Mechanics Of Elastic Structures

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the subject discussed in this book is the stability of thin walled elastic systems under static loads the presentation of these problems is based on modern approaches to elastic stability theory special attention is paid to the formulation of elastic stability criteria to the statement of column plate and shell stability problems to the derivation of basic relationships and to a discussion of the boundaries of the application of analytic relationships the author has tried to avoid arcane nonstandard problems and elaborate and unexpected solutions which bring real pleasure to connoisseurs but confuse students and cause bewilderment to some practical engineers the author has an apprehension that problems which though interesting are limited in application can divert the reader s attention from the more prosaic but no less sophisticated general problems of stability theory

elasticity theory is a classical discipline the mathematical theory of elasticity in mechanics especially the linearized theory is quite mature and is one of the foundations of several engineering sciences in the last twenty years there has been significant progress in several areas closely related to this classical field this applies in particular to the following two areas first progress has been made in numerical methods especially the development of the finite element method the finite element method which was independently created and developed in different ways by sci entists both in china and in the west is a kind of systematic and modern numerical method for solving partial differential equations especially el liptic equations experience has shown that the finite element method is efficient enough to solve problems in an extremely wide range of applica tions of elastic mechanics in particular the finite element method is very suitable for highly complicated problems one of the authors feng of this book had the good fortune to participate in the work of creating and establishing the theoretical basis of the finite element method he thought in the early sixties that the method could be used to solve computational problems of solid mechanics by computers later practice justified and still continues to justify this point of view the authors believe that it is now time to include the finite element method as an important part of the content of a textbook of modern elastic mechanics

this book presents the main results of extensive research on the diffraction radiation and propagation of elastic waves in isotropic and anisotropic media and bodies of various shapes based on integral equations the separation of variables the method of green s functions the method of finite elements and the method of boundary elements it explores the application of methods and equations of the theory of diffraction to the problems of synthesis of hydroacoustic antennas and considers the spatial characteristics of loudspeakers the book also provides a detailed description of the acoustic monitoring of oil products in different volumes

very good no highlights or markup all pages are intact

elastic structures conceived as slender bodies able to transmit loads have been studied by scientists and engineers for centuries by the seventeenth century several useful theories of elastic structures had emerged with applications to civil and mechanical engineering problems in recent years improved mathematical tools have extended applications into new areas such as geomechanics and biomechanics this book first published in 1998 offers a critically filtered collection of the most significant theories dealing with elastic slender bodies it includes mathematical models involving elastic structures which are used to solve practical problems with particular emphasis on nonlinear problems this collection of interesting and important problems in elastic structures will appeal to a broad range of scientists engineers and graduate students working in the area of structural mechanics

theory of stability of continuous elastic structures presents an applied mathematical treatment of the stability of civil engineering structures the book s modern and rigorous approach makes it especially useful as a text in advanced engineering courses and an invaluable reference for engineers

the interaction of acoustic fields with submerged elastic structures both by propagation and scattering is being investigated at various institutions and laboratories world wide with ever increasing sophistication of experiments and analysis this book offers a collection of contributions from these research centers that represent the present state of the art in the study of acoustic elastic interaction being on the cutting edge of these investigations this includes the

description of acoustic scattering from submerged elastic objects and shells by the resonance scattering theory of flax dragonette and berall and the interaction of these phenomena in terms of interface waves it also includes the use of this theory for the purpose of inverse scattering i e the determination of the scattered objects properties from the received acoustic backscattered signals the problem of acoustically excited waves in inhomogeneous and anisotropic materials and of inhomogeneous propagating waves is considered vibrations and resonances of elastic shells including shells with various kinds of internal attachments are analyzed acoustic scattering experiments are described in the time domain and on the basis of the wignerocoville distribution acoustic propagation in the water column over elastic boundaries is studied experimentally both in laboratory tanks and in the field and is analyzed theoretically ultrasonic nondestructive testing including such aspects like probe modelling scattering by various types of cracks receiving probes and calibration by a side drilled hole is also studied in details a comprehensive picture of these complex phenomena and other aspects is presented in the book by researchers that are experts in each of these domains giving up to date accounts of the field in all these aspects contents discrete spectral analysis for solitary waves j engelbrecht et al propagation and interaction of waves in nonlinear elastic solids with microstructures v i erofeyev matched field processing a powerful tool for the study of oceans and scatterers a tolstoy progress in underwater acoustic modeling p c etter reflectivity response of a submerged layer with density sound velocity and absorbtion gradients r carb fit r mathematical aspects of wave phenomena in a wave guide with elastic walls and operator polynomials b p belinskiy j p dauer on some general mathematical properties of the system elastic plate oco acoustic medium b p belinskiy acoustic scattering from finite length cylinders encapped by two hemispheres d decultot et al acoustic scattering from a circular cylindrical shell immersed in water generation and reradiation of guided waves f l r on g maze the finite element boundary element approach to the radiation and scattering of submerged shells including internal structure or equipment r miller resonance extraction phase matching method and the surface paths for finite elastic cylinders x l bao nonlinear waves in thermoelastic solids undergoing phase transitions j k knowles readership nonlinear scientists

