Urban Rail Transit, Beijing Jiaotong University, Beijing 100044, China

Abstract

Considering an incident on a track of a double-track subway line, this paper formulates an optimization model to find near-optimal rescheduled timetables with the least total delay time compared to the original one, in which crossover tracks connecting two parallel subway lines are particularly taken into consideration for balancing the service quality under emergent situations. On the basis of a discrete event model where the train position state transitions are characterized as a series of discrete events, an efficient train rescheduling strategy (ETRS) is developed for solving the proposed model, in which a well-developed capacity check algorithm is particularly integrated to prevent the potential deadlocks. By using the infrastructure data of Beijing Yizhuang subway line of China, numerical case studies are implemented to demonstrate the effectiveness and efficiency of the proposed model and algorithm.

Keywords: Subway line; Train rescheduling; Crossover track; Discrete event model

1 Introduction

1.1 Motivation

It is widely recognized that subway traffic is an ideal transport mode to relieve the traffic pressure in the large cities due to its inherent features of high-capacity, low-energy consumption and safety. In the real-world applications, however, a variety of factors might lead to the reduction of link capacities owing to the complicate traffic environment, such as the rail deformation, locomotive default and signal system failure. When an incident occurs, the current train timetable will probably be ineffective, and an efficient and rapid rescheduling method is expectedly developed to recover the subway traffic.

To the best of our knowledge, the existing subway system usually consists of two parallel tracks (main tracks) for services in different directions and a number of crossover tracks connecting two main tracks. Without the incident, trains are required to traverse on main tracks according to the pre-specified train schedule, while under

*Corresponding author: 11114207@bjtu.edu.cn; kpli@bjtu.edu.cn; lxyang@bjtu.edu.cn

Download English Version:

https://daneshyari.com/en/article/1702776

Download Persian Version:

https://daneshyari.com/article/1702776

Daneshyari.com