

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Record Nr.           | UNINA9910150205003321                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Autore                  | Moaveni Saeed                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Titolo                  | Finite element analysis : theory and application with ANSYS / / Saeed Moaveni                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Pubbl/distr/stampa      | Harlow, England : , : Pearson, , [2015]<br>Â©2015                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| ISBN                    | 0-273-77433-6                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Edizione                | [Fourth, Global edition.]                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Descrizione fisica      | 1 online resource (928 pages) : illustrations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Disciplina              | 620.00151535                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Soggetti                | Finite element method - Data processing                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Lingua di pubblicazione | Inglese                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Formato                 | Materiale a stampa                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| Livello bibliografico   | Monografia                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Note generali           | Includes index.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Nota di bibliografia    | Includes bibliographical references at the end of each chapters and index.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Nota di contenuto       | Cover -- Title -- Copyright -- Contents -- Preface -- Acknowledgments -- 1 Introduction -- 1.1 Engineering Problems -- 1.2 Numerical Methods -- 1.3 A Brief History of the Finite Element Method and Ansys -- 1.4 Basic Steps in the Finite Element Method -- 1.5 Direct Formulation -- 1.6 Minimum Total Potential Energy Formulation -- 1.7 Weighted Residual Formulations -- 1.8 Verification of Results -- 1.9 Understanding the Problem -- Summary -- References -- Problems -- 2 Matrix Algebra -- 2.1 Basic Definitions -- 2.2 Matrix Addition or Subtraction -- 2.3 Matrix Multiplication -- 2.4 Partitioning of a Matrix -- 2.5 Transpose of a Matrix -- 2.6 Determinant of a Matrix -- 2.7 Solutions of Simultaneous Linear Equations -- 2.8 Inverse of a Matrix -- 2.9 Eigenvalues and Eigenvectors -- 2.10 Using Matlab to Manipulate Matrices -- 2.11 Using Excel to Manipulate Matrices -- Summary -- References -- Problems -- 3 Trusses -- 3.1 Definition of a Truss -- 3.2 Finite Element Formulation -- 3.3 Space Trusses -- 3.4 Overview of the Ansys Program -- 3.5 Examples Using Ansys -- 3.6 Verification of Results -- Summary -- References -- Problems -- 4 Axial Members, Beams, and Frames -- 4.1 Members Under Axial Loading -- 4.2 Beams -- 4.3 Finite Element Formulation of Beams -- 4.4 Finite Element Formulation of Frames -- 4.5 Three-Dimensional Beam Element -- 4.6 An Example Using Ansys -- 4.7 Verification of Results -- Summary -- |

