

Preface

Railway transportation, as an important public transport form, has its constant aim, which is to transport passengers and freights safely, rapidly, reliably, punctually, and economically. With the increase in the mileage of the Chinese railway network, the requirement of *higher, faster, and more* for railway transportation is proposed. However, natural disasters affecting railway are characterized in recent years by universality, frequency, and variety. Moreover, there are occasional railway accidents railway safety public incidents, which declined the capacity of the railway line and reduced the safety and efficiency of the passenger and freight transportation. Therefore, research on an objective basis to study the train operating problem in emergencies is required.

On the other hand, with the increase of available mileage in railway (especially high-speed railway), the topology structure of the railway network is changing profoundly. A new railway network is forming gradually, which provides conditions for organizing the train operating work based on the network and makes the train operating work more complicated. It is urgent to study the train operating problem based on the railway network.

Based on this background, this book focuses on the theories and methods for train operation organization in emergencies, using the top-down system analysis method.

The research work includes railway transport organization mode in emergencies, railway service network reconstruction, capacity calculation in emergencies, generation of train paths, train repathing and train re-scheduling problem. The railway transportation mode in emergencies is the most macro, the most fundamental issue, which proposes the most basic constraints for train operation organization. It is a strategic level problem.

And the train service network is the intuitive representation of the line plan, deciding the origin station, destination station, train path, stops plan, service frequency, and other factors, which is a tactical level problem.

Capacity calculation is the basis of train repathing problem, which is also studied in this book.

At the operational level, the train timetable on the dispatching sections is the key issue, determining the inbound and outbound time of the trains at stations.

The solution of strategic level problem is the constraint of the tactical level problem, and the solution of the tactical level problem is the constraint of the operational level problem. Conversely, the solution of the operational level problem can be fed back to the tactical level problem, which can be helpful for the decision-makers of the tactical level problem. In addition, the solution of the tactical level problem can be fed back to the strategic level problem, which can generate some decision-supporting information for the strategic level problem.

The authors and their team are involved in the research work of train operation organization for many years. They have undertaken and completed *China National Key Research and Development Project* (Grant: 2016YFB1200105). The authors developed a series of computer management systems and obtained the software copyright of train operation regulation system for high-speed railway network. The research work of these projects and the results of the work provide materials for this book.

Here the authors want to express thanks to Vice Professor Xu Jie and Li Wang for their valuable advice in writing this book.

When writing this book, the authors searched for various publications. We tried to keep a style of clear definition, with lucid brain, so as to make all kinds of readers have a clear understanding of the transportation organization and train operation in emergencies. Due to the author's knowledge level and the depth and breadth of the study, the views, methods, and theories mentioned in the book certainly have some deficiencies. Do not hesitate connecting with the authors to provide your priceless advice.

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