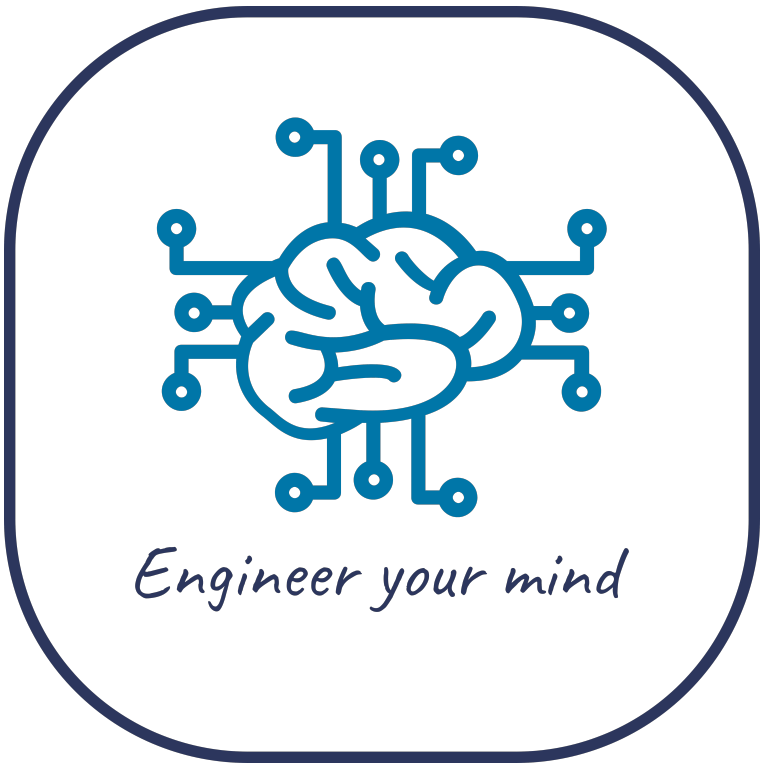

Books for the Finite Element Method (FEM) v1.0

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Content

1 Introduction

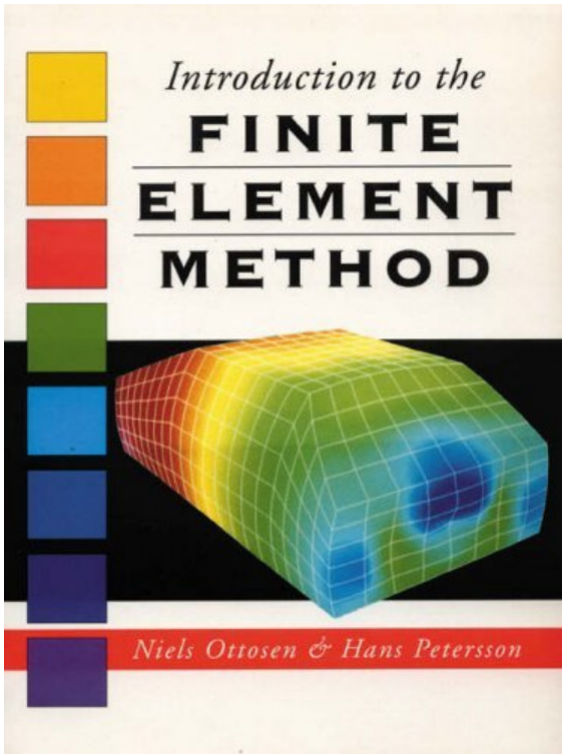
When you have this PDF, you most likely have watched my video. Thanks a ton, I really do appreciate that! It would be amazing if you spread the word, share the PDF with your friends and **subscribe** to my channel & make sure to activate the notification bell :)

2 Books for Getting Started in FEM - Personal Recommendations

This list will give you an overview of the best books that I personally used or have browsed in the past!

2.1 Introduction to the Finite Element Method - Ottosen & Petersson

This book by Ottosen & Petersson is also one I personally use and was demonstrated in the video.