References -- Problems -- 5 One-Dimensional Elements -- 5.1 Linear Elements -- 5.2 Quadratic Elements -- 5.3 Cubic Elements -- 5.4 Global, Local, and Natural Coordinates -- 5.5 Isoparametric Elements -- 5.6 Numerical Integration: Gauss-Legendre Quadrature -- 5.7 Examples of One-Dimensional Elements in Ansys -- Summary -- References -- Problems -- 6 Analysis of One-Dimensional Problems -- 6.1 Heat Transfer Problems -- 6.2 A Fluid Mechanics Problem. 6.3 An Example Using Ansys -- 6.4 Verification of Results -- Summary -- References -- Problems -- 7 Two-Dimensional Elements -- 7.1 Rectangular Elements -- 7.2 Quadratic Quadrilateral Elements -- 7.3 Linear Triangular Elements -- 7.4 Quadratic Triangular Elements -- 7.5 Axisymmetric Elements -- 7.6 Isoparametric Elements -- 7.7 Two-Dimensional Integrals: Gauss-Legendre Quadrature -- 7.8 Examples of Two-Dimensional Elements in Ansys -- Summary -- References -- Problems -- 8 More Ansys -- 8.1 Ansys Program -- 8.2 Ansys Database and Files -- 8.3 Creating a Finite Element Model with Ansys: Preprocessing -- 8.4 h-Method Versus p-Method -- 8.5 Applying Boundary Conditions, Loads, and the Solution -- 8.6 Results of Your Finite Element Model: Postprocessing -- 8.7 Selection Options -- 8.8 Graphics Capabilities -- 8.9 Error-Estimation Procedures -- 8.10 An Example Problem -- Summary -- References -- 9 Analysis of Two-Dimensional Heat Transfer Problems -- 9.1 General Conduction Problems -- 9.2 Formulation with Rectangular Elements -- 9.3 Formulation with Triangular Elements -- 9.4 Axisymmetric Formulation of Three-Dimensional Problems -- 9.5 Unsteady Heat Transfer -- 9.6 Conduction Elements Used by Ansys -- 9.7 Examples Using Ansys -- 9.8 Verification of Results -- Summary -- References -- Problems -- 10 Analysis of Two-Dimensional Solid Mechanics Problems -- 10.1 Torsion of Members with Arbitrary Cross-Section Shape -- 10.2 Plane-Stress Formulation -- 10.3 Isoparametric Formulation: Using a Quadrilateral Element -- 10.4 Axisymmetric Formulation -- 10.5 Basic Failure Theories -- 10.6 Examples Using Ansys -- 10.7 Verification of Results -- Summary -- References -- Problems -- 11 Dynamic Problems -- 11.1 Review of Dynamics -- 11.2 Review of Vibration of Mechanical and Structural Systems -- 11.3 Lagrange's Equations. 11.4 Finite Element Formulation of Axial Members -- 11.5 Finite Element Formulation of Beams and Frames -- 11.6 Examples Using Ansys -- Summary -- References -- Problems -- 12 Analysis of Fluid Mechanics Problems -- 12.1 Direct Formulation of Flow Through Pipes -- 12.2 Ideal Fluid Flow -- 12.3 Groundwater Flow -- 12.4 Examples Using Ansys -- 12.5 Verification of Results -- Summary -- References -- Problems -- 13 Three-Dimensional Elements -- 13.1 The Four-Node Tetrahedral Element -- 13.2 Analysis of Three-Dimensional Solid Problems Using Four-Node Tetrahedral Elements -- 13.3 The Eight-Node Brick Element -- 13.4 The Ten-Node Tetrahedral Element -- 13.5 The Twenty-Node Brick Element -- 13.6 Examples of Three-Dimensional Elements in Ansys -- 13.7 Basic Solid-Modeling Ideas -- 13.8 A Thermal Example Using Ansys -- 13.9 A Structural Example Using Ansys -- Summary -- References -- Problems -- 14 Design and Material Selection -- 14.1 Engineering Design Process -- 14.2 Material Selection -- 14.3 Electrical, Mechanical, and Thermophysical Properties of Materials -- 14.4 Common Solid Engineering Materials -- 14.5 Some Common Fluid Materials -- Summary -- References -- Problems -- 15 Design Optimization -- 15.1 Introduction to Design Optimization -- 15.2 The Parametric Design Language of Ansys -- 15.3 Examples of Batch Files -- Summary -- References -- Problems -- Appendix A Mechanical Properties of Some Materials -- Appendix B Thermophysical Properties of Some Materials -- Appendix C Properties of Common Line

and Area Shapes -- Appendix D Geometrical Properties of Structural Steel Shapes -- Appendix E Conversion Factors -- Appendix F An Introduction to MATLAB -- Index.

---

## Sommario/riassunto

For courses in Finite Element Analysis, offered in departments of Mechanical or Civil and Environmental Engineering. While many good textbooks cover the theory of finite element modeling, Finite Element Analysis: Theory and Application with ANSYS is the only text available that incorporates ANSYS as an integral part of its content. Moaveni presents the theory of finite element analysis, explores its application as a design/modeling tool, and explains in detail how to use ANSYS intelligently and effectively. Teaching and Learning Experience This program will provide a better teaching and learning experience-for you and your students. It will help: Present the Theory of Finite Element Analysis: The presentation of theoretical aspects of finite element analysis is carefully designed not to overwhelm students. Explain How to Use ANSYS Effectively: ANSYS is incorporated as an integral part of the content throughout the book. Explore How to Use FEA as a Design/Modeling Tool: Open-ended design problems help students apply concepts.

---