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Theory and Analysis of Elastic Plates and Shells, Second Edition *CRC Press 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.* **Theory and Analysis of Elastic Plates and Shells, Second Edition** *CRC Press 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.* **Theory of Plates and Shells ... Second Edition The Mathematical Theory of Elasticity** *CRC Press Through its inclusion of specific applications, The Mathematical Theory of Elasticity, Second Edition continues to provide a bridge between the theory and applications of elasticity. It presents classical as well as more recent results, including those obtained by the authors and their colleagues. Revised and improved, this edition incorporates add* **Solutions Manual for Theory and Analysis of Elastic Plates and Shells, Second Edition** *CRC Press* **Mathematical Elasticity Theory of Shells** *SIAM The objective of Theory of Shells, the third book of a three-volume set, is to show how asymptotic methods provide a rigorous mathematical justification of the classical two-dimensional linear shell theories: membrane, generalized membrane, and flexural. The book also shows how asymptotic methods justify nonlinear elastic shell theories and gives a detailed presentation of the Koiter equations for a nonlinearly elastic shell. 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.* **Analysis of Shells and Plates** *Springer Science & Business Media The study of three-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 contributed 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.* **Applied Plasticity, Second Edition** *Springer Science & Business Media This book begins with the fundamentals of the mathematical theory of plasticity. The discussion then turns to the theory of plastic stress and its applications to structural analysis. It concludes with a wide range of topics in dynamic plasticity including wave propagation, armor penetration, and structural impact in the plastic range. In view of the rapidly growing interest in computational methods, an appendix presents the fundamentals of a finite-element analysis of metal-forming problems.* **Mathematical Elasticity Volume II: Theory of Plates** *Elsevier 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.* **Advances in the Theory of Plates and Shells** *Elsevier Plates and shells play an important role in structural, mechanical, aerospace and manufacturing applications. The theory of plates and shells have advanced in the past two decades to handle more complicated problems that were previously beyond reach. In this book, the most recent advances in this area of research are documented. These include topics such as thick plate and shell analyses, finite rotations of shell structures, anisotropic thick plates, dynamic analysis, and laminated composite panels. The book is divided into two parts. In Part I, emphasis is placed on the theoretical aspects of the analysis of plates and shells, while Part II deals with modern applications. Numerous eminent researchers in the various areas of plate and shell analyses have contributed to this work which pays special attention to aspects of research such as theory, dynamic analysis, and composite plates and shells.* **Shell Theory** *Elsevier This account of the theory of plates and shells is written primarily as a textbook for graduate students in mechanical and civil engineering. The unified treatment of shells of arbitrary shape is accomplished by tensor analysis. This useful tool is introduced in the first chapter, and no knowledge of advanced mathematical methods is required. The general theory developed in the first eight chapters is applied in the remaining part to thin elastic plates and shells with special emphasis on engineering methods and engineering applications. A number of detailed examples illustrate the theory.* **The Theory of Shells and Plates. Part II: Nonlinear Theories of Elastic Shells** *The report, the second of two parts, deals with the nonlinear and the linear theories of elastic shells and plates. It represents continuation of Part I and again all developments are carried out both by direct approach (i.e., via the theory of an elastic surface) and from the three-dimensional equations. Chapter D contains derivations of constitutive equations, thermodynamical retrictions, material symmetries and related results for both the nonlinear and the linear theories of elastic shells and plates. The relationship and correspondence between the results derived from the three-dimensional theory and those obtained by direct approach is discussed and special attention is given to the determination of the constitutive coefficients of the linear theory by direct approach in Chapter E. (Author).* **Elasticity and Geometry From Hair Curls to the Non-linear Response of Shells** *Oxford University Press We experience elasticity everywhere in everyday life: straightening or curling of hairs, irreversible deformations of car bodies after a crash, bouncing of elastic balls (ping-pong, soccer), etc. In the technological domain, many bulk materials are coated with thin layers that may be subject to delamination, another complex process where elasticity is important. This book covers several modern aspects of the venerable field of elasticity theory. This book appliesgeneral methods of classical analysis including advanced nonlinear aspects to derive detailed, fully explicit solutions to specific problems. These theoretical concepts are discussed in connection withexperiments. The matter is self-contained; the prerequisites are calculus at the undergraduate level. This book can serve as a concrete introduction to nonlinear methods in science.