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Theories of elastic plates *Vibrations of Elastic Plates* **An Introduction to the Mathematical Theory of Vibrations of Elastic Plates** **Theory and Analysis of Elastic Plates and Shells, Second Edition** **Theory and Analysis of Elastic Plates and Shells, Second Edition** **Simplified Analytical Methods of Elastic Plates** **Elementary Theory of Elastic Plates** Poisson Theory of Elastic Plates **Elastic Plates** *Elementary Theory of Elastic Plates* **Theories of elastic plates** *Nonlinear Theory of Elastic Plates* *Mathematical Methods for Elastic Plates* **The Theory of Anisotropic Elastic Plates** **Anisotropic Elastic Plates** *Elastic Plates* **Elastic Plates** **Einflußfelder elastischer Platten / Influence Surfaces of Elastic Plates** Stationary Oscillations of Elastic Plates *Theory and Analysis of Elastic Plates* Anisotropic Elastic Plates *Mathematical Elasticity, Volume II* Large Deflections of Elastic Plates **The Generalized Fourier Series Method** **Plates and Junctions in Elastic Multi-structures** Introduction To The Mathematical Theory Of Vibrations Of Elastic Plates, An - By R D Mindlin **Poisson Theory of Elastic Plates** *The Finite Strip Method* Annotated Bibliography of Selected References on the Theory of Elastic Plates **Plates and FEM** **Numerical Analysis of Elastic Plates and Shallow Shells by an Integral Equation Method** *Theories and Applications of Plate Analysis* **Mathematical Elasticity** **The Bending and Stretching of Plates** **Analysis of Shells and Plates** *Elasticity and Geometry* **Mathematical Elasticity** *Nonlinear Mechanics of Shells and Plates in Composite, Soft and Biological Materials* Thin Plates and Shells **Integral Methods in Science and Engineering**

This book is based on my experiences as a teacher and as a researcher for more than four decades. When I started teaching in the early 1950s, I became interested in the vibrations of plates and shells. Soon after I joined the Polytechnic Institute of Brooklyn as a professor, I began working busily on my research in vibrations of sandwich and layered plates and shells, and then teaching a graduate course on the same subject. Although I tried to put together my lecture notes into a book, I never finished it. Many years later, I came to the New Jersey Institute of Technology as the dean of engineering. When I went back to teaching and looked for some research areas to work on, I came upon laminated composites and piezoelectric layers, which appeared to be natural extensions of sandwiches. Working on these for the last several years has brought me a great deal of joy, since I still am able to find my work relevant. At least I can claim that I still am pursuing life-long learning as it is advocated by educators all over the country. This book is based on the research results I accumulated during these two periods of my work, the first on vibrations and dynamical model ing of sandwiches, and the second on laminated composites and piezoelec tric layers. Presenting recent principles of thin plate and shell theories, this book emphasizes novel analytical and numerical methods for solving linear and nonlinear plate and shell dilemmas, new theories for the design and analysis of thin plate-shell structures, and real-world numerical solutions, mechanics, and plate and shell models for engineering appli This book guides the reader into the modelling of shell structures in applications where advanced composite materials or complex biological materials must be described with great accuracy. A valuable resource for researchers, professionals and graduate students, it presents a variety of practical concepts, diagrams and numerical results. This text presents a complete treatment of the theory and analysis of elastic plates. It provides detailed coverage of classic and shear deformation plate theories and their solutions by analytical as well as numerical methods for bending, buckling and natural vibrations. Analytical solutions are based on the Navier and Levy solution method, and numerical solutions are based on the Rayleigh-Ritz methods and finite element method. The author address a range of topics, including basic equations of elasticity, virtual work and energy principles, cylindrical bending of plates, rectangular plates and an introduction to the finite element method with applications to plates. The Bending and Stretching of Plates deals with elastic plate theory, particularly on small- and large-deflexion theory. Small-deflexion theory concerns derivation of basic equations, rectangular plates, plates of various shapes, plates whose boundaries are amenable to conformal transformation, plates with variable rigidity, and approximate methods. Large-deflexion theory includes general equations and some exact solutions, approximate methods in large-deflexion theory, asymptotic large-deflexion theories for very thin plates. Asymptotic theories covers membrane theory, tension field theory, and inextensional theory. The book explains stress-strain relations, effect of forces in the plane of the plate, and rectangular plates that have all edges simply supported, or where plates that have all edges clamped. The text also considers plates of constant thickness whose boundaries are circular, sector-shaped, elliptical, or triangular. Muskhelishvili (1933) addresses boundary value problems of plane stress using analytical methods of the biharmonic equation. The book also investigates some approximate methods of analysis of large-deflexion behavior of plates of constant thickness where there is either a uniformly distributed load, or a compressive load in the plane of the plate in excess of that