普通高等院校双语教材

Engineering Surveying

工程测量

陈学平 ◎ 主编

原汁原味专业英语　系统阐述学科知识

突出实用难点注释　附加译文以利学习

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内 容 简 介

本教材按学科系统性，并考虑教学与学生自学的方便组成新的体系。全书 12 章包括测绘的基础知识、基本理论与基本技能，以及若干工程领域的工程测量。第 1～5 章为绪论、误差理论、距离测量、水准测量和角度测量，第 7～8 章为控制测量与地形测量。前 8 章为普通测量学的主要内容。第 9～11 章包括公路曲线测量、面积与体积的计算以及施工测量，是工程领域的重要内容。第 6 章全站仪与第 12 章全球定位测量是已在生产中广泛使用的重要的测绘新技术。

本书可作为普通高等院校工程测量、土木建筑、公路交通等专业的双语教材、有关专业研究生的参考书，也可供从事测绘教学与生产人员作为英语学习资料使用。

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前　言

目前国内英文版测绘教材和相关书籍较少，购买国外原版教材价格昂贵，且难以找到十分适用的版本。为了满足广大测绘科技工作者、生产单位作业员以及在校师生学习测绘专业英语的需求，本人尝试编写一本以反映测绘基础知识和基本理论与方法为主并能反映当代测绘科技特点的双语教材。为此，本人查阅国家图书馆近十年来四十多本英文测量学、工程测量及 GPS 教材，从中精选内容进行编辑。

本书选材与编写的要求是：

（1）明确章节的基本要求，从多本原著中选材，主要考虑科学性、系统性与实用性。内容深度适当，尽量避免因内容过于艰深而影响阅读理解。

（2）教材内容突出三基（基础知识、基本理论与基本技能），注意把阐述理论与讲解实践操作相结合。阐述概念与原理力求准确、简洁、清晰，叙述观测步骤注意条理性，算例尽可能表格化。

（3）测量精度要求符合国内规范，计算表格采用国内的通用格式。

（4）图文并茂。介绍仪器时，除照片外尽可能配以描述仪器主要结构的线划图，以便于读者理解与掌握。

（5）每节后列出单词与词组，遇有难以理解的句子做了注释。

全书分为两大部分，第一部分为英文课文，第二部分为课文参考译文。建议读者按英文课文顺序学习，独立阅读与翻译，不懂时再看参考译文。

本书的编写过程得到中国建材工业出版社教材教辅编辑部同志的大力支持与帮助，提出了许多宝贵意见，在此表示十分感谢。

编者水平有限，时间仓促，书中内容难免存在错误与漏洞，敬请读者批评指正。

陈学平

2014 年 1 月于北京

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China Building Materials Press

Part 1 TEXT

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第二部分　课文参考译文

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Part 1 TEXT

Chapter 1 Introduction

1.1 Relevant definition

1.1.1 Surveying and Engineering surveying

*1[Surveying may be defined as the science of determining the position, in three dimensions, of natural and man-made features on or beneath the surface of the Earth. These features may be represented in analogue form as a contoured map, plan or chart, or in digital form such as a digital ground model (DGM).]

Engineering surveying is defined as those activities involved in the planning and execution of surveys for the location, design, construction, maintenance, and operation of civil construction and other engineered projects. Such activities include all the survey work required before, during and after any engineering works.

(1) Before any works are started, large-scale topographical maps or plans are required as a basis for design. To produce up-to-date maps of the areas in which engineering projects are to be built. The scales of the maps are usually considerably larger than those produced in the other forms of land surveys. Civil engineering works commonly use scales 1:500, 1:1000, 1:2000 and 1:5000. Town planning commonly use scales 1:5000 and 1:10000. Preliminary survey map for route surveys commonly use scales 1:1000 to 1:10000. Cross sections and longitudinal sections are often drawn with exaggerated vertical scales.

(2) The proposed position of any new item of construction must then be marked out on the ground, both in plan and height, an operation generally termed setting out. Surveyors must ensure that the construction is built in its correct relative and absolute position on the ground. In land surveys and cadastral surveys, it is often required to calculate the areas and volumes of land.

(3) As-built surveys are made after a construction project is complete, to provide the positions and dimensions of the features of the projects as they were actually constructed. These surveys not only provide a record of what was constructed but also become a very important document that must be preserved for future maintenance, expansions and new construction.

(4) Providing permanent control points by which the future movement of structures such as dams and bridges can be monitored.

Engineering surveying is one of the most important areas of expertise in geomatics.

1.1.2 Geomatics

Where does the word Geomatics come from? GEODESY + GEOINFORMATICS = GEOMATICS or the combination of GEO—for Geoscience and—MATICS for informatics. The term geomatics emerged first in Canada and as an academic discipline; it has been introduced worldwide in a number of institutes of higher education during the past few years, *2[mostly by renaming what was previously called "geodesy" or "surveying", and by adding a number of computer science and GIS-oriented courses.] Now the term includes the traditional surveying definition. Along with surveying steadily increased importance with the development of new technologies and the growing demand for a variety of spatially related types of information, particularly in measuring and monitoring our environment.

Geomatics is the science and technology of acquiring, storing, processing, managing, analyzing and presenting geographically referenced information (geo-spatial data). It integrates the following more specific disciplines and technologies including surveying and mapping, geodesy, satellite positioning, photogrammetry, remote sensing, geographic information systems (GIS), land management, computer systems, environmental visualization and computer graphics.

Geomatics not only covers the traditional work of the surveyor but also reflects the changing role of the surveyor in data management. This has arisen because of the advances made in surveying which make it possible to collect, process and display large amounts of spatial data with relative ease using digital technology. This in turn has created an enormous demand for this data from a wide variety of sources such as geology, geophysics, hydrology, forestry, transportation, government and human resources. For all of these, data is collected and processed by a computer in a Geographic Information System (GIS). These are databases that can integrate the spatial data provided by surveyors with environmental, geographic and social information layers (see Fig. 1-1) which can be combined, processed and displayed in any format according to the needs of the end user. Without any doubt, the most important part of a GIS is the spatial data on which all other information is based and the provision of this has been a huge growth area in surveying.

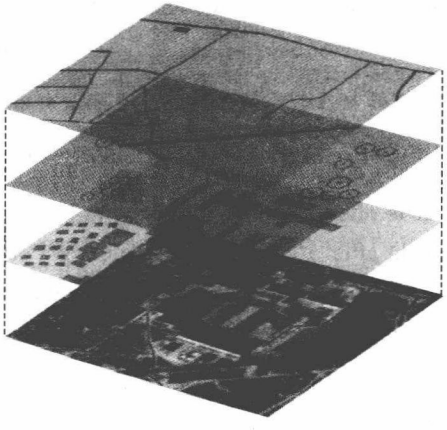

Fig. 1-1 Layers in a GIS