Periodic Timetabling for Fixed Driving and Waiting Times

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December 8, 2015

Various investigations for solving the periodic timetabling problem in public transportation research make the assumption that a train (or public transport facility in general) which is able to drive a distance between two stations in a time from the interval $[l, u]$, should drive this distance in time l. This assumption is extended for the time a train rests at a station, meaning that these times are also set to the minimal possible time this train must stay at a station. What remains to optimize are the starting times of all lines (routes the trains drive along). This should be done in such a way that for all stations the changing times between two lines that both stop at the same station are as small as possible.

The first result presented is an investigation of how much the objective value of an optimal solution increases due to the aforementioned assumption, where the objective function is the sum of travelling times for all passengers. Furthermore some algorithms will be developed for solving the timetabling problem with the described assumption. A special structure for solutions of this particular timetabling problem will be shown, which then allows to solve several instances exactly in reasonable time. For all remaining instances the idea of a matching-merge approach on the set of lines will be introduced in order to solve this special timetabling problem heuristically.