- Amazon: **https://amzn.to/2yt9HSm**

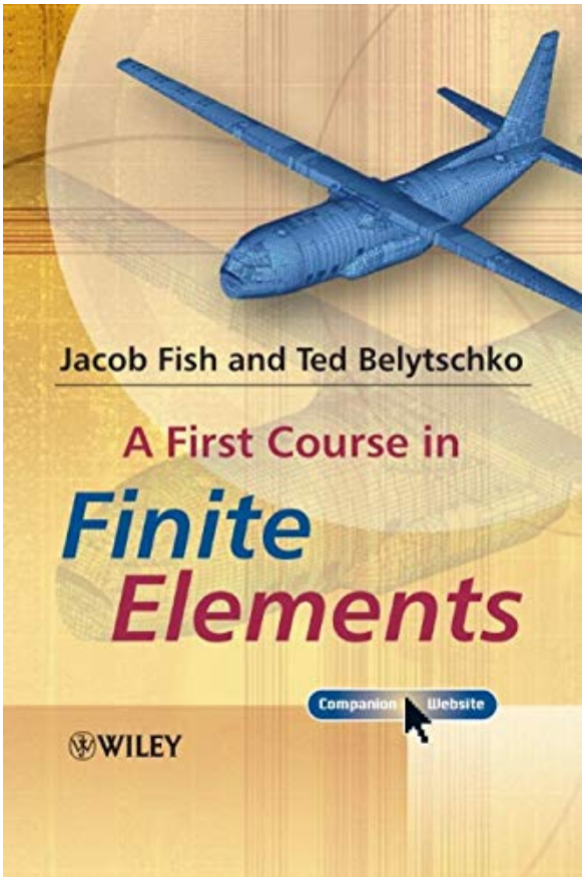
2.2 A First Course in Finite Elements - Fish & Belytschko

My students really love that one and also use it for exam preparations! The good thing is: This book also has exercises!

The text material evolved from over 50 years of combined teaching experience it deals with a formulation and application of the finite element method. A meaningful course can be constructed from a subset of the chapters in this book for a quarter course; instructions for such use are given in the preface. The course material is organized in three chronological units of one month each:

1. The finite element formulation for one-dimensional problems
2. The finite element formulation for scalar field problems in two dimensions
3. Finite element programming and application to scalar field problems; and finite element formulation for vector field problems in two dimensions and beams.

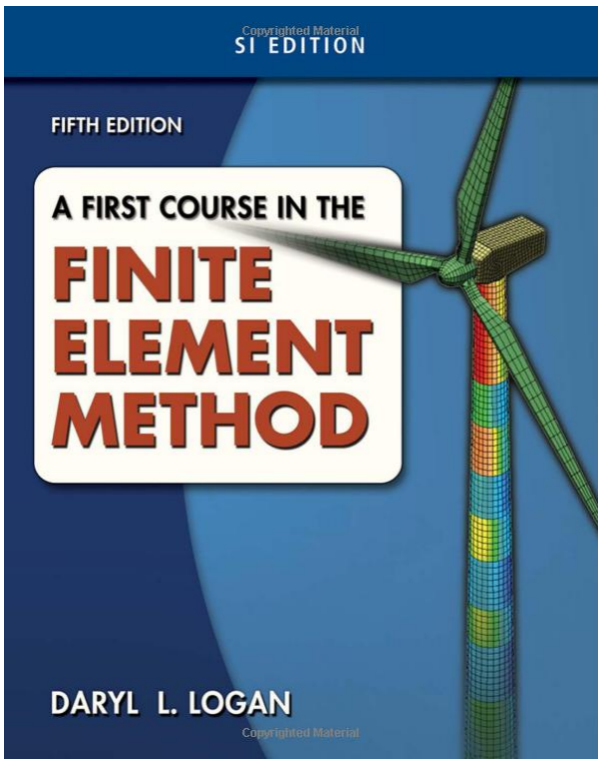
In conjunction with the book there will be the access and use of ABAQUS software and MATLAB exercises.



- Amazon: **https://amzn.to/3eyIwX4**

2.3 A First Course in the Finite Element Method - Logan

This book provides a simple, basic approach to the course material that can be understood by both undergraduate and graduate students without the usual prerequisites (i.e. structural analysis). The book is written primarily as a basic learning tool for the undergraduate student in civil and mechanical engineering whose main interest is in stress analysis and heat transfer. The text is geared toward those who want to apply the finite element method as a tool to solve practical physical problems.

