Chapter 7 Flexural Analysis Of Non Rectangular Beams

Flexural-Torsional Buckling of Structures provides an up-to-date, comprehensive treatment of flexural-torsional buckling and demonstrates how to design against this mode of failure. The author first explains the fundamentals of this type of buckling behavior and then summarizes results that will be of use to designers and researchers in either equation or graphical form. This approach makes the book an ideal text/reference for students in structural engineering as well as for practicing civil engineers, structural engineers, and constructional steel researchers and designers. The book begins by introducing the modern development of the theory of flexural-torsional buckling through discussions on the general concepts of equilibrium, total potential, virtual work, and buckling. It then continues with in-depth coverage of hand methods for solving buckling problems, the analysis of flexural-torsional buckling using the finite element method, and the buckling of different types of structural elements and frames composed of various elastic materials. Other topics addressed include the design and inelastic buckling of steel members. The book's final chapter considers a collection of special topics.

This book reports on a comprehensive analytical, experimental and numerical study on the flexural

response of post-tensioned masonry walls under in-plane loads. It explores an important mechanism in this new generation of structural walls, called “Self-centering”. This mechanism can reduce residual drifts and structural damage during earthquake ground motion, and is particularly favorable for structures which are designed for immediate occupancy performance levels. The book reports on the development and verification of a finite element model of post-tensioned masonry walls. It describes a detailed parametric study to predict the strength of post-tensioned masonry walls. New design methodologies and expressions are developed to predict the flexural strength and force-displacement response of post-tensioned masonry. Experimental study is carried out to better understand the behavior of post-tensioned masonry walls and also to evaluate the accuracy of the proposed design procedure and expressions. The book also includes an introduction to current research on unbounded post-tensioned masonry walls, together with an extensive analysis of previously published test results.

Introduces readers to the fundamentals and applications of variational formulations in mechanics Nearly 40 years in the making, this book provides students with the foundation material of mechanics using a variational tapestry. It is centered around the variational structure underlying the Method of Virtual

Power (MVP). The variational approach to the modeling of physical systems is the preferred approach to address complex mathematical modeling of both continuum and discrete media. This book provides a unified theoretical framework for the construction of a wide range of multiscale models. Introduction to the Variational Formulation in Mechanics: Fundamentals and Applications enables readers to develop, on top of solid mathematical (variational) bases, and following clear and precise systematic steps, several models of physical systems, including problems involving multiple scales. It covers: Vector and Tensor Algebra; Vector and Tensor Analysis; Mechanics of Continua; Hyperelastic Materials; Materials Exhibiting Creep; Materials Exhibiting Plasticity; Bending of Beams; Torsion of Bars; Plates and Shells; Heat Transfer; Incompressible Fluid Flow; Multiscale Modeling; and more. A self-contained reader-friendly approach to the variational formulation in the mechanics Examines development of advanced variational formulations in different areas within the field of mechanics using rather simple arguments and explanations Illustrates application of the variational modeling to address hot topics such as the multiscale modeling of complex material behavior Presentation of the Method of Virtual Power as a systematic tool to construct mathematical models of physical systems gives readers a fundamental asset

towards the architecture of even more complex (or open) problems Introduction to the Variational Formulation in Mechanics: Fundamentals and Applications is a ideal book for advanced courses in engineering and mathematics, and an excellent resource for researchers in engineering, computational modeling, and scientific computing.
Explores code-ready language containing general design guidance and a simplified design procedure for blast-resistant reinforced concrete bridge columns. The report also examines the results of experimental blast tests and analytical research on reinforced concrete bridge columns designed to investigate the effectiveness of a variety of different design techniques.
The second edition of An Introduction to Nonlinear Finite Element Analysis has the same objective as the first edition, namely, to facilitate an easy and thorough understanding of the details that are involved in the theoretical formulation, finite element model development, and solutions of nonlinear problems. The book offers an easy-to-understand treatment of the subject of nonlinear finite element analysis, which includes element development from mathematical models and numerical evaluation of the underlying physics. The new edition is extensively reorganized and contains substantial amounts of new material. Chapter 1 in the second edition contains a section on applied functional

