Train Timetabling on multiple track and station capacity railway with enhanced upper bound heuristic method

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Abstract Train scheduling is a significant issue in the railway industry in recent years. In this paper, the timetabling problem of a multiple tracked railway network is discussed. A new Mathematical model proposed which handles the trains overtaking in a station and innovatively considers the its capacity. In order to reduce the processing time of the problem we represent some heuristic rules based on parameters to reduce the number of binary variables. Comprehensive numerical experiments with different number of trains, stations and capacities are reported to show the performance of the model and its proposed rules. The result shows that the computational time is considerably reduced and the global optimum of the optimization problem is achieved by using the heuristic rules.

1 Introduction

Railway is one the most fast and cheap way of transportation. But construction of new infrastructures is very expensive and time consuming. So the optimization of the railway network has important role in railway management. The first mathematical programing model was presented by Szpigel in 1973 [5]. Higgins et al in 1996 presented the first model which consider the dynamic transfer times [3]. Kroons and Peeters in 2003 presented another model which all of their parameters dynamically considered [4]. Zhou and Zhong proposed a bicriteria algorithm based on branch and bound to solve the MIP models based on Beijing-Shanghai high speed railway [6], and then in 2007 they presented a complicated branch and bound algorithm

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