this monograph presents the mechanics of vibration buckling and bending of elastic structures with inclined members such as x braced high rise frames and conical shells more than giving detailed derivations of basic equations mechanics of elastic structures with inclined members is mainly oriented towards practical problem solving the book can be used

as a textbook for graduate students concentrating on structural mechanics or as a reference book for engineers and researchers in the fields of engineering mechanics civil engineering mechanical engineering and aerospace engineering

in this book the author has collected existing information on the analysis of elastic plastic structures subjected to variable repeated loads and to variable temperature fields he presents the foundations of the theory and its applications to the shakedown analysis of structures of various types and to computational algorithms the book provides useful and interesting material for students of civil and mechanical engineering practising engineers with a good mathematical background and also scientists concerned with the analysis of inelastic structures

theory of stability of continuous elastic structures presents an applied mathematical treatment of the stability of civil engineering structures the book s modern and rigorous approach makes it especially useful as a text in advanced engineering courses and an invaluable reference for engineers

a crucial element of structural and continuum mechanics stability theory has limitless applications in civil mechanical aerospace naval and nuclear engineering this text of unparalleled scope presents a comprehensive exposition of the principles and applications of stability analysis it has been proven as a text for introductory courses and various advanced courses for graduate students it is also prized as an exhaustive reference for engineers and researchers the authors focus on understanding of the basic principles rather than excessive detailed solutions and their treatment of each subject proceed from simple examples to general concepts and rigorous formulations all the results are derived using as simple mathematics as possible numerous examples are given and 700 exercise problems help in attaining a firm grasp of this central aspect of solid mechanics the book is an unabridged republication of the 1991 edition by oxford university press and the 2003 edition by dover updated with 18 pages of end notes

a thorough guide to the fundamentals and how to use them of finite element analysis for elastic structures for elastic structures the finite element method is an invaluable tool which is used most effectively only when one understands completely each of its facets a primer for finite elements in elastic structures disassembles the entire finite element

method for civil engineering students and professionals detailing its supportive theory and its mathematical and structural underpinnings in the context of elastic structures and the principle of virtual work the book opens with a discussion of matrix algebra and algebraic equation systems to foster the basic skills required to successfully understand and use the finite element method key mathematical concepts outlined here are joined to pertinent concepts from mechanics and structural theory with the method constructed in terms of one dimensional truss and framework finite elements the use of these one dimensional elements in the early chapters promotes better understanding of the fundamentals subsequent chapters describe many two dimensional structural finite elements in depth including the geometry mechanics transformations and mapping needed for them most chapters end with questions and problems which review the text material answers for many of these are at the end of the book an appendix describes how to use matlab r a popular matrix manipulation software platform necessary to perform the many matrix operations required for the finite element method such as matrix addition multiplication inversion partitioning rearrangement and assembly as an added extra the m files discussed can be downloaded from the wiley ftp server

this book gives a unified presentation of the field of stability buckling and post buckling states are studied on the basis of total potential energy of structural systems emphasis is placed throughout the text on post buckling analysis and behaviour the sensitivity of buckling and post buckling states to changes in design parameters is also discussed as well as changes due to imperfections and damage

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

this series of volumes constitutes an outstanding collection of contributions by the most active research workers in the area of acoustics and mechanics it brings the reader up to date on the status of the various aspects of research in this

field the volumes should preserve their value for a long time as they represent a monument to the achievements of human research capabilities in the underwater acoustics aspects of the environment

this book bridges a gap between a rigorous mathematical approach to variational problems and the practical use of algorithms of structural optimization in engineering applications the foundations of structural optimization are presented in sufficiently simple form as to make them available for practical use

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