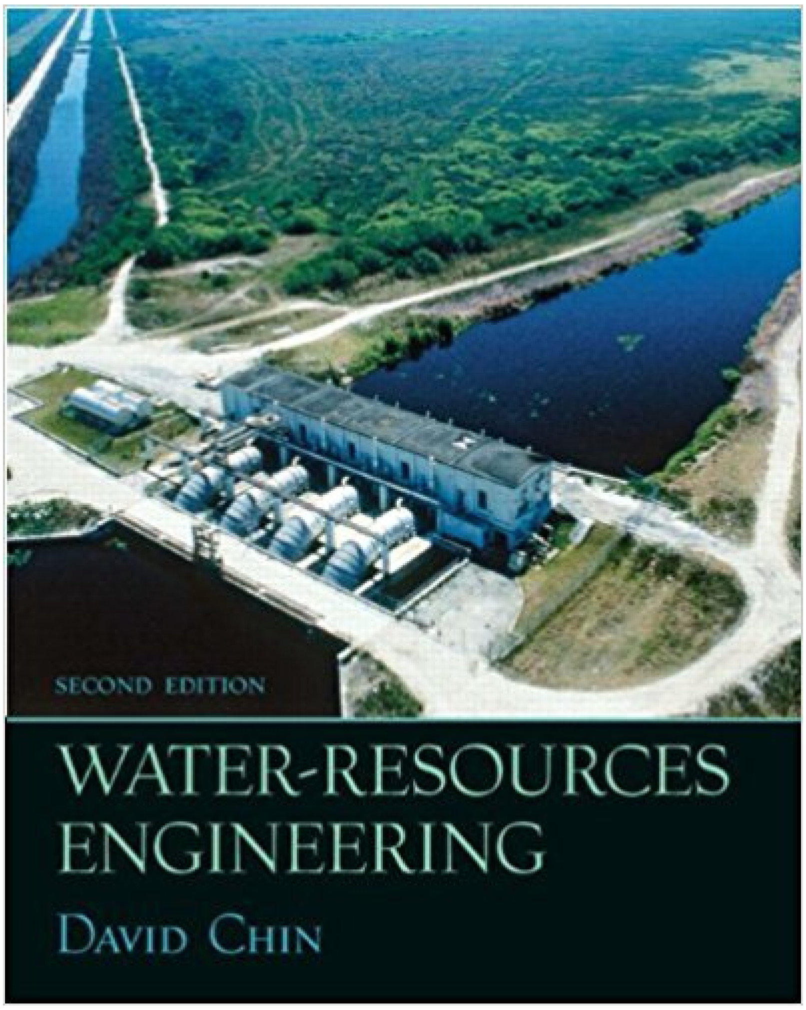
Water-Resources Engineering (2nd Edition)



Synopsis

This in-depth review of water-resources engineering essentials focuses on both fundamentals and design applications.   Emphasis on fundamentals encourages readersâ ™ understanding of basic equations in water-resources engineering and the background that is necessary to develop innovative solutions to complex problems. Comprehensive design applications illustrate the practical application of the basic equations of water-resources engineering. Full coverage of hydraulics, hydrology, and water-resources planning and management is provided. Hydraulics is separated into closed-conduit flow and open-channel flow, and hydrology is separated into surface-water hydrology and ground-water hydrology.   For professionals looking for a reference book on water-resources engineering.

Book Information

Hardcover: 976 pages

Publisher: Pearson; 2 edition (April 13, 2006)

Language: English

ISBN-10: 0131481924

ISBN-13: 978-0131481923

Product Dimensions: 8 x 1.4 x 9.9 inches

Shipping Weight: 3.6 pounds

Average Customer Review: 4.0 out of 5 stars   7 customer reviews

Best Sellers Rank: #537,528 in Books (See Top 100 in Books)   #124 inÂ Books > Engineering & Transportation > Engineering > Civil & Environmental > Hydrology   #128 inÂ Books > Engineering & Transportation > Engineering > Civil & Environmental > Environmental > Waste Management #159 inÂ Books > Engineering & Transportation > Engineering > Mechanical > Hydraulics