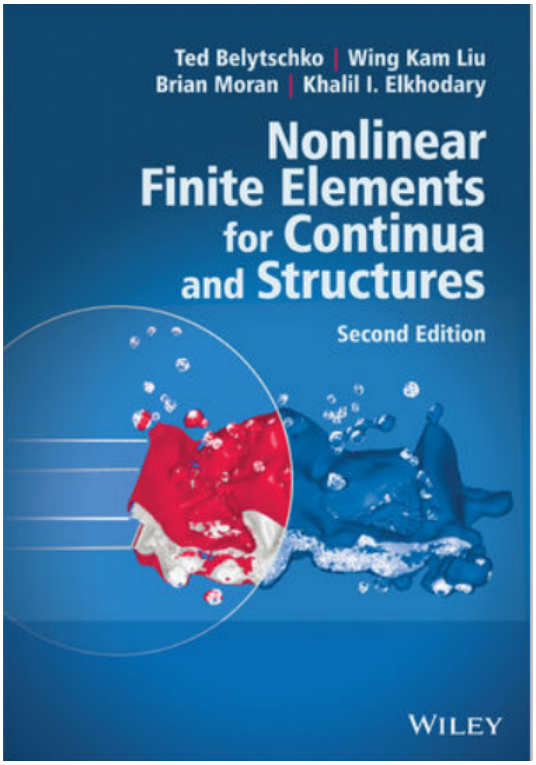


- Amazon: **https://amzn.to/34MdMxn**

3 Exotic Topics

3.1 Nonlinear Finite Elements for Continua and Structures, 2nd Edition - Belytschko

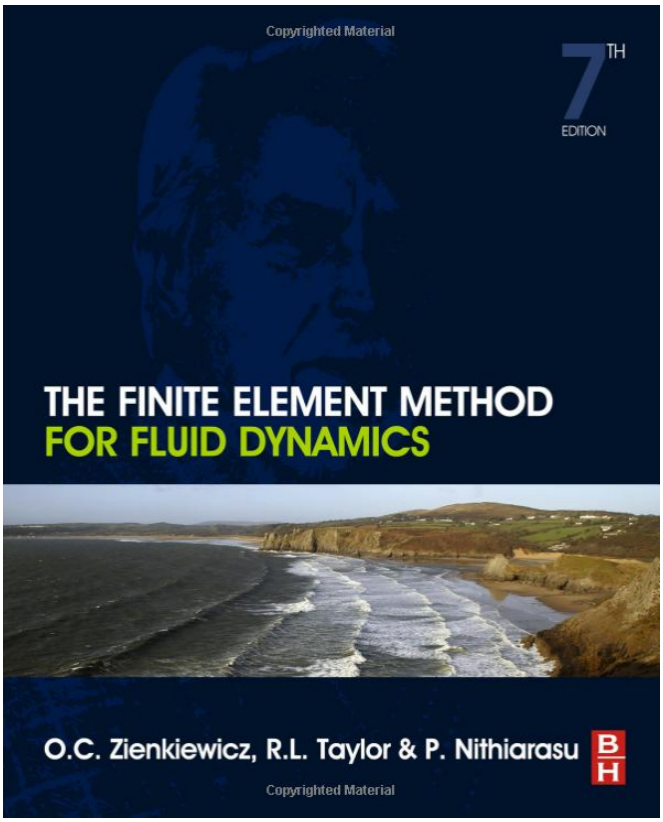
Nonlinear Finite Elements for Continua and Structures, Second Edition focuses on the formulation and solution of discrete equations for various classes of problems that are of principal interest in applications to solid and structural mechanics. Topics covered include the discretization by finite elements of continua in one dimension and in multi-dimensions; the formulation of constitutive equations for nonlinear materials and large deformations; procedures for the solution of the discrete equations, including considerations of both numerical and multiscale physical instabilities; and the treatment of structural and contact-impact problems.



- Wiley: **Wiley book store**

3.2 The Finite Element Method for Fluid Dynamics - Zienkiewicz

The Finite Element Method for Fluid Dynamics offers a complete introduction the application of the finite element method to fluid mechanics. The book begins with a useful summary of all relevant partial differential equations before moving on to discuss convection stabilization procedures, steady and transient state equations, and numerical solution of fluid dynamic equations.