analysis. Chapter 2 on nonlinear continuum mechanics is entirely new. Chapters 3 through 8 in the new edition correspond to Chapter 2 through 8 of the first edition, but with additional explanations, examples, and exercise problems. Material on time dependent problems from Chapter 8 of the first edition is absorbed into Chapters 4 through 8 of the new edition. Chapter 9 is extensively revised and it contains up to date developments in the large deformation analysis of isotropic, composite and functionally graded shells. Chapter 10 of the first edition on material nonlinearity and coupled problems is reorganized in the second edition by moving the material on solid mechanics to Chapter 12 in the new edition and material on coupled problems to the new chapter, Chapter 10, on weak-form Galerkin finite element models of viscous incompressible fluids. Finally, Chapter 11 in the second edition is entirely new and devoted to least-squares finite element models of viscous incompressible fluids. Chapter 12 of the second edition is enlarged to contain finite element models of viscoelastic beams. In general, all of the chapters of the second edition contain additional explanations, detailed example problems, and additional exercise problems. Although all of the programming segments are in Fortran, the logic used in these Fortran programs is transparent and can be used in Matlab or C++ versions of the same. Thus the new edition

more than replaces the first edition, and it is hoped that it is acquired by the library of every institution of higher learning as well as serious finite element analysts. The book may be used as a textbook for an advanced course (after a first course) on the finite element method or the first course on nonlinear finite element analysis. A solutions manual is available on request from the publisher to instructors who adopt the book as a textbook for a course.

The third edition of Reinforced and Prestressed Concrete continues to be the most comprehensive text for engineering students, instructors and practising engineers. Theoretical and practical aspects of analysis and design are presented in a clear, easy-to-follow manner and are complemented by numerous illustrative and design examples to aid students' comprehension of complex concepts. This edition has been fully updated to reflect recent amendments and addenda to the Australian Standard for Concrete Structures AS3600–2009 and allied standards. Two new chapters, covering T-beams, irregular-shaped sections and continuous beams, and strut-and-tie modelling have been added as discrete modules to enhance the progression of topics. Additional information is provided on fire resistance, detailing and covering, long-term deflection and design for torsion. An expanded collection of end-of-chapter tutorial problems consolidate student learning and develop problem-

solving skills. Reinforced and Prestressed Concrete remains an indispensable resource for students and engineers continuing their professional development. Steel and composite steel–concrete structures are widely used in modern bridges, buildings, sport stadia, towers, and offshore structures. Analysis and Design of Steel and Composite Structures offers a comprehensive introduction to the analysis and design of both steel and composite structures. It describes the fundamental behavior of steel and composite members and structures, as well as the current design criteria and procedures given in Australian standards AS/NZS 1170, AS 4100, AS 2327.1, Eurocode 4, and AISC-LRFD specifications. Featuring numerous step-by-step examples that clearly illustrate the detailed analysis and design of steel and composite members and connections, this practical and easy-to-understand text: Covers plates, members, connections, beams, frames, slabs, columns, and beam-columns Considers bending, axial load, compression, tension, and design for strength and serviceability Incorporates the author's latest research on composite members Analysis and Design of Steel and Composite Structures is an essential course textbook on steel and composite structures for undergraduate and graduate students of structural and civil engineering, and an indispensable resource for practising structural and civil engineers and academic researchers. It

provides a sound understanding of the behavior of structural members and systems.

Structural analysis is the corner stone of civil engineering and all students must obtain a thorough understanding of the techniques available to analyse and predict stress in any structure. The new edition of this popular textbook provides the student with a comprehensive introduction to all types of structural and stress analysis, starting from an explanation of the basic principles of statics, normal and shear force and bending moments and torsion. Building on the success of the first edition, new material on structural dynamics and finite element method has been included. Virtually no prior knowledge of structures is assumed and students requiring an accessible and comprehensive insight into stress analysis will find no better book available. Provides a comprehensive overview of the subject providing an invaluable resource to undergraduate civil engineers and others new to the subject Includes numerous worked examples and problems to aide in the learning process and develop knowledge and skills Ideal for classroom and training course usage providing relevant pedagogy

With conventional materials contributing greatly to environmental waste, biodegradable and natural composites have grown in interest and display low environmental impact at low cost across a wide range of applications. This book provides an

overview of different biodegradable and natural composites and focuses on efforts into increasing their mechanical performance to extend their capabilities and applications.