* **Vibrations of Shells and Plates** *CRC Press With increasingly sophisticated structures involved in modern engineering, knowledge of the complex vibration behavior of plates, shells, curved membranes, rings, and other complex structures is essential for today's engineering students, since the behavior is fundamentally different than that of simple structures such as rods and beams. Now in its* **Fundamentals and Applications of Ultrasonic Waves, Second Edition** *CRC Press Written at an intermediate level in a way that is easy to understand, Fundamentals and Applications of Ultrasonic Waves, Second Edition provides an up-to-date exposition of ultrasonics and some of its main applications. Designed specifically for newcomers to the field, this fully updated second edition emphasizes underlying physical concepts over mathematics. The first half covers the fundamentals of ultrasonic waves for isotropic media. Starting with bulk liquid and solid media, discussion extends to surface and plate effects, at which point the author introduces new modes such as Rayleigh and Lamb waves. This focus on only isotropic media simplifies the usually complex mathematics involved, enabling a clearer understanding of the underlying physics to avoid the complicated tensorial description characteristic of crystalline media. The second part of the book addresses a broad spectrum of industrial and research applications, including quartz crystal resonators, surface acoustic wave devices, MEMS and microacoustics, and acoustic sensors. It also provides a broad discussion on the use of ultrasonics for non-destructive evaluation. The author concentrates on the developing area of microacoustics, including exciting new work on the use of probe microscopy techniques in nanotechnology. Focusing on the physics of acoustic waves, as well as their propagation, technology, and applications, this book addresses viscoelasticity, as well as new concepts in acoustic microscopy. It updates coverage of ultrasonics in nature and developments in sonoluminescence, and it also compares new technologies, including use of atomic force acoustic microscopy and lasers. Highlighting both direct and indirect applications for readers working in neighboring disciplines, the author presents particularly important sections on the use of microacoustics and acoustic nanoprobes in next-generation devices and instruments.* **Mechanics of Laminated Composite Plates and Shells Theory and Analysis, Second Edition** *CRC Press The second edition of this popular text provides complete, detailed coverage of the various theories, analytical solutions, and finite element models of laminated composite plates and shells. The book reflects advances in materials modeling in general and composite materials and structures in particular. It includes a chapter dedicated to the theory and analysis of laminated shells, discussions on smart structures and functionally graded materials, exercises and examples, and chapters that were reorganized from the first edition to improve the clarity of the presentation.* **Plastic Limit Analysis of Plates, Shells and Disks** *Elsevier This revised and updated edition of a book first published in 1972 has kept the general features of the first edition but as could be expected after two decades there are also substantial differences. For instance optimal design has been completely deleted as the developments in this field have been so great that it warrants a book in itself. The fundamental concepts based on Drucker's postulate rather than those of Prager's assumptions function have been introduced. Problems of cyclic loading have been given some more extensive treatment, both in the general theory and in applications. General indications and references have been added for reinforced concrete plates and shells. A general presentation of the yield condition for both plates and shells has been included and the section on the influence of axial force in plates has been almost re-written. Finally, a chapter has been added exclusively devoted to the numerical approach to limit load and shake-down load evaluation. Like the previous edition the book is directed towards engineering applications. The theory is rigorously developed and is therefore of great use to engineering students in plastic limit analysis. Furthermore, applications to metal and reinforced concrete plates and shells and to metal disks are treated by both analytical and numerical approaches.* **The Theory of Piezoelectric Shells and Plates** *CRC Press This is the first book devoted to a systematic description of the linear theory of piezoelectric shells and plates theory. The book contains two parts. In the first part, the theories for electroelastic thin-walled elements of arbitrary form with different directions of preliminary polarization are presented in an easy form for practical use. The approximate methods for integrating the equations of piezoelectric shells and plates are developed and applied for solving*