necessary to cause initial buckling. The book explains that the engineer can use the principle of minimum potential energy to investigate large deflexion of plates. The text is suitable for structural engineers in civil, mechanical or marine engineering, as well as to structural research workers and students. We experience elasticity everywhere in everyday life. This book covers several modern aspects of the established field of elasticity theory, applying general methods of classical analysis including advanced nonlinear aspects to derive detailed solutions to specific problems. It can serve as an introduction to nonlinear methods in science. This book by the late R D Mindlin is destined to become a classic introduction to the mathematical aspects of two-dimensional theories of elastic plates. It systematically derives the two-dimensional theories of anisotropic elastic plates from the variational formulation of the three-dimensional theory of elasticity by power series expansions. The uniqueness of two-dimensional problems is also examined from the variational viewpoint. The accuracy of the two-dimensional equations is judged by comparing the dispersion relations of the waves that the two-dimensional theories can describe with prediction from the three-dimensional theory. Discussing mainly high-frequency dynamic problems, it is also useful in traditional applications in structural engineering as well as provides the theoretical foundation for acoustic wave devices. As structural elements, anisotropic elastic plates find wide applications in modern technology. The plates here are considered to be subjected to not only inplane load but also transverse load. In other words, both plane and plate bending problems as well as the stretching-bending coupling problems are all explained in this book. In addition to the introduction of the theory of anisotropic elasticity, several important subjects have are discussed in this book such as interfaces, cracks, holes, inclusions, contact problems, piezoelectric materials, thermoelastic problems and boundary element analysis. Elementary Theory of Elastic Plates deals with plate theory, particularly on the elastic behavior of initially flat thin plates subjected to loads, producing deflexions. This book discusses rectangular plates and circular plates subjected to different types of load conditions. This text describes the bending moment and curvature of beams, and gives the formula of principal axes, where the location of a neutral axis that experiences zero stress and strain, can be found. This book also notes how calculations can show small or negligible deflexions. The text discusses Possion's ratio effect and the Mohr's circle relationship. This text analyzes the various loads acting on different parts of the rectangular plate using the Navier method; the Levy's method is taken up when considerations are on other forms of boundary support on the rectangular plate. This book then addresses the circular plate that experiences bending moments and curvatures when it is placed under radially symmetric loads. This text explains the equation that is applicable in a radially symmetric case. This book also addresses understanding approximations of energy in stability problems when there is bending and twisting as shown in a strut with a certain thickness, radial length of the arms, and length of the strut. Engineers, physicists, architects, and designers of industrial equipment subject to heavy loads will appreciate the information found in this book. Because plates and shells are common structural elements in aerospace, automotive, and civil engineering structures, engineers must understand the behavior of such structures through the study of theory and analysis. Compiling this information into a single volume, Theory and Analysis of Elastic Plates and Shells, Second Edition presents a complete, up-to-date, and unified treatment of classical and shear deformation plates and shells, from the basic derivation of theories to analytical and numerical solutions. Revised and updated, this second edition incorporates new information in most chapters, along with some rearrangement of topics to improve the clarity of the overall presentation. The book presents new material on the theory and analysis of shells, featuring an additional chapter devoted to the topic. The author also includes new sections that address Castigliano's theorems, axisymmetric buckling of circular plates, the relationships between the solutions of classical and shear deformation theories, and the nonlinear finite element analysis of plates. The book provides many illustrations of theories, formulations, and solution methods, resulting in an easy-to-understand presentation of the topics. Like the previous edition, this book remains a suitable textbook for a course on plates and shells in aerospace, civil, and mechanical engineering curricula and continues to serve as a reference for industrial and academic structural engineers and scientists. As structural elements, anisotropic elastic plates find wide applications in modern technology. The plates here are considered to be subjected to not only inplane load but also transverse load. In other words, both plane and plate bending problems as well as the stretching-bending coupling problems are all explained in this book. In addition to the introduction of the theory of anisotropic elasticity, several important subjects have are discussed in this book such as interfaces, cracks, holes, inclusions, contact problems, piezoelectric materials, thermoelastic problems and boundary element analysis. The study ofthree-dimensional continua has been a traditional part of graduate education in solid