

Dynamic passenger assignment during disruptions in railway systems

Disruptions that result in track blockages or station closures frequently happen in railways. Currently, they are handled by adopting contingency plans that are designed beforehand by experienced traffic controllers, and could further be modified according to the specific conditions of the disruption.

Generally, a contingency plan is designed to adjust and cancel services for accommodating the reduced infrastructure capacity due to the disruption, without consideration of the resulting passenger inconvenience. However, a better understanding of passenger inconvenience could help traffic controllers to modify the contingency plans or design new plans beforehand in a passenger-oriented manner. To this end, we propose a dynamic passenger assignment model, based on which the resulting inconvenience of a contingency plan can be estimated.

The proposed dynamic passenger assignment model can assign passengers to different trains, by taking into account the time-dependent passenger demand, disruption-induced service variations and vehicle capacities.

To implement the model, event-based simulation is applied, which enables the dynamic loading and unloading procedures of passengers. Based on the model, individual travels and time-dependent loadings of each train can be tracked, which makes the estimation of passenger inconvenience (e.g. passenger punctuality, congestion levels) possible. Moreover, the proposed model can also be used to estimate the influence of different factors (rather than the adjusted services only) on passenger inconvenience, such as the influence of full trains, and the influence regarding the locations of publishing disruption information •