some engineering problems. In the second part, the theory of piezoelectric shells and plates is substantiated by the asymptotic method. The area of applicability for different kinds of electroelastic shell theories is studied. A new problem concerning the electroelastic phenomena at the edge of a thin-walled element is raised and solved. The Theory of Piezoelectric Shells and Plates will be valuable to researchers working in the field of electroelasticity as well as to electrical and electronic engineers who use thin-walled piezoelements. It is also be helpful for students and post-graduates specializing in mechanics and for scientists concerning asymptotic methods. **Asymptotic Methods for Elastic Structures Proceedings of the International Conference, Lisbon, Portugal, October 4-8, 1993** *Walter de Gruyter* The series is aimed specifically at publishing peer reviewed reviews and contributions presented at workshops and conferences. Each volume is associated with a particular conference, symposium or workshop. These events cover various topics within pure and applied mathematics and provide up-to-date coverage of new developments, methods and applications. **Linear Theories of Elasticity and Thermoelasticity Linear and Nonlinear Theories of Rods, Plates, and Shells** *Springer* **Vibrations of Elastic Plates Linear and Nonlinear Dynamical Modeling of Sandwiches, Laminated Composites, and Piezoelectric Layers** *Springer Science & Business Media* 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. **Piezoelectric Shells Sensing, Energy Harvesting, and Distributed Control--Second Edition** This book offers an introduction to piezoelectric shells and distributed sensing, energy harvesting and control applications. It familiarizes readers with a generic approach of piezoelectric shells and fundamental electromechanics of distributed piezoelectric sensors, energy harvesters and actuators applied to shell structures. The book is divided into two major parts, the first of which focuses on piezoelectric shell continua, while the second examines distributing sensing, energy harvesting and control of elastic continua, e.g., shells and plates. The exploitation of new, advanced multifunctional smart structures and structronic systems has been one of the mainstream research and development activities over the years. In the search for innovative structronics technologies, piezoelectric materials have proved to be very versatile in both sensor and actuator applications. Consequently, the piezoelectric technology has been applied to a broad range of practical applications, from small-scale nano- and micro-sensors/actuators to large-scale airplane and space structures and systems. The book provides practicing engineers and researchers with an introduction to advanced piezoelectric shell theories and distributed sensor/energy harvester/actuator technologies in the context of structural identification, energy harvesting and precision control. The book can also be used as a textbook for graduate students. This second edition contains substantial new materials, especially energy harvesting and experimental components, and has been updated and corrected for a new generation of readers. **Elastic and Thermoelastic Problems in Nonlinear Dynamics of Structural Members Applications of the Bubnov-Galerkin and Finite Difference Methods** *Springer Nature* From the reviews: "A unique feature of this book is the nice blend of engineering vividness and mathematical rigour. [...] The authors are to be congratulated for their valuable contribution to the literature in the area of theoretical thermoelasticity and vibration of plates." Journal of Sound and Vibration **Applied Mechanics Reviews Plates and shells with cracks A collection of stress intensity factor solutions for cracks in plates and shells** *Springer Science & Business Media* This third volume of a series on Mechanics of Fraeture deals with eraeks in plates and shells. It was noted in Volume 2 on three-dimensional eraek problems that additional free surfaees can lead to substantial mathematical complexities, often making the analysis unmanageable. The theory of plates and shells forms a part of the theory of elasticity in which eertain physieal assumptions are made on the basis that the distanee between two bounded surfaees, either fiat or eurved, is small in eomparison with the overall dimen sions of the body. In modern times, the broad and frequent applieations of plate- and shell-like struetural members have aeted as a stimulus to whieh engineers and researchers in the field of fracture meehanies have responded with a wide variety of solutions of teehnieal importanee. These eontributions are covered in this book so that the reader may gain an understanding of how analytieal treat me nt s ofplates and shells containing initial imperfeetions in the form of eraeks are earried out. The development of plate and shell theories has involved long standing controversy on the eonsisteney of omitting eertain small terms and at the same time retaining others of the same order of magnitude. This defieieney depends on the ratio of the plate or shell thiekness, h, to other eharaeteristie dimensions and eannot be eompletely resolved in view of the approximations inherent in the transverse dependence of the extensional and bending stresses. **Proceedings of the Second International Conference on Structural Stability and Dynamics Singapore, 16-18 December 2002** *World Scientific* ICSSD 2002 is the second in the series of International Conferences on Structural Stability and Dynamics, which provides a forum for the