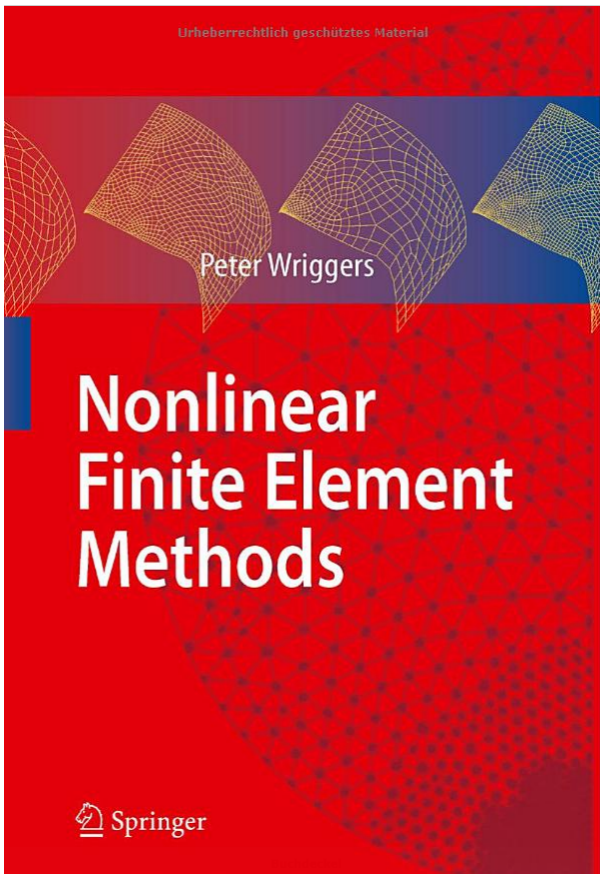


- Amazon: **https://amzn.to/2xFtjmg**

3.3 Nonlinear Finite Element Methods - Wriggers

Finite element methods have become ever more important to engineers as tools for design and optimization, now even for solving non-linear technological problems. However, several aspects must be considered for finite-element simulations which are specific for non-linear problems: These problems require the knowledge and the understanding of theoretical foundations and their finite-element discretization as well as algorithms for solving the non-linear equations.

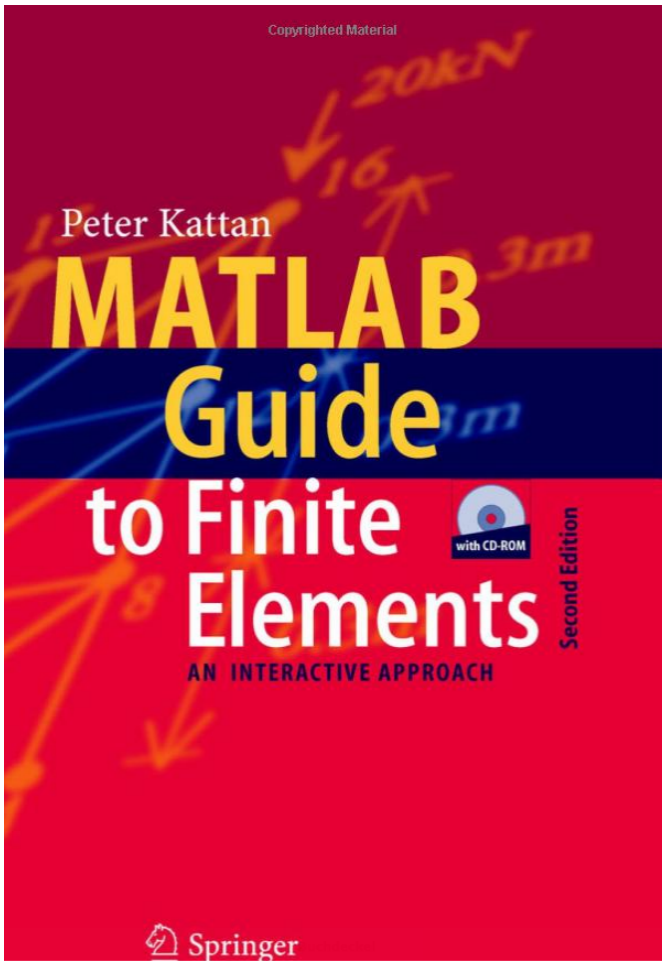
This book provides the reader with the required knowledge covering the complete field of finite element analyses in solid mechanics. It is written for advanced students in engineering fields but serves also as an introduction into non-linear simulation for the practising engineer.



