Special Session Title: **New Optimization Methods for Railway Operations Management**

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Presentation 1

Title: **An Efficient Train Scheduling Algorithm on a Single-track Railway System**

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Abstract:

We'll present an iterative train scheduling algorithm that developed based on a train movement simulation method. In this method, the time space statuses of trains in the railway system are firstly divided into three categories, including dwelling at a station, waiting at a station and traveling on a segment. A check algorithm is then particularly proposed to guarantee the feasibility of transition among different statuses where each status transition is defined as a discrete event. Besides, several detailed operation rules are also developed to clarify the scheduling procedure in some special cases. We conduct some extensive experiments by using randomly generated data set to show the effectiveness and efficiency of the proposed method.

Presentation 2

Title: ***Integrated Railway Timetable Rescheduling and Dynamic Passenger Route Choice in a Complete Blockage***

Author(s) and affiliation(s):

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Abstract:

In this talk, we are going to present a work on the train rescheduling in a seriously disrupted situation where a track segment is completely blocked for a relatively long period of time, e.g., 2 hours. In this disrupted situation, trains cannot pass the disrupted segment during the disruption. Passengers will be influenced by the disruption and cannot travel as scheduled. We simultaneously reschedule trains and passenger routes from both operator's and passenger's perspectives. Train rescheduling and passenger route choice problem is formulated by an Integer Linear Programming model based on a space-time network. We decompose the integrated model into two subproblems, train rescheduling problem and passenger route choice problem, by Lagrangian relaxation approach. Both subproblems can be further decomposed into a series of shortest path problems for trains or passenger groups, and solved by dynamic programming. Finally, we test our models and algorithms on both a small artificial railway network and a part of Chinese high speed railway network.

Presentation 3

Title: ***Integrated Train Timetabling and Locomotive Assignment***

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Zhou Xu **(Presenter)**

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Abstract:

In this talk, we are going to present our recent study on modeling and solving an integrated train timetabling and locomotive assignment problem. We first present a three-dimensional state-space-time network model in which a state is used to indicate which train a locomotive is serving. Based on this, we formulate the problem as a minimum cost multi-commodity network flow problem with incompatible arcs and integer flow restrictions. We then develop a Lagrangian relaxation heuristic for solving this network flow problem, and conduct a computational study to show its effectiveness.