exchange of ideas and experiences in structural stability and dynamics among academics, engineers, scientists and applied mathematicians. Held in the modern and vibrant city of Singapore, ICSSD 2002 provides a peep at the areas which experts on structural stability and dynamics will be occupied with in the near future. From the technical sessions, it is evident that well-known structural stability and dynamic theories and the computational tools have evolved to an even more advanced stage. Many delegates from diverse lands have contributed to the ICSSD 2002 proceedings, along with the participation of colleagues from the First Asian Workshop on Meshfree Methods and the International Workshop on Recent Advances in Experiments and Computations on Modeling of Heterogeneous Systems. Forming a valuable source for future reference, the proceedings contain 153 papers ? including 3 keynote papers and 23 invited papers ? contributed by authors from all over the world who are working in advanced multi-disciplinary areas of research in engineering. All these papers are peer-reviewed, with excellent quality, and cover the topics of structural stability, structural dynamics, computational methods, wave propagation, nonlinear analysis, failure analysis, inverse problems, non-destructive evaluation, smart materials and structures, vibration control and seismic responses.The major features of the book are summarized as follows: a total of 153 papers are included with many of them presenting fresh ideas and new areas of research; all papers have been peer-reviewed and are grouped into sections for easy reference; wide coverage of research areas is provided and yet there is good linkage with the central topic of structural stability and dynamics; the methods discussed include those that are theoretical, analytical, computational, artificial, evolutional and experimental; the applications range from civil to mechanical to geo-mechanical engineering, and even to bioengineering. **Introduction to Mathematical Elasticity** *World Scientific* This book provides the general reader with an introduction to mathematical elasticity, by means of general concepts in classic mechanics, and models for elastic springs, strings, rods, beams and membranes. Functional analysis is also used to explore more general boundary value problems for three-dimensional elastic bodies, where the reader is provided, for each problem considered, a description of the deformation; the equilibrium in terms of stresses; the constitutive equation; the equilibrium equation in terms of displacements; formulation of boundary value problems; and variational principles, generalized solutions and conditions for solvability.Introduction to Mathematical Elasticity will also be of essential reference to engineers specializing in elasticity, and to mathematicians working on abstract formulations of the related boundary value problems. **Piezoelectric Shells Sensing, Energy Harvesting, and Distributed Control—Second Edition** *Springer* This book offers an introduction to piezoelectric shells and distributed sensing, energy harvesting and control applications. It familiarizes readers with a generic approach of piezoelectric shells and fundamental electromechanics of distributed piezoelectric sensors, energy harvesters and actuators applied to shell structures. The book is divided into two major parts, the first of which focuses on piezoelectric shell continua, while the second examines distributing sensing, energy harvesting and control of elastic continua, e.g., shells and plates. The exploitation of new, advanced multifunctional smart structures and structronic systems has been one of the mainstream research and development activities over the years. In the search for innovative structronics technologies, piezoelectric materials have proved to be very versatile in both sensor and actuator applications. Consequently, the piezoelectric technology has been applied to a broad range of practical applications, from small-scale nano- and micro-sensors/actuators to large-scale airplane and space structures and systems. The book provides practicing engineers and researchers with an introduction to advanced piezoelectric shell theories and distributed sensor/energy harvester/actuator technologies in the context of structural identification, energy harvesting and precision control. The book can also be used as a textbook for graduate students. This second edition contains substantial new materials, especially energy harvesting and experimental components, and has been updated and corrected for a new generation of readers. **Analysis of Shells, Plates, and Beams A State of the Art Report** *Springer Nature* This book commemorates the 75th birthday of Prof. George Jaiani – Georgia's leading expert on shell theory. He is also well known outside Georgia for his individual approach to shell theory research and as an organizer of meetings, conferences and schools in the field. The collection of papers presented includes articles by scientists from various countries discussing the state of the art and new trends in the theory of shells, plates, and beams. Chapter 20 is available open access under a Creative Commons Attribution 4.0 International License via link.springer.com. **Official Gazette of the United States Patent and Trademark Office Patents Stresses in Plates and Shells** *McGraw-Hill Science, Engineering & Mathematics* Due to its easy writing