- Amazon: **https://amzn.to/34N7ayE**

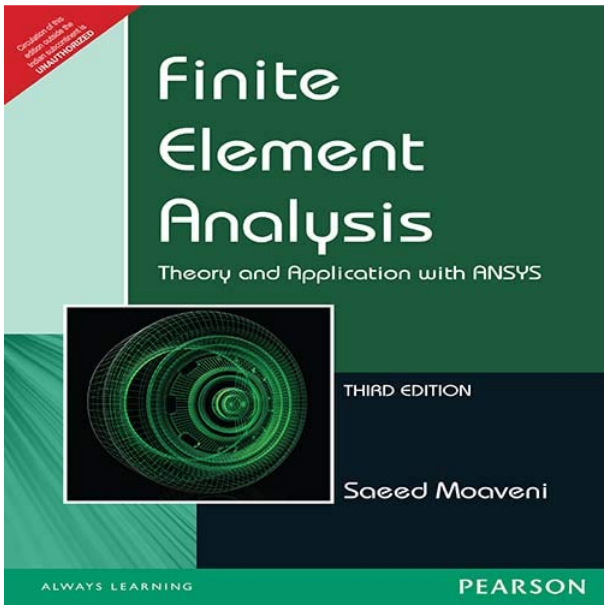
4 Books Found Online

4.1 MATLAB Guide to Finite Elements: An Interactive Approach - Kattan



- Amazon: **https://amzn.to/2KhzqA3**

4.2 Finite Element Analysis Theory And Application With Ansys 3Rd Edition - Moaeveni



- Amazon: **https://amzn.to/34MtYOU**

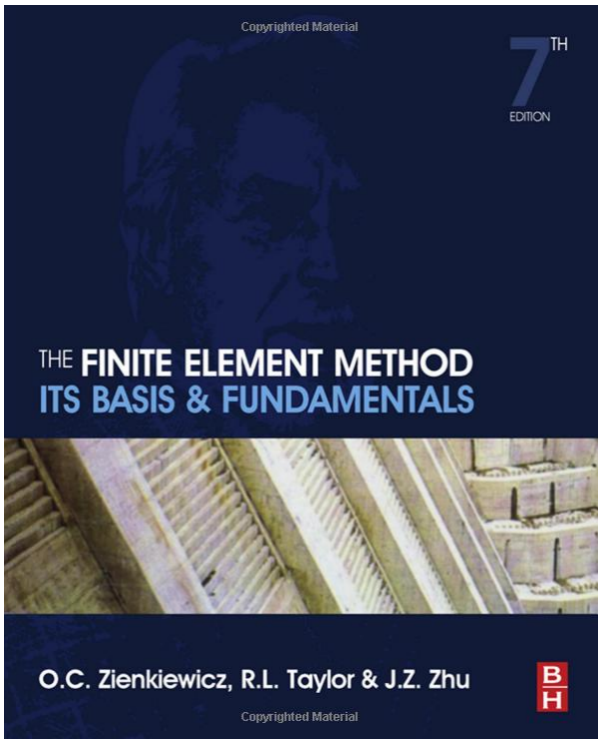
4.3 The Finite Element Method: Its Basis and Fundamentals - Zienkiewicz

The Finite Element Method: Its Basis and Fundamentals offers a complete introduction to the basis of the finite element method, covering fundamental theory and worked examples in the detail required for readers to apply the knowledge to their own engineering problems and understand more advanced applications.

This edition sees a significant rearrangement of the book's content to enable clearer development of the finite element method, with major new chapters and sections added to cover:

1. Weak forms
2. Variational forms
3. Multi-dimensional field problems
4. Automatic mesh generation
5. Plate bending and shells
6. Developments in meshless techniques

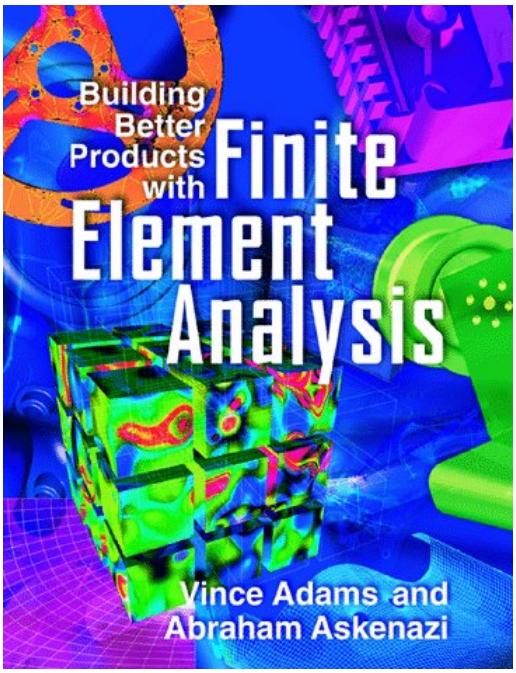
Focusing on the core knowledge, mathematical and analytical tools needed for successful application, The Finite Element Method: Its Basis and Fundamentals is the authoritative resource of choice for graduate level students, researchers and professional engineers involved in finite element-based engineering analysis.