Introduction to Aircraft Structure Analysis, Third Edition covers the basics of structural analysis as applied to aircraft structures. Coverage of elasticity, energy methods and virtual work set the stage for discussions of airworthiness/airframe loads and stress analysis of aircraft components. Numerous worked examples, illustrations and sample problems show how to apply the concepts to realistic situations. As a self-contained guide, this value-priced book is an excellent resource for anyone learning the subject. Based on the author's best-selling text, Aircraft Structures for Engineering Students Contains expanded coverage of composite materials and structures“/li> Includes new practical and design-based examples and problems throughout the text Provides an online teaching and learning tool with downloadable MATLAB code, a solutions manual, and an image bank of figures from the book

Why do totalitarian propaganda such as those created in Nazi Germany and the former German Democratic Republic initially succeed, and why do they ultimately fail? Outside observers often make two serious mistakes when they interpret the propaganda of this time. First, they assume the

propaganda worked largely because they were supported by a police state, that people cheered Hitler and Honecker because they feared the consequences of not doing so. Second, they assume that propaganda really succeeded in persuading most of the citizenry that the Nuremberg rallies were a reflection of how most Germans thought, or that most East Germans were convinced Marxist-Leninists. Subsequently, World War II Allies feared that rooting out Nazism would be a very difficult task. No leading scholar or politician in the West expected East Germany to collapse nearly as rapidly as it did. Effective propaganda depends on a full range of persuasive methods, from the gentlest suggestion to overt violence, which the dictatorships of the twentieth century understood well. In many ways, modern totalitarian movements present worldviews that are religious in nature. Nazism and Marxism-Leninism presented themselves as explanations for all of life—culture, morality, science, history, and recreation. They provided people with reasons for accepting the status quo. Bending Spines examines the full range of persuasive techniques used by Nazi Germany and the German Democratic Republic, and concludes that both systems failed in part because they expected more of their propaganda than it was able to deliver.

Considerable activity in the acoustics of wood has occurred since the first edition of this book in 1995.

An informal survey of a number of the published articles and papers presented at international conferences revealed that the interest of the wood science community is continually increasing. In this context, I felt c- pelled to revise the text in accordance with newer findings and this prompted the addition in the present book of 159 new references added to the existing 850 in the first edition. As a result of the favorable comments upon the first edition, from students and colleagues, I have included a part on mathematical theory related to wave pro- gation in orthotropic solids in the general text, in order to enable the interested reader to follow the essentially physical aspects of the subject. A new chapter related to “acousto-ultrasonics” is introduced; Chapters 4, 5, 6, 8, 9, 10, 11, and 12 have been considerably expanded and a significant redistribution of the subject matter from the earlier edition has been made.

In this exciting work, Link and Scott summarize more than a decade of their research on public support of R&D in small, entrepreneurial firms, concluding public R&D investments, primarily funded by the U.S. Small Business Innovation Research (SBIR) program, are indeed bending the arc of innovation. Firms that receive SBIR project funding would not undertake the projects in the absence of SBIR's support. SBIR support has had a positive impact on the employment trajectory of firms and their ability to

commercialize innovations. Bending the Arc of Innovation offers a theoretical model of the effects of the SBIR program. Link and Scott demonstrate that with SBIR support of R&D often comes contractual commercial agreements with other firms to sell the rights to the technology generated by the public support. These agreements between another firm and a small firm with a SBIR-award enable an effective transfer of knowledge created with the small firm's publicly-supported research. Both parties to the agreement have better access to the knowledge resources of the other. Link and Scott show how these agreements allow the dedication of resources and organizational efforts necessary for the commercially successful access to and use of external knowledge.

In recent years the application of the boundary element to plate bending problems has gained much popularity. This book brings together leading researchers in the field of BEM and plate bending to provide a comprehensive and detailed report of these advances.

The third edition of this successful textbook is concerned specifically with the design of steel structures to the British Standard BS 5950. Thoroughly revised and updated in accordance with the latest 2000 amendment to Part 1 of the standard, it discusses all aspects of the behaviour of steel structures, and criteria used in their design. With

copious worked examples, The Behaviour and Design of Steel Structures to BS 5950 is an ideal course textbook for senior undergraduate students, and will also provide a useful reference source for the practising engineer.