Customer Reviews

Preface Water-resources engineering is concerned with the design of systems that control the quantity, quality, timing, and distribution of water to support both human habitation and the needs of the environment. Water-resources engineers are typically trained in civil or environmental engineering programs and specialize in a variety of areas, including the design of water-supply systems, water and wastewater treatment facilities, irrigation and drainage systems, hydropower systems, and flood-control systems. The technical and scientific bases for most water-resources specializations are found in the areas of fluid mechanics, hydraulics, hydrology, contaminant fate and transport processes, and water-treatment processes. Many engineering schools classify watertreatment processes as a subject that belongs to environmental engineering rather than water-resources engineering; however, a holistic view of the practice of waterresources engineering supports the study of water-treatment processes as part of both water-resources and environmental engineering specialties. The pigeonholing of fluid mechanics, hydraulics, hydrology, and contaminant fate and transport into discrete subjects, usually taught in separate courses using different textbooks, has resulted in large part from the extensive knowledge base that has developed in each of these areas and the commensurate specialization of engineers involved in research and academic practice. Engineering students are consequently left with a sense of compartmentalization and intimidation. Typically, they fail to see the complete picture of water-resources engineering and view each specialty as so vast that mastery at the undergraduate level is impossible. To address this misperception, an integrated treatment of water-resources engineering must necessarily present the fundamental aspects of the field while providing sufficient detail for the student to feel comfortable and competent in all the areas covered. Such an integrated approach has been taken in preparing this text, resulting in a book that covers the topics most fundamental to the practicing water-resources engineer— and does so with sufficient rigor that further instruction, whether at the graduate level or in professional journals, can be assimilated at a high technical level. A course in fluid mechanics is generally regarded as the first step in a water-resources engineering track, and criteria for accrediting civil and environmental engineering programs in the United States (ABET Engineering Criteria 2000) require at most that engineering students demonstrate a proficiency in fluid mechanics relevant to their program of study. This book covers the elements of fluid mechanics relevant to a waterresources engineering track as well as the fundamentals of fluid mechanics covered on the Fundamentals of Engineering (FE) exam. The majority of this book provides detailed treatment of hydraulics, surface-water hydrology, ground-water hydrology, and hydrologic fate and transport processes, and it features practical design applications in all of these areas. The text incorporates, and explains in detail, the design of water distribution systems, sanitary sewer systems, stormwater management systems, and water-quality control systems in rivers, lakes, ground waters, and coastal waters. Care has been taken that all the design protocols presented in this book are consistent with the relevant American Society of Civil Engineers (ASCE), Water Environment Federation (WET), and American Water Works Association (AWWA) Manuals of Practice. The topics covered in this book constitute much of the technical background expected of water-resources engineers and part of the core requirements for environmental engineering students. This text is appropriate for undergraduate and first-year graduate courses in hydraulics, hydrology, and contaminant fate and transport processes. It also incorporates enough fluid mechanics background to rigorously cover the fundamentals of hydraulics and hydrology. Prerequisites for courses that use this text should include calculus up to differential equations. The book begins with an introduction to water-resources engineering (Chapter 1) that orients the reader to the depth and breadth of the field. Chapter 2 covers the fundamentals of classical fluid mechanics relevant to water-resources engineering, and Chapter 3 presents the fundamentals of flow in closed conduits, including a detailed exposition on the design of water-supply systems. Chapter 4 covers flow in open channels from basic principles, including the computation of watersurface profiles and the performance of hydraulic structures. Applications of this material to the design of lined, unlined, and grassed drainage channels are presented along with the design of sanitary sewer systems. Computer models commonly used in practice to apply the principles of open-channel hydraulics are reviewed at the end of the chapter. Many of the analytical methods used by water-resources engineers are based in the theory of probability and statistics, and Chapter 5 presents elements of probability and statistics relevant to the practice of water-resources engineering. Useful probability distributions, hydrologic data analysis, and frequency analysis are all covered, and the applications of these techniques to risk analysis in engineering design are illustrated by examples. Chapter 6 covers surface-water hydrology and focuses mostly on urban design applications. The ASCE Manuals of Practice on the design of surface-water management systems (ASCE,1992) and urban runoff quality management (ASCE, 1998) were used as bases for much of the material presented. Coverage includes the specification of design rainfall, runoff models, routing models, and water-quality models. Applications of this material to the design of both minor and major components of stormwater management systems are presented, along with computer models widely used in practice to implement these techniques in complex stormwater management systems. Chapter 7 covers ground-water hydrology, including the basic equations of groundwater flow, analytic solutions describing flow in aquifers, saltwater intrusion, and ground-water flow in the unsaturated zone. Applications to the design of municipal wellfields and individual water-supply wells, the delineation of wellhead protection areas, the design of aquifer pumping tests, and the design of exfiltration trenches are presented. Numerical models of ground-water flow used in practice are also reviewed. Chapter 8, finally, covers hydrologic fate and transport processes, including waterquality regulations, and quantitative analyses of fate and transport processes in rivers, lakes, ground waters, and coastal waters. The applications of these analyses to the design of water-quality management systems are presented. Seven appendices at the end of the book include conversion factors between SI and U.S. Customary units, fluid properties, geometric properties of plane surfaces, statistical tables, special functions, and drinking water standards. This book can be used in a variety of ways, depending on the needs of students and instructors. As a guideline, the material in this text could be substantially covered in a two-course sequence. The first course could cover the material in Chapters 1 through 5 (Introduction, Fundamentals of Fluid Mechanics, Flow in Closed Conduits, Flow in Open Channels, Probability and Statistics in Water-Resources Engineering); the second, Chapters 6 through 8 (Surface-Water Hydrology, Ground-Water Hydrology, Hydrologic Fate and Transport Processes). A course plan that complements other required courses in the engineering curriculum is generally recommended. In summary, this book is a reflection of the author's belief that water-resources engineers must have a firm understanding of the depth and breadth of the technical areas fundamental to their discipline. This knowledge will allow them to be more innovative, view water-resource systems holistically, and be technically prepared for a lifetime of learning. On the basis of this vision, the material contained in this book is presented mostly from first principles, is rigorous, is relevant to the practice of water-resources engineering, and is reinforced by detailed presentations of design applications. Even though the United States is squarely on the road to adopting International Standard (SI) units, most textbooks in hydraulics and hydrology published in this country continue to use the system of U.S. Customary units. Providing a mix of units can sometimes be confusing and usually forces the reader to adopt one set and ignore the other. Unfortunately, many engineering students tend to adopt the U.S. Customary unit system and disregard the SI system. If they are to be competitive in the future, American engineers cannot afford this luxury. Therefore, this textbook preferentially uses SI units. Many people have contributed both directly and indirectly to the creation of this book. I acknowledge the many inspirational teachers who kindled my interest in waterresources engineering and whose philosophical ideas have contributed to development of my present view of the field. To name only a few people would be a disservice to many, but the faculty I studied under at Caltech and Georgia Tech during my graduate school days certainly deserve special recognition. My students in the civil and environmental engineering programs at the University of Miami provided valuable feedback in the development of this book, and Michael Slaughter of Addison-Wesley was a source of advice and help. I would like to join with the publisher in thanking the following reviewers for their comments and suggestions during the development of the manuscript: Mary Bergs, University of Toledo; Paul C. Chan, New Jersey Institute of Technology; Alexander Cheng, University of Delaware; Steven Chiesa, Santa Clara University; Bruce DeVantier, Southern Illinois University-Carbondale; Robert Kersten, University of Central Florida; Jay Lund, University of California, Davis; Joe Middlebrooks, University of Nevada, Reno; Paul Trotta, Northern Arizona