- Amazon: **https://amzn.to/3bsbVQU**

4.4 Building Better Products With Finite Element Analysis - Adams

This book offers a practical view of finite element analysis (FEA) by reviewing the basics of design analysis from an engineering perspective. It provides practical guidelines for specific design problems, such as setting boundaries, contact points between parts, sheetmetal weldments, plastic components, and other common encounter problems. The book also includes a compilation of data which is invaluable to the beginning as well as experienced design analyst.



- Amazon: **https://amzn.to/2Vjfy5W**

5 Suggested by other people

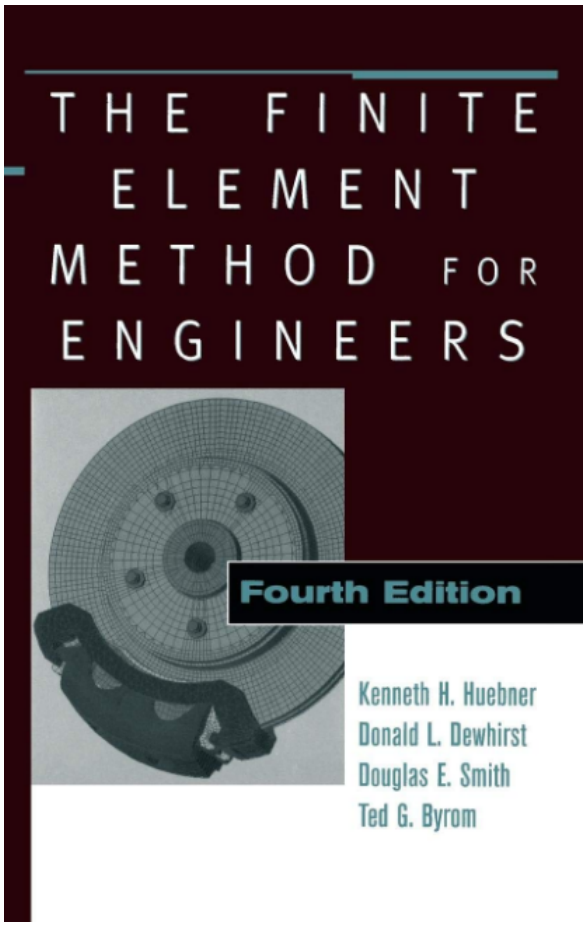
5.1 The Finite Element Method for Engineers - Huebner

A useful balance of theory, applications, and real-world examples.

The Finite Element Method for Engineers, Fourth Edition presents a clear, easy-to-understand explanation of finite element fundamentals and enables readers to use the method in research and in solving practical, real-life problems. It develops the basic finite element method mathematical formulation, beginning with physical considerations, proceeding to the well-established variation approach, and placing a strong emphasis on the versatile method of weighted residuals, which has shown itself to be important in nonstructural applications.

The authors demonstrate the tremendous power of the finite element method to solve problems that classical methods cannot handle, including elasticity problems, general field problems, heat transfer problems, and fluid mechanics problems. They supply practical information on boundary conditions and mesh generation, and they offer a fresh perspective on finite element analysis with an overview of the current state of finite element optimal design.

