

A New Mathematical Programming Model for Transit Timetable Synchronisation

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Schedule synchronisation has always been a big concern for public transport planners, as it directly affects the delay imposed to the passengers transferring between transit lines. Schedule synchronisation is a highly complex optimisation problem by nature and consists in setting the timetables by which the total transfer waiting time for all passengers in a transit network becomes minimised. Although a wealth of research has been dedicated to developing efficient algorithms for this problem, its mathematical formulation has not received sufficient attention in the literature. In this study, the variation of transfer waiting time is formulated through introducing the concept of transfer cycle, and based on this, a new mathematical programming model is proposed for the schedule synchronisation problem. This model aims to minimise the total transfer waiting time incurred by all transferring passenger in a transit network while preventing long waiting times at all transfer points. The new model is also able to reflect schedule deviation and transfer importance, which are critical factors in transit timetabling. This model is less complex and more tractable, compared to the previous synchronisation models.