Serviceability failures of concrete structures involving excessive cracking or deflection are relatively common, even in structures that comply with code requirements. This is often as a result of a failure to adequately account for the time-dependent deformations of concrete in the design of the structure. The serviceability provisions embodied in codes of practice are relatively crude and, in some situations, unreliable and do not adequately model the in-service behaviour of structures. In particular, they fail to adequately account for the effects of creep and shrinkage of the concrete. Design for serviceability is complicated by the non-linear and inelastic behaviour of concrete at service loads. Providing detailed information, this book helps engineers to rationally predict the time-varying deformation of concrete structures under typical in-service conditions. It gives analytical methods to help anticipate time-dependent cracking, the gradual change in tension stiffening with time, creep induced deformations and the load independent strains caused by shrinkage and temperature changes. The calculation procedures are illustrated with many worked examples. A vital guide for practising

engineers and advanced students of structural engineering on the design of concrete structures for serviceability and provides a penetrating insight into the time-dependent behaviour of reinforced and prestressed concrete structures.

Aircraft Structures for Engineering Students, Fifth Edition, is the leading self-contained aircraft structures course text. It covers all fundamental subjects, including elasticity, structural analysis, airworthiness, and aeroelasticity. The author has revised and updated the text throughout and added new examples and exercises using Matlab. Additional worked examples make the text even more accessible by showing the application of concepts to airframe structures. The text is designed for undergraduate and postgraduate students of aerospace and aeronautical engineering. It is also suitable for professional development and training courses. New worked examples throughout the text aid understanding and relate concepts to real world applications Matlab examples and exercises added throughout to support use of computational tools in analysis and design An extensive aircraft design project case study shows the application of the major techniques in the book

"Bending the Aging Curve" provides fitness professionals with a multifaceted periodized training program specifically for older adults. You will learn to use tests to diagnose your clients' needs and then

prescribe training cycles with the appropriate mix of work, active recovery, and skill practice to maximize functional improvements.

There have been important recent developments in the production and application of three dimensional fabrics. These 3D textile structures have great potential for new fabrics and textile applications. 3D fibrous assemblies summarises some key developments and their applications in the textile industry. The book begins with an introductory chapter which defines the concepts and types of 3D fibrous assemblies. The book then discusses how 3D fabrics can be applied in textile products. These range from composites and protective clothing to medical textiles. The remainder of the book reviews the two main 3D fabrics; multi-axial warp knitted fabrics and multi-layer woven fabrics. Themes such as structure, manufacture, properties and modelling are considered for both fabrics. Written by a distinguished author, 3D fibrous assemblies is a pioneering guide for a broad spectrum of readers, ranging from fibre scientists and designers through to those involved in research and development of new generation textile products. Presents exciting opportunities for the creation of new textiles through the use of three dimensional textile fibre assemblies A comprehensive account of the different types of 3D fabrics and their associated structure, properties, manufacture and modelling Examples of how three

dimensional fibres can be applied in textile products
The second edition of An Introduction to Nonlinear Finite Element Analysis offers an easy-to-understand treatment of nonlinear finite element analysis, which includes element development from mathematical models and numerical evaluation of the underlying physics. Additional explanations, examples, and problems have been added to all chapters.
A major basic text on the theory and structural applications of laminated anisotropic plates. Detailed coverage of problems of bending under transverse load, stability, and free-vibrations, as well as laminated beams, expansional strain effects, curved plates, and free-edge effects.
This book is designed as a software-based lab book to complement a standard textbook in a mechanics of material course, which is usually taught at the undergraduate level. This book can also be used as an auxiliary workbook in a CAE or Finite Element Analysis course for undergraduate students. Each book comes with a disc containing video demonstrations, a quick introduction to SOLIDWORKS, and all the part files used in the book. This textbook has been carefully developed with the understanding that CAE software has developed to a point that it can be used as a tool to aid students in learning engineering ideas, concepts and even formulas. These concepts are demonstrated in each section of this book. Using the graphics-based tools of SOLIDWORKS Simulation can help reduce the dependency on mathematics to teach these concepts substantially. The contents of this book have been written to match the contents of most mechanics of materials textbooks. There are 14

chapters in this book. Each chapter is designed as one week's workload, consisting of 2 to 3 sections. Each section is designed for a student to follow the exact steps in that section and learn a concept or topic of mechanics of materials. Typically, each section takes 15-40 minutes to complete the exercises. Each copy of this book comes with a disc containing videos that demonstrate the steps used in each section of the book, a 123 page introduction to Part and Assembly Modeling with SOLIDWORKS in PDF format, and all the files readers may need if they have any trouble. The concise introduction to SOLIDWORKS pdf is designed for those students who have no experience with SOLIDWORKS and want to feel more comfortable working on the exercises in this book. All of the same content is available for download on the book's companion website.