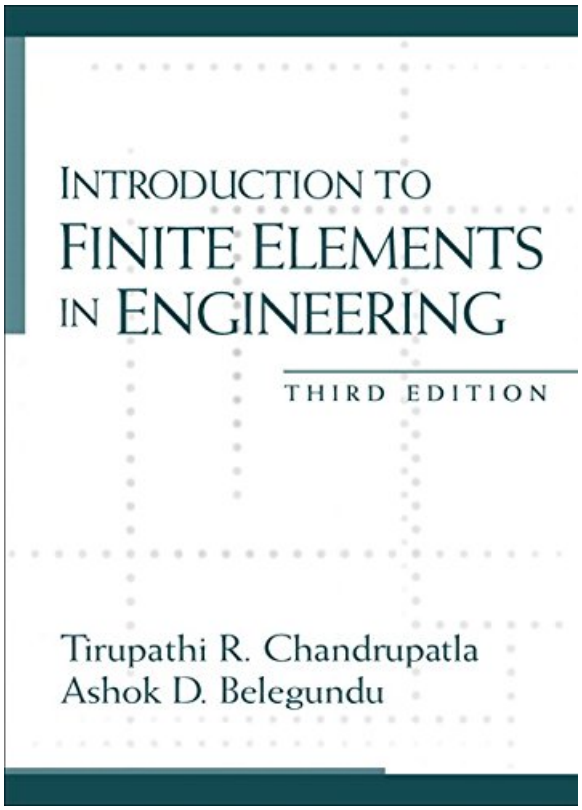
Supplemented with numerous real-world problems and examples taken directly from the authors' experience in industry and research, The Finite Element Method for Engineers, Fourth Edition gives readers the real insight needed to apply the method to challenging problems and to reason out solutions that cannot be found in any textbook.



- Amazon: **https://amzn.to/2VUiN2X**

5.2 Introduction to Finite Elements in Engineering - Chandrupatla

This book provides an integrated approach to finite element methodologies. The development of finite element theory is combined with examples and exercises involving engineering applications. The steps used in the development of the theory are implemented in complete, self-contained computer programs. While the strategy and philosophy of the previous editions has been retained, the Third Edition has been updated and improved to include new material on additional topics. Chapter topics cover fundamental concepts, matrix algebra and gaussian elimination, one-dimensional problems, trusses, two-dimensional problems using constant strain triangles, axisymmetric solids subjected to axisymmetric loading, two-dimensional isoparametric elements and numerical integration, beams and frames, three-dimensional problems in stress analysis, scalar field problems, dynamic considerations, and preprocessing and postprocessing. For practicing engineers as a valuable learning resource.



- Amazon: **https://amzn.to/2Kk57Zz**

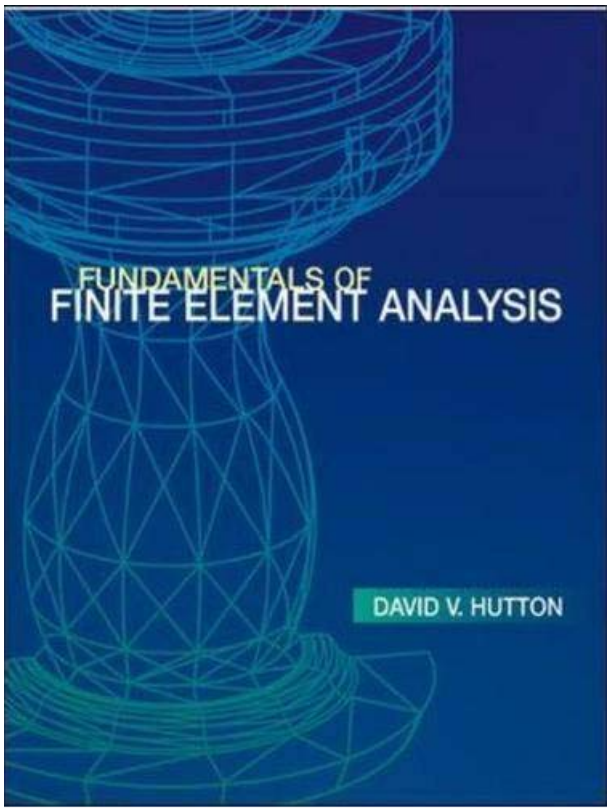
5.3 Fundamentals of Finite Element Analysis - Hutton

This new text, intended for the senior undergraduate finite element course in mechanical, civil and aerospace engineering departments, gives students a solid, practical understanding of the principles of the finite element method within a variety of engineering applications.

Hutton discusses basic theory of the finite element method while avoiding variational calculus, instead focusing upon the engineering mechanics and mathematical background that may be expected of senior engineering students. The text relies upon basic equilibrium principles, introduction of the principle of minimum potential energy, and the Galerkin finite element method, which readily allows application of finite element analysis to nonstructural problems.

The text is software-independent, making it flexible enough for use in a wide variety of programs, and offers a good selection of homework problems and examples.