mechanics for some time. With rational simplifications to the three-dimensional theory of elasticity, the engineering theories of medium-thin plates and of thin shells may be derived and applied to a large class of engi neering structures distinguished by a characteristically small dimension in one direction. Often, these theories are developed somewhat independently due to their distinctive geometrical and load-resistance characteristics. On the other hand, the two systems share a common basis and might be unified under the classification of Surface Structures after the German term Fliichentragwerke. This common basis is fully exploited in this book. A substantial portion of many traditional approaches to this subject has been devoted to constructing classical and approximate solutions to the governing equations of the system in order to proceed with applications. Within the context of analytical, as opposed to numerical, approaches, the limited general ity of many such solutions has been a formidable obstacle to applications involving complex geometry, material properties, and/or loading. It is now relatively routine to obtain computer-based solutions to quite complicated situations. However, the choice of the proper problem to solve through the selection of the mathematical model remains a human rather than a machine task and requires a basis in the theory of the subject. This groundbreaking book resolves the main lacuna in Kirchhoff theory of bending of plates in the Poisson-Kirchhoff boundary conditions paradox through the introduction of auxiliary problem governing transverse stresses. The book highlights new primary bending problem which is formulated and analyzed by the application of developed Poisson theory. Analysis with prescribed transverse stresses along faces of the plate, neglected in most reported theories, is presented with an additional term in displacements. The book presents a systematic procedure for the analysis of unsymmetrical laminates. This volume will be a useful reference for students, practicing engineers as well as researchers in applied mechanics. The increase in the popularity and the number of potential applications of the finite strip method has created a demand for a definitive text/reference on the subject. Fulfilling this demand, The Finite Strip Method provides practicing engineers, researchers, and students with a comprehensive introduction and theoretical development, and a complete treatment of current practical applications of the method. Written by experts who are arguably the world's leading authorities in the field, The Finite Strip Method covers both the classical strip and the newly developed spline strip and computed shape function strip. Applications in structural engineering, with particular focus on practical structures such as slab-beam bridges, box girder bridges, and tall buildings are discussed extensively. Applications in geotechnology are also covered, as are recently formulated applications in nonlinear analysis. The Finite Strip Method is a unique book, supplying much-needed information by well-known and highly regarded authors. Many problems in mathematical physics rely heavily on the use of elliptical partial differential equations, and boundary integral methods play a significant role in solving these equations. Stationary Oscillations of Elastic Plates studies the latter in the context of stationary vibrations of thin elastic plates. The techniques presented here reduce the complexity of classical elasticity to a system of two independent variables, modeling problems of flexural-vibrational elastic body deformation with the aid of eigenfrequencies and simplifying them to manageable, uniquely solvable integral equations. The book is intended for an audience with a knowledge of advanced calculus and some familiarity with functional analysis. It is a valuable resource for professionals in pure and applied mathematics, and for theoretical physicists and mechanical engineers whose work involves elastic plates. Graduate students in these fields can also benefit from the monograph as a supplementary text for courses relating to theories of elasticity or flexural vibrations. Based on proceedings of the International Conference on Integral Methods in Science and Engineering, this collection of papers addresses the solution of mathematical problems by integral methods in conjunction with approximation schemes from various physical domains. Topics and applications include: wavelet expansions, reaction-diffusion systems, variational methods , fracture theory, boundary value problems at resonance, micromechanics, fluid mechanics, combustion problems, nonlinear problems, elasticity theory, and plates and shells. This book by a renowned structural engineer offers comprehensive coverage of both static and dynamic analysis of plate behavior, including classical, numerical, and engineering solutions. It contains more than 100 worked examples showing step by step how the various types of analysis are performed. The present monograph deals with refined theories of elastic plates in which both bending and transverse shear effects are taken into account and with some of their applications. Generally these more exact theories result in inte gration problems of the sixth order; consequently, three mutually independent boundary conditions at each edge of the plate are required. This is in perfect agreement with the conclusions of the theory of elasticity. The expressions for shearing forces following from refined theories are then valid for the whole investigated region including its boundary where the corresponding boundary conditions for these shearing forces can be prescribed. Quite different