

The impact of Robust Train Path Envelopes on Line Capacity



Problem description

The Dutch railway network is one of the most dense networks in the world. The constant growth of railway transport demand on one hand, and the limited existing infrastructure capacity on the other forces the railways to constantly enhance their processes to improve performance in managing existing and planned resources. Mathematical models significantly contribute to better and more efficient planning of services and operations. Robust Train Path Envelopes are sets of locations on the route with specified windows for passing times and speeds that are designed with the objective of mitigating the impact of the stochasticity present in railway operation on the timetable. This new concept reduces the amount of disturbances generated, at the expense of some extra capacity usage.

Assignment

This project aims to assess the impact on line capacity of robust train path envelopes that aim to mitigate the impact of the stochasticity present in railway operation. Furthermore, the capacity usage will be compared with other methods.

Expected research steps are:

- Literature study of existing articles
- Data preparation
- **Develop a capacity assessment method for robust train path envelopes**
- Experimental study
- Write a report and a scientific paper

Background

A student is expected to have knowledge and interest in mathematical optimization, railway capacity, programming and has basic knowledge of railway transport, such as provided in CIE5803 Railway Traffic Management. The project builds on recent developments of the Digital Rail Traffic Lab with NS. It can be performed as a final thesis project or research project. The project could be performed within NS.

References

Wang, P., & Goverde, R. M. P. (2016). Multiple-phase train trajectory optimization with signalling and operational constraints. *Transportation Research Part C: Emerging Technologies*, 69, 255-275.

Information

Digital Rail Traffic Lab (DRTLlab) www.tudelft.nl/drtlab/

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