



北京市高等教育精品教材立项项目

# Traffic Engineering

## 交通工程学

Wuhong Wang  
王武宏 主编



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高等学校双语教材

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## SUMMARY

This book provides an introduction to traffic engineering. The emphasis will be placed on fundamental concepts and principles of traffic operations, procedures and methods of traffic engineering studies, and analytical and computational skills of transportation system analysis and control. It is hoped that this book will be useful to the senior undergraduate students and graduate students, and to those in traffic and transportation profession who need to solve problems on the analysis, design, plan, operation, control and management of traffic system.

## 内 容 提 要

本书详细地介绍了交通工程学的基本概念、原理和方法,是高等学校交通工程专业双语教材,可作为交通工程、交通运输、土木工程、车辆工程、城市规划、物流工程等专业高年级本科生和交通运输工程学科研究生的教材,也可供城市规划、汽车设计与运用服务、交通运输管理部门和公共交通营运单位以及物流企业的专业技术人员参考。

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## PREFACE

Because the discipline of traffic engineering is experiencing a phenomenal growth in the academia and engineering, this book is designed for use as a bilingual text in an introduction to traffic engineering course with English and Chinese. The emphasis on this book will be placed on fundamental concepts and principles of traffic operations, procedures and methods of traffic engineering studies, and analytical and computational skills of transportation system analysis and control. This book should be most suitable to the junior and senior undergraduate students and first year graduate students, and to those in traffic and transportation profession who need to solve problems on the analysis, design, plan, operation, control and management of traffic system.

This book consists of nine chapters, representing the most updated and unique compilation of knowledge in the field of traffic engineering. These chapters are:

Chapter 1, Introduction of Traffic Engineering, written by Wuhong Wang, ( Beijing Institute of Technology ); edited by Huachun Tan, Jianqun Wang ( Beijing Institute of Technology )

Chapter 2, Traffic Characteristics, written by Xiaobei Jiang ( Technical University of Munich ), Wuhong Wang; edited by Xiaohua Zhao, Jian Rong ( Beijing University of Technology )

Chapter 3, Traffic Stream Characteristics, written by Xiaobei Jiang, Wuhong Wang; edited by Jian Rong, Xiaohua Zhao

Chapter 4, Traffic Engineering Studies and Programs, written by Hongwei Guo, Ziyou Gao ( Beijing Jiaotong University ); edited by Liya Yao, Hui Xiong ( Beijing Institute of Technology )

Chapter 5, Fundamentals of Traffic Flow Theory, written by Hui Xiong; edited by Hongwei Guo, Wuhong Wang

Chapter 6, Traffic Control and Management, written by Huachun Tan ( Beijing Institute of Technology ); edited by Liya Yao, Jian Rong

Chapter 7, Capacity and Level-of-Service Analysis, written by Hongwei Guo, Wuhong Wang; edited by Xiaobei Jiang, Hui Xiong

Chapter 8, Transportation Planning, written by Liya Yao, Lishan Sun ( Beijing University of Technology ); edited by Huachun Tan, Wuhong Wang

Chapter 9, New technologies in Traffic System, written by Jianqun Wang; edited by Lishan Sun, Wuhong Wang

We are very grateful to Prof. Futian Ren, Beijing University of Technology; Prof. Heiner Bubb, Technical University of Munich; Prof. Katchushi Ikeuchi, the University of Tokyo, they kindly provided many helpful suggestions for this book writing and our research & teaching works. We have incorporated most of their suggestions, and we feel that the book is stronger because of them.

We wish to acknowledge the useful comments offered by our many colleagues and students: Chenxi Ding, Tangqiao Xu, Shijie Guo, Hao Liu, Hanru Li, Shuangchen Xia, Yuejun Liu, Xuedong Guo, Xiao Wang, Yan Mao, Jing Jin. Of course, we sincerely thank all authors whose works are cited in the references of this book. No them without this book!

Last but not least we feel honored that the publication of this book is supported by Beijing Municipal Higher-quality Textbook for Higher Education Project and key Education Reform Project of Beijing Institute of Technology.