seems to be the situation in the classical Kirchhoff-Love's theory in which the influence of transverse shearing strains is neglected. Owing to this simplification the governing differential equation developed by the classical theory is of the fourth order only; consequently, the number of boundary conditions appurtenant to the applied mode of support appears now to be in disagreement with the order of the valid governing equation. Then, limiting the validity of the expressions for shearing forces to the open region of the middle plane and introducing the notion of the so called fictitious Kirchhoff's shearing forces for the boundary of the plate, three actual boundary conditions at each edge of the plate have to be replaced by two approximate conditions transformed in the Kirchhoff's sense. This book explains in detail the generalized Fourier series technique for the approximate solution of a mathematical model governed by a linear elliptic partial differential equation or system with constant coefficients. The power, sophistication, and adaptability of the method are illustrated in application to the theory of plates with transverse shear deformation, chosen because of its complexity and special features. In a clear and accessible style, the authors show how the building blocks of the method are developed, and comment on the advantages of this procedure over other numerical approaches. An extensive discussion of the computational algorithms is presented, which encompasses their structure, operation, and accuracy in relation to several appropriately selected examples of classical boundary value problems in both finite and infinite domains. The systematic description of the technique, complemented by explanations of the use of the underlying software, will help the readers create their own codes to find approximate solutions to other similar models. The work is aimed at a diverse readership, including advanced undergraduates, graduate students, general scientific researchers, and engineers. The book strikes a good balance between the theoretical results and the use of appropriate numerical applications. The first chapter gives a detailed presentation of the differential equations of the mathematical model, and of the associated boundary value problems with Dirichlet, Neumann, and Robin conditions. The second chapter presents the fundamentals of generalized Fourier series, and some appropriate techniques for orthonormalizing a complete set of functions in a Hilbert space. Each of the remaining six chapters deals with one of the combinations of domain-type (interior or exterior) and nature of the prescribed conditions on the boundary. The appendices are designed to give insight into some of the computational issues that arise from the use of the numerical methods described in the book. Readers may also want to reference the authors' other books Mathematical Methods for Elastic Plates, ISBN: 978-1-4471-6433-3 and Boundary Integral Equation Methods and Numerical Solutions: Thin Plates on an Elastic Foundation, ISBN: 978-3-319-26307-6. Very Good,No Highlights or Markup,all pages are intact. The objective of Volume II is to show how asymptotic methods, with the thickness as the small parameter, indeed provide a powerful means of justifying two-dimensional plate theories. More specifically, without any recourse to any a priori assumptions of a geometrical or mechanical nature, it is shown that in the linear case, the three-dimensional displacements, once properly scaled, converge in H1 towards a limit that satisfies the well-known two-dimensional equations of the linear Kirchhoff-Love theory; the convergence of stress is also established. In the nonlinear case, again after ad hoc scalings have been performed, it is shown that the leading term of a formal asymptotic expansion of the three-dimensional solution satisfies well-known two-dimensional equations, such as those of the nonlinear Kirchhoff-Love theory, or the von Kármán equations. Special attention is also given to the first convergence result obtained in this case, which leads to two-dimensional large deformation, frame-indifferent, nonlinear membrane theories. It is also demonstrated that asymptotic methods can likewise be used for justifying other lower-dimensional equations of elastic shallow shells, and the coupled pluri-dimensional equations of elastic multi-structures, i.e., structures with junctions. In each case, the existence, uniqueness or multiplicity, and regularity of solutions to the limit equations obtained in this fashion are also studied. This book by the late R D Mindlin is destined to become a classic introduction to the mathematical aspects of two-dimensional theories of elastic plates. It systematically derives the two-dimensional theories of anisotropic elastic plates from the variational formulation of the three-dimensional theory of elasticity by power series expansions. The uniqueness of two-dimensional problems is also examined from the variational viewpoint. The accuracy of the two-dimensional equations is judged by comparing the dispersion relations of the waves that the two-dimensional theories can describe with prediction from the three-dimensional theory. Discussing mainly high-frequency dynamic problems, it is also useful in traditional applications in structural engineering as well as provides the theoretical foundation for acoustic wave devices. The Finite Element Method, shortly FEM, is a widely used computational tool in structural engineering. For basic design purposes it usually suf ces to apply a linear-elastic analysis. Only for special structures and for forensic investigations the analyst need to apply more advanced features like plasticity