style, this is the most accessible book on the market. It provides comprehensive coverage of both plates and shells and a unique blend of modern analytical and computer-oriented numerical methods in presenting stress analysis in a realistic setting. Distinguished by its broad range of exceptional visual interpretations of the solutions, applications, and means by which loads are carried in beams, plates and shells. Combining the modern-numerical, mechanics of materials, and theory of elasticity methods of analysis, it provides an in-depth and complete coverage of the subject, not explored by other texts. Its flexible organization allows instructors to more easily pick and choose topics they want to cover, depending on their course needs. Students are exposed to both the theory and the latest applications to various structural elements. Two new chapters on the fundamentals provide a stronger foundation for understanding the material. An increased emphasis on computer tools, and updated problems, examples, and references, expose students to the latest information in the field. **General Register** Announcements for the following year included in some vols. **Theory of Plates and Shells Vibrations of Hollow Elastic Bodies** *Springer* This book focuses on the justification and refinement of highly diverse approximate dynamic models for engineering structures arising in modern technology, including high-tech domains involving nano- and meta-materials. It proposes a classification for vibration spectra over a broad frequency domain and evaluates the range of validity of various existing 2D theories for thin-walled shells by comparing them with 3D benchmark solutions. The dynamic equations in 3D elasticity are applied to the analysis of harmonic vibrations in hollow bodies with canonical shapes. New exact homogeneous and inhomogeneous solutions are derived for cylinders, spheres and cones (including spherical and conical layers), as well as for plates of variable thickness. The book includes a wealth of numerical examples, as well as refined versions of 2D dynamic formulations. Boundary value problems for hollow bodies are also addressed. **Vibrations of Shells and Plates, Second Edition,** *CRC Press* The second edition of this work contains new chapters on areas including: the rotating ring and its practical applications, which gives an example of a rotating circular cylindrical shell; the basic theory of thermoelasticity including thermally excited vibrations of shells and plates; similitude arguments for shells or plates that are supported by an elastic medium; and specialized similitudes for various structural elements, deriving exact and approximate scaling relationships. **Nonlinear Mechanics of Shells and Plates in Composite, Soft and Biological Materials** *Cambridge University Press* 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. **Nonlinear Dynamics of Continuous Elastic Systems** *Springer Science & Business Media* This monograph is devoted to recent advances in nonlinear dynamics of continuous elastic systems. A major part of the book is dedicated to the analysis of non-homogeneous continua, e.g. plates and shells characterized by sudden changes in their thickness, possessing holes in their bodies or/and edges, made from different materials with diverse dynamical characteristics and complicated boundary conditions. New theoretical and numerical approaches for analyzing the dynamics of such continua are presented, such as the method of added masses and the method of proper orthogonal decomposition. The presented hybrid approach leads to results that cannot be obtained by other standard theories in the field. The demonstrated methods are illustrated by numerous examples of application. **Vibration of Laminated Shells and Plates** *Elsevier* Vibrations drive many engineering designs in today's engineering environment. There has been an enormous amount of research into this area of research over the last decade. This book documents some of the latest research in the field of vibration of composite shells and plates filling a much-needed gap in the market. Laminated composite shells have many engineering applications including aerospace, mechanical, marine and automotive engineering. This book makes an ideal reference for researchers and practicing engineers alike. The first book of its kind Documents 10 years of research in the field of composite shells Many Engineering applications **A Theory of Latticed Plates and Shells** *World Scientific* The book presents the theory of latticed shells as continual systems and describes its applications. It analyses the problems of statics, stability and dynamics. Generally, a classical rod deformation theory is applied. However, in some instances, more precise theories which particularly consider geometrical and physical nonlinearity are employed. A new effective method for solving general boundary value problems and its application for numerical and analytical solutions of mathematical physics and reticulated shell theory problems is described. A new method of solving the shell theory's nonlinear problems, substantially simplifying the existing algorithms is given. Questions of optimum design are discussed. Some of the findings are generalized and extended to edged and composite systems. The results of the solutions of a wide range of pressing problems are presented. **University of Michigan Official Publication** *UM Libraries*