University; and Ralph Wurbs, Texas A&M University. A special thanks to Bob Liu, who drafted most of the figures, and whose dedication to this project was beyond the call of duty. David A. Chin --This text refers to an out of print or unavailable edition of this title.

Water-Resources Engineering provides the reader with a complete picture of water resources engineering by integrating the fundamental concepts of fluid mechanics, hydraulics, hydrology, and contaminant fate and transport processes in the hydrologic cycle. The material in the book is presented from first principles, is rigorous, is relevant to the practice of water resources engineering, and is reinforced by detailed presentations of design applications. FEATURES/BENEFITS Contains practical design applications—From the areas of hydraulics, surface water and ground water hydrology, and hydrologic fate and transport processes. Coverage of design applications reinforces the basic theory. Design methods are state-of-the-art in preparation for engineering practice. Detailed coverage of hydraulics, hydrology, and contaminant transport in a single book, provide a holistic view of water-resources engineering. Presents computer models—Widely used in practice to implement the techniques discussed. It is essential that today's engineers be familiar with state-of-the-art computer models for efficient and comprehensive engineering design. Presents design protocols—Consistent with ASCE, WEF, and AWWA Manuals of Practice. Most modern designs are guided by codes and design standards. Familiarity with these rules is essential. Uses SI units throughout. To be competitive in a global environment the use of SI units is essential. The United States is moving inexorably towards the universal adoption of SI units. --This text refers to an out of print or unavailable edition of this title.

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I have been hesitant to write this review for a long while but the arrival time and quality where good.

The book came in good condition, but it took forever and i did ask for special 2-3day delivery. It came like 2 weeks later!!!!!!!!

I believe this is a kind of book that everyone involved in water resources engineering and management must have. It covers all the important topics in a single handy source. I, however, do not recommend it if you are looking for detailed examples. It does include good examples with solutions but it should be better used as a reference and handbook.

The book is very straight forward and explains a lot but does not give enough examples. Overall its a good book to use.

This book should be on the bookshelf of every engineer who specializes in water-resources engineering.