A Book Website is also included, with book illustrations for class presentation; complete problem solutions (password protected); the FEPC 2-D finite element program for student use; instructions on FEPC and its use with the text; and links to commercial FEA sites.



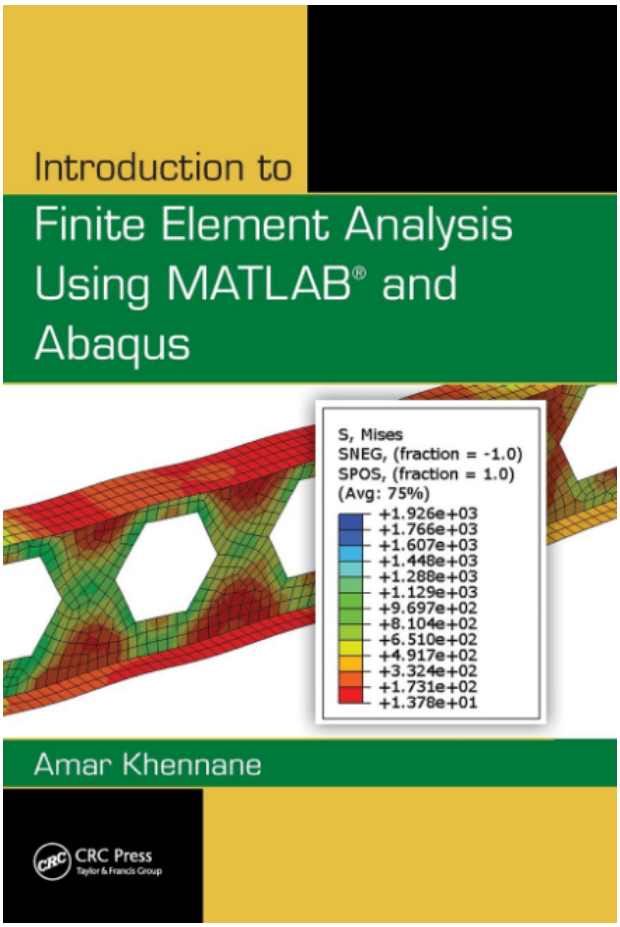
- Amazon: **https://amzn.to/3as8KHC**

5.4 Introduction to Finite Element Analysis Using MATLAB (R) and Abaqus - Khennane

There are some books that target the theory of the finite element, while others focus on the programming side of things. Introduction to Finite Element Analysis Using MATLAB® and Abaqus accomplishes both. This book teaches the first principles of the finite element method. It presents the theory of the finite element method while maintaining a balance between its mathematical formulation, programming implementation, and application using commercial software. The computer implementation is carried out using MATLAB, while the practical applications are carried out in both MATLAB and Abaqus. MATLAB is a high-level language specially designed for dealing with matrices, making it particularly suited for programming the finite element method, while Abaqus is a suite of commercial finite element software.

Introduction to Finite Element Analysis Using MATLAB and Abaqus introduces and explains theory in each chapter, and provides corresponding examples. It offers introductory notes and provides matrix structural analysis for trusses, beams, and frames. The book examines the theories of stress and strain and the relationships between them. The author then covers weighted residual methods and finite element approximation and numerical integration. He presents the finite element formulation for plane stress/strain problems, introduces axisymmetric problems, and highlights the theory of plates. The text supplies step-by-step

procedures for solving problems with Abaqus interactive and keyword editions. The described procedures are implemented as MATLAB codes and Abaqus files can be found on the CRC Press website.



- Amazon: **https://amzn.to/3anApZW**

5.5 Finite Element Procedures - Bathe

For courses in finite element methods, finite element analysis taught in departments of Civil, Mechanical, Aerospace, Agriculture, and Mechanics departments. Course for which this book is appropriate is usually taught to seniors or graduate students. Comprehensive - this text explores the full range of finite element methods used in engineering practice for actual applications in computer-aided design. It provides not only an introduction to finite element methods and the commonality in the various techniques, but explores state-of-the-art methods as well - with a focus on what are deemed to become "classical techniques" - procedures that will be standard and authoritative for finite element analysis for years to come.

- Amazon: **https://amzn.to/2RMbY1W**

6 Closing Remarks

I hope that you like this brief summary of FEM resources. If you have any recommendations that you would like to have in this document, please sent me an email to **engineeredmind-business@gmail.com**!

Support my channel if you like by clicking the Patreon button below.