**Part 1: Markov Chains**

Chapter 1: Introductions

Theorem 1.1: Perron-Frobenius theorem
Mean first passage times
Kemeny constant
Theorem 1.2
Second eigenvector and clustering
Theorem 1.3

Chapter 2: Markov Chains and big data

Theorem 2.1
Theorem 2.2

Chapter 3: Markov Chains of Public Transport Network

Waiting graph
Travel graph
multimodality
Validation by Perron eigenvector
Clusters
Big data example

Chapter 4: Improve and optimize public transport network

Accessibility to critical areas
Balanced control of waiting and travel time
Services and advertising control

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**Part 2: Delay Management**

Chapter 5: Introduction

Application
Related Literature
A Model for the Delay Management Problem
Event-activity Networks in Delay Management

Chapter 6: Delay Management with Fixed Connections
- Linear Programming Approach
- Relation to the Critical Path Method
- Relation to the Feasible Differential Problem

Chapter 7: Minimizing the Sum of All Delays
- A Linear Model
- Activity-based Model
- Constant Weights and the Never-meet Property
- A Simple Special Case
- Solving the model with constant weights
- Solving the Total Delay Management Problem

Chapter 8: The Bicriteria Delay Management Problem
- A First Analysis
- Integer Programming Formulation
- Lexicographic and Supported Efficient Solutions
- Finding All Efficient Solutions