



Synchronizing transfers through integrated timetabling and vehicle scheduling - an iterative matheuristic approach with public transit traffic assignment

Fonseca, Joao Filipe Paiva; van der Hurk, Evelien; Larsen, Allan; Zündorf, Tobias

Publication date:
2018

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):

Fonseca, J. F. P., van der Hurk, E., Larsen, A., & Zündorf, T. (2018). Synchronizing transfers through integrated timetabling and vehicle scheduling - an iterative matheuristic approach with public transit traffic assignment. Abstract from EURO 2018 conference on Operational Research, Valencia, Spain.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Synchronizing transfers through integrated timetabling and vehicle scheduling - an iterative matheuristic approach with public transit traffic assignment

João Paiva Fonseca, Evelien van der Hurk, Allan Larsen
DTU Management Engineering, Technical University of Denmark
{jfpf, evdh, alar}@dtu.dk

Tobias Zündorf
Karlsruhe Institute of Technology
tobias.zuendorf@kit.edu

Abstract

Transfer times add inconvenience to journeys and thus synchronizing departures and arrival times of relevant lines improves the service for passengers. As the timetable changes passengers may also change their travel itineraries. Additionally, introducing small timetable modifications may also affect the operational costs, as the timetable defines a set of feasible vehicle schedules. We address the Integrated Timetabling and Vehicle Scheduling Problem (IT-VSP) with Public Transit Traffic Assignment (PTTA). The IT-VSP is formulated as a MILP that minimizes transfer costs with a budget on operational costs. Given an initial non-cyclical timetable, time-dependent service times and passenger demands, the transfer time cost is minimized by allowing modifications to the timetable that respect a set of headway constraints. Timetable modifications consist of shifts in departure time and addition of dwell time at intermediate stops. We propose to solve the problem iterating between solving a matheuristic for the IT-VSP and re-computing the PTTA. The matheuristic solves the IT-VSP MILP allowing timetable modifications for a subset of timetabled trips only, while solving the full vehicle scheduling problem. Results for the Greater Copenhagen area indicate that our approach finds better solutions faster than a commercial solver and that allowing the addition of dwell time creates a larger potential for reducing transfer costs. We also show that the integration with the PTTA model generated solutions with lower transfer costs than the solutions obtained with a version that does not compute new passenger assignments once the timetables change.

Keywords

Bus Timetabling Vehicle Scheduling Transit Assignment Mixed Integer Linear Programming
Matheuristic