This book was written with a dual purpose, as a reference book for practicing engineers and as a textbook for students of prestressed concrete. It represents the fifth generation of books on this subject written by its author. Significant additions and revisions have been made in this edition. Chapters 2 and 3 contain new material intended to assist the engineer in understanding factors affecting the time-dependent properties of the reinforcement and concrete used in prestressing concrete, as well as to facilitate the evaluation of their effects on prestress loss and deflection. Flexural strength, shear strength, and bond of prestressed concrete members were treated in a single chapter in the of flexural strength has third edition. Now, in the fourth edition, the treatment been expanded, with more emphasis on strain compatibility, and placed in Chapter 5 which is devoted to this subject alone. Chapter 6 of this edition, on flexural-shear strength, torsional strength, and bond of prestressed reinforce ment, was expanded to include discussions of Compression Field Theory and torsion that were not treated in the earlier

editions. In similar fashion, expanded discussions of loss of prestress, deflection, and partial prestressing now are presented separately, in Chapter 7. Minor additions and revisions have been made to the material contained in the remaining chapters with the exception of xv xvi I PREFACE Chapter 17. This chapter, which is devoted to construction considerations, has important new material on constructibility and tolerances as related to prestressed concrete.

The second edition of Statics and Mechanics of Materials: An Integrated Approach continues to present students with an emphasis on the fundamental principles, with numerous applications to demonstrate and develop logical, orderly methods of procedure. Furthermore, the authors have taken measure to ensure clarity of the material for the student. Instead of deriving numerous formulas for all types of problems, the authors stress the use of free-body diagrams and the equations of equilibrium, together with the geometry of the deformed body and the observed relations between stress and strain, for the analysis of the force system action of a body.

This book discusses the building blocks of electronic circuits - the microchips, transistors, resistors, condensers, and so forth, and the boards that support them - from the point of view of mechanics: What are the stresses that result from thermal expansion and contraction? What are the elastic parameters that determine whether a component will survive a certain acceleration? After an introduction to the elements of structural analysis and finite-element analysis, the author turns to components, data and testing. A discussion of leadless chip carriers leads to a detailed thermal analysis of pin grid arrays. For compliant leaded systems, both mechanical (bending and twisting) and thermal stresses are discussed in detail. The book concludes with discussions of the dynamic response of circuit cards, plated holes in cards

and boards, and the final assembly of cards and boards.
First book to discuss the analysis of structural steel connections by Finite Element Analysis—which provides fast, efficient, and flexible checking of these vital structural components The analysis of steel structures is complex—much more so than the analysis of similar concrete structures. There are no universally accepted rules for the analysis of connections in steel structures or the analysis of the stresses transferred from one connection to another. This book presents a general approach to steel connection analysis and check, which is the result of independent research that began more than fifteen years ago. It discusses the problems of connection analysis and describes a generally applicable methodology, based on Finite Element Analysis, for analyzing the connections in steel structures. That methodology has been implemented in software successfully, providing a fast, automatic, and flexible route to the design and analysis of the connections in steel structures. Steel Connection Analysis explains several general methods which have been researched and programmed during many years, and that can be used to tackle the problem of connection analysis in a very general way, with a limited and automated computational effort. It also covers several problems related to steel connection analysis automation. Uses Finite Element Analysis to discuss the analysis of structural steel connections Analysis is applicable to all connections in steel structures The methodology is the basis of the commercially successful CSE connection analysis software Analysis is fast and flexible Structural engineers, fabricators, software developing firms, university researchers, and advanced students of civil and structural engineering will all benefit from Steel Connection Analysis.
The purpose of this book is to introduce the basic principles and techniques of model studies, which will prove very useful

for analysis design and review of structural design, especially of those structures which are not amenable to treatment by the usually simpler and faster theoretical methods.