and cracking to account for material nonlinearities, or nonlinear relations between strains and displacements for geometrical nonlinearity to account for buckling. Advanced analysis techniques may also be necessary if we have to judge the remaining structural capacity of aging structures. In this book we will abstain from such special cases and focus on everyday jobs. Our goal is the worldwide everyday use of linear-elastic analysis, and dimensioning on basis of these elastic computations. We cover steel and concrete structures, though attention to structural concrete prevails. Structural engineers have access to powerful FEM packages and apply them intensively. Experience makes clear that often they do not understand the software that they are using. This book aims to be a bridge between the software world and structural engineering. Many problems are related to the correct input data and the proper interpretation and handling of output. The book is neither a text on the Finite Element Method, nor a user manual for the software packages. Rather it aims to be a guide to understanding and handling the results gained by such software. We purposely restrict ourselves to structure types which frequently occur in practise. This text presents classical as well as shear deformation beam and plate theories, and their solutions by analytical and numerical methods, for bending, buckling, and natural vibrations. Analytical solutions are based on the Navier and Levy solution methods, and numerical methods are based on the Rayleigh-Ritz method and the finite element method. Extensive illustrations and tables of numerical solutions are provided, as well as end of chapter exercises and references for additional reading. Nonlinear Theory of Elastic Plates provides the theoretical materials necessary for the three plate models—Cosserat plates, Reissner-Mindlin plates and Kirchhoff-Love plates— in the context of finite elastic deformations. One separate chapter is devoted to the linearized theory of Kirchhoff-Love plates, which allows for the study of vibrations of a pre-stressed plate and the static buckling of a plate. All mathematical results in the tensor theory in curvilinear coordinates necessary to investigate the plate theory in finite deformations are provided, making this a self-contained resource. Presents the tricky process of linearization, which is rarely dealt with, but explained in detail in a separate chapter Organized in a mathematical style, with definitions, hypotheses, theorems and proofs clearly stated Presents every theorem with its accompanying hypotheses, enabling the reader to quickly recognize the conditions of validity in results The present monograph deals with refined theories of elastic plates in which both bending and transverse shear effects are taken into account and with some of their applications. Generally these more exact theories result in inte gration problems of the sixth order; consequently, three mutually independent boundary conditions at each edge of the plate are required. This is in perfect agreement with the conclusions of the theory of elasticity. The expressions for shearing forces following from refined theories are then valid for the whole investigated region including its boundary where the corresponding boundary conditions for these shearing forces can be prescribed. Quite different seems to be the situation in the classical Kirchhoff-Love's theory in which the influence of transverse shearing strains is neglected. Owing to this simplification the governing differential equation developed by the classical theory is of the fourth order only; consequently, the number of boundary conditions appurtenant to the applied mode of support appears now to be in disagreement with the order of the valid governing equation. Then, limiting the validity of the expressions for shearing forces to the open region of the middle plane and introducing the notion of the so called fictitious Kirchhoff's shearing forces for the boundary of the plate, three actual boundary conditions at each edge of the plate have to be replaced by two approximate conditions transformed in the Kirchhoff's sense. Mathematical models of deformation of elastic plates are used by applied mathematicians and engineers in connection with a wide range of practical applications, from microchip production to the construction of skyscrapers and aircraft. This book employs two important analytic techniques to solve the fundamental boundary value problems for the theory of plates with transverse shear deformation, which offers a more complete picture of the physical process of bending than Kirchhoff's classical one. The first method transfers the ellipticity of the governing system to the boundary, leading to singular integral equations on the contour of the domain. These equations, established on the basis of the properties of suitable layer potentials, are then solved in spaces of smooth (Hölder continuous and Hölder continuously differentiable) functions. The second technique rewrites the differential system in terms of complex variables and fully integrates it, expressing the solution as a combination of complex analytic potentials. The last chapter develops a generalized Fourier series method closely connected with the structure of the system, which can be used to compute approximate solutions. The numerical results generated as an illustration for the interior Dirichlet problem are accompanied by remarks regarding the efficiency and accuracy of the procedure. The presentation of the material is detailed and self-contained, making Mathematical Methods for Elastic Plates accessible to researchers and graduate students with a basic knowledge