# 前 言

本书详细地介绍了交通工程的基本概念、原理和方法,是国内高等院校交通工程专业双语教材。由于交通工程学是交通工程、交通运输及土木工程等专业的平台课,也是城市规划、汽车服务工程、交通管理工程、车辆工程、物流工程等相关专业重点涉及的必修或选修课程,因此,在编写本书时,我们结合了在德国、日本、美国留学的多年经验,在研读和课堂随听德语—英语、日语—英语双语教学及英语教学的基础上,注重教材内容取舍和编写方式的创新,不仅合理借鉴了近年来国内著名高校双语教学示范的研究成果以及实施经验,而且着重参考了德国三所精英大学之一的慕尼黑工业大学德—英双语国际学生培养模式和日本最高学府东京大学日—英双语交互式联合教学的成功案例,同时结合美国高等学校交通工程学课程的发展现状,用简单明了的英文来撰写相关内容,以推荐阅读的方式给出对应中文知识的相关教材和文献名称,供学生课外选读与复习,从而保证了中英文专业内容的互通。此外,本教材在体系构建和编写方面还有如下特点:

(1) 本书不是从纯粹的英文专业教材角度出发,而是从专业基础课的双语教学层次上,通过大量的实际工程案例和具体例题来说明交通工程学的基本原理、方法和理论,最后给出详细的思考题、问答题和分析计算题,供学生选做;

(2) 考虑到中国学生的认知能力和英语水平,对涉及的某些关键性的交通工程标准规范,结合中、日、德、美等国间的交通发展现状进行了必要的说明和透彻的解释;

(3) 充分结合本课程的导论性质,全书以丰富多彩的图片图例来说明复杂的交通现象并解析其本质,同时贯穿了从概述——讲解——总结——阅读的路线来构建和编写具体的章节内容;

(4) 每一章均包含有推荐阅读的中文文献和参考资料,按不同的难易顺序列出,使学生在学交通工程专业知识的同时,既能够充分掌握本专业内容的中文术语表达,也能了解对应的专业英语词汇,以期达到中英文术语和专业内容的互通、互译、互解和互知;

(5) 本书的每一章均由具有留学背景的教授参与编写或校改,以中英文索引的方式在附录中列出大量交通工程常见术语,对一些重要的单词进行了必要的解释,以便于学生和读者理解教材内容。

本书由北京理工大学王武宏教授主编,北京工业大学任福田教授、德国慕尼黑工业大学 Heiner Bubb 教授、日本东京大学池内克史教授审阅并提出了许多有益的建议,保证了全书编写与内容取材方面的规范。本书共分九章,涵盖了交通工程学的主要内容,即概论、交通特性、交通流特性、交通调查、交通流理论、通行能力与服务水平、交通管理与控制、交通规划、新技术在交通中的应用。本书具体编写和校改人员的分工如下:

第一章由北京理工大学王武宏教授编写,北京理工大学谭华春、王建群教授校改;

第二章由慕尼黑工业大学蒋晓蓓,王武宏编写,北京工业大学赵晓华、荣建教授校改;

第三章由蒋晓蓓、王武宏编写,荣建、赵晓华校改;

第四章由北京交通大学郭宏伟、高自友教授编写,北京理工大学姚丽亚讲师、熊辉副教授

校改;

第五章由熊辉编写,郭宏伟、王武宏校改;

第六章由谭华春编写,姚丽亚、荣建校改;

第七章由郭宏伟、王武宏编写,蒋晓蓓、熊辉校改;

第八章由姚丽亚、北京工业大学孙立山讲师编写,谭华春、王武宏校改;

第九章由王建群编写,孙立山、王武宏校改。

本书在编写过程中,北京理工大学的丁晨曦参与了部分章节的编写和资料查阅工作,我们的同事和学生徐唐桥、郭思婕、刘皓、李涵茹、夏埏辰、刘跃军、郭雪东、王潇、毛琰、金晶等提出了许多有用的建议并整理了文稿。当然,我们也要特别感谢本书的所有被引文献的作者,正是他们辛苦的前提工作给予了我们编写本书的便利。由于编者学识有限,加之国内缺少可供参考的交通工程学双语教材,书中的错误和疏忽之处在所难免,祈请大家不吝指正,以便修订再版时改进完善!

本书系北京市高等教育精品教材立项项目,得到北京理工大学教育教学改革重点项目的资助,可作为高等院校交通工程、交通运输、土木工程、车辆工程、城市规划、物流工程等专业高年级本科生和交通运输工程研究生的教材,也可供城市交通规划、汽车设计制造与运用服务、交通运输管理部门和公共交通运营单位以及物流企业的专业技术人员参考。

编者

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