Follows the legal proceedings that resulted from the A.H. Robins Company's declaration of bankruptcy, which halted thousands of lawsuits filed against Robins by women injured by its Dalkon Sheild IUD

Who determines the fuel standards for our cars? What about whether Plan B, the morning-after pill, is sold at the local pharmacy? Many people assume such important and controversial policy decisions originate in the halls of Congress. But the choreographed actions of Congress and the president account for only a small portion of the laws created in the United States. By some estimates, more than ninety percent of law is created by administrative rules issued by federal agencies like the Environmental Protection Agency and the Department of Health and Human Services, where unelected bureaucrats with particular policy goals and preferences respond to the incentives created by a complex, procedure-bound rulemaking process. With Bending the Rules, Rachel Augustine Potter shows that rulemaking is not the rote administrative activity it is commonly imagined to be but rather an intensely political activity in its own right. Because rulemaking occurs in a separation of powers system, bureaucrats are not free to implement their preferred policies unimpeded: the president, Congress, and the courts can all get involved in the process, often at the bidding of affected interest groups. However, rather than capitulating to demands, bureaucrats routinely employ “procedural politicking,” using their deep knowledge of the process to strategically insulate their proposals from political scrutiny and interference. Tracing the rulemaking process from when an agency first begins working on a rule to when it completes that regulatory action, Potter show how bureaucrats use

procedures to resist interference from Congress, the President, and the courts at each stage of the process. This exercise reveals that unelected bureaucrats wield considerable influence over the direction of public policy in the United States.

A popular text in its first edition, Mechanics of Solids and Structures serves as a course text for the senior/graduate (fourth or fifth year) courses/modules in the mechanics of solid/advanced strength of materials, offered in aerospace, civil, engineering science, and mechanical engineering departments. Now, Mechanics of Solid and Structure, Seco

Uses Finite Element Analysis (FEA) as Implemented in SolidWorks Simulation Outlining a path that readers can follow to ensure a static analysis that is both accurate and sound, Introduction to Static Analysis using SolidWorks Simulation effectively applies one of the most widely used software packages for engineering design to the concepts of static analysis. This text utilizes a step-by-step approach to introduce the use of a finite element simulation within a computer-aided design (CAD) tool environment. It does not center on formulae and the theory of FEM; in fact, it contains essentially no theory on FEM other than practical guidelines. The book is self-contained and enables the reader to progress independently without an instructor. It is a valuable guide for students, educators, and practicing professionals who wish to forego commercial training programs, but need to refresh or improve their knowledge of the subject. Classroom Tested with Figures, Examples, and Homework Problems The book contains more than 300 illustrations and extensive explanatory notes covering the features of the SolidWorks (SW) Simulation software. The author presents commonly used examples and techniques highlighting the close interaction between CAD modelling and FE analysis. She describes the stages and program demands used during

static analysis, details different cases, and explores the impact of selected options on the final result. In addition, the book includes hands-on exercises, program commands, and a summary after each chapter. Explores the static studies of simple bodies to more complex structures Considers different types of loads and how to start the loads property managers Studies the workflow of the run analysis and discusses how to assess the feedback provided by the study manager Covers the generation of graphs Determines how to assess the quality of the created mesh based on the final results and how to improve the accuracy of the results by changing the mesh properties Examines a machine unit with planar symmetrical geometry or with circular geometry exposed to symmetrical boundary conditions Compares 3D FEA to 2D FEA Discusses the impact of the adopted calculating formulation by comparing thin-plate results to thick-plate results Introduction to Static Analysis using SolidWorks Simulation equips students, educators, and practicing professionals with an in-depth understanding of the features of SW Simulation applicable to static analysis (FEA/FEM). The science and study of functionally graded materials (FGMs) have intrigued researchers over the last few decades. Their application has the capability to produce parts with unmatched properties which are virtually impossible to obtain via conventional material routes. This book addresses various FGM aspects and provides a relevant, high-quality, and comprehensive data source. The book covers trends, process classification on various bases, physical processes involved, structure, properties, applications, advantages, and limitations. Emerging trends in the field are discussed in detail and advancements are thoroughly reviewed and presented to broaden the spectrum of FGM applications. This reference book will be of interest to scholars, researchers, academicians, industry practitioners, government labs,

libraries, and anyone interested in the area of materials engineering.

The third edition of this authoritative handbook provides the structural designer with comprehensive guidance on prestressed concrete and its effective use, covering materials, behaviour, analysis and design of prestressed elements. It includes numerous examples, design charts and details of post-tensioning systems.

Uses state-of-the-art computer technology to formulate displacement method with matrix algebra. Facilitates analysis of structural dynamics and applications to earthquake engineering and UBC and IBC seismic building codes.