of advanced calculus. In this second book of a three-volume set, asymptotic methods provide a rigorous mathematical justification of the classical two-dimensional linear plate and shallow shell theories. Theory of Plates also illustrates how asymptotic methods allow for justification of the Kirchhoff–Love theory of nonlinear elastic plates and presents a detailed mathematical analysis of the von Kármán equations. An extended preface and extensive bibliography have been added to highlight the progress that has been made since the volume's original publication. While each one of the three volumes is self-contained, together the Mathematical Elasticity set provides the only modern treatise on elasticity; introduces contemporary research on three-dimensional elasticity, the theory of plates, and the theory of shells; and contains proofs, detailed surveys of all mathematical prerequisites, and many problems for teaching and self-study These classic textbooks are for advanced undergraduates, first-year graduate students, and researchers in pure or applied mathematics or continuum mechanics. They are appropriate for courses in mathematical elasticity, theory of plates and shells, continuum mechanics, computational mechanics, and applied mathematics in general. The main purpose of this work is construction of the mathematical theory of elastic plates and shells, by means of which the investigation of basic boundary value problems of the spatial theory of elasticity in the case of cylindrical do mains reduces to the study of two-dimensional boundary value problems (BVP) of comparatively simple structure. In this respect in sections 2-5 after the introductory material, methods of re duction, known in the literature as usually being based on simplifying hypotheses, are studied. Here, in contradiction to classical methods, the problems, connected with construction of refined theories of anisotropic nonhomogeneous plates with variable thickness without the assumption of any physical and geometrical re strictions, are investigated. The comparative analysis of such reduction methods was carried out, and, in particular, in section 5, the following fact was established: the error transition, occuring with substitution of a two-dimensional model for the initial problem on the class of assumed solutions is restricted from below. Further, in section 6, Vekua's method of reduction, containing regular pro cess of study of three-dimensional problem, is investigated. In this direction, the problems, connected with solvability, convergence of processes, and construction of effective algorithms of approximate solutions are studied. This book presents simplified analytical methodologies for static and dynamic problems concerning various elastic thin plates in the bending state and the potential effects of dead loads on static and dynamic behaviors. The plates considered vary in terms of the plane (e.g. rectangular or circular plane), stiffness of bending, transverse shear and mass. The representative examples include void slabs, plates stiffened with beams, stepped thickness plates, cellular plates and floating plates, in addition to normal plates. The closed-form approximate solutions are presented in connection with a groundbreaking methodology that can easily accommodate discontinuous variations in stiffness and mass with continuous function as for a distribution. The closed-form solutions can be used to determine the size of structural members in the preliminary design stages, and to predict potential problems with building slabs intended for human beings' practical use. This groundbreaking book resolves the main lacuna in Kirchhoff theory of bending of plates in the Poisson-Kirchhoff boundary conditions paradox through the introduction of auxiliary problem governing transverse stresses. The book highlights new primary bending problem which is formulated and analyzed by the application of developed Poisson theory. Analysis with prescribed transverse stresses along faces of the plate, neglected in most reported theories, is presented with an additional term in displacements. The book presents a systematic procedure for the analysis of unsymmetrical laminates. This volume will be a useful reference for students, practicing engineers as well as researchers in applied mechanics. . The Mathematical Elasticity set contains three self-contained volumes that together provide the only modern treatise on elasticity. They introduce contemporary research on three-dimensional elasticity, the theory of plates, and the theory of shells. Each volume contains proofs, detailed surveys of all mathematical prerequisites, and many problems for teaching and self-study. An extended preface and extensive bibliography have been added to each volume to highlight the progress that has been made since the original publication. The first book, Three-Dimensional Elasticity, covers the modeling and mathematical analysis of nonlinear three-dimensional elasticity. In volume two, Theory of Plates, asymptotic methods provide a rigorous mathematical justification of the classical two-dimensional linear plate and shallow shell theories. The objective of Theory of Shells, the final volume, is to show how asymptotic methods provide a rigorous mathematical justification of the classical two-dimensional linear shell theories: membrane, generalized membrane, and flexural. These classic textbooks are for advanced undergraduates, first-year graduate students, and researchers in pure or applied mathematics or continuum mechanics. They are appropriate for courses in mathematical elasticity, theory of plates and shells, continuum mechanics, computational mechanics, and applied mathematics in general.