Elasticity Plasticity The Structur 2nd Edition

A wide range of topics in the area of mechanics of materials and structures are covered in this volume, ranging from analysis to design. There is no special emphasis on a specific area of research. The first section of the book deals with topics on the mechanics and damage of concrete. It also includes two papers on granular packing structure changes and cumulative damage in polymers. In the second part more theoretical topics in mechanics are discussed, such as shell theory and nonlinear elasticity. The following section dicusses areas dealing primarily with plasticity, viscoelasticity, and viscoplasticity. These include such topics as dynamic and cyclic plasticity. In the final section the subject is structural dynamics, including seismic analysis, composite frames and nonlinear analysis of bridges. The volume is compiled in honor of Professor Maciej P. Bieniek who has served as a teacher and researcher at several universities, and who has made many significant contributions in the evaluation, rehabilitation, and design of infrastructures.

Under the auspices of the Euromech Committee, the Fifth European Turbulence Conference was held in Siena on 5-8 July 1994. Following the previous ETC meeting in Lyon (1986), Berlin (1988), Stockholm (1990) and Delft (1992), the Fifth ETC was aimed at providing a review of the fundamental aspects of turbulence from a theoretical, numerical and experimental point of view. In the magnificent town of Siena, more than 250 scientists from all over the world, spent four days discussing new ideas on turbulence. As a research worker in the field of turbulence, I must say that the works presented at the Conference, on which this book is based, covered almost all areas in this field. I also think that this book provides a major opportunity to have a complete overview of the most recent research works. I am extremely grateful to Prof. C. Cercignani, Dr. M. Loffredo, and Prof. R. Piva who, as members of the local organizing committee, share the success of the Conference. I also want to thank Mrs. Liu' Catena, for her invaluable contribution to the work done by the local organizing committee and the European Turbulence Committee in the scientific organization of the meeting. The "Servizio Congressi" of the University of Siena provided perfect organization in Siena and wonderful hospitality. The Conference has been supported by CNR, Cira, Alenia, the Universities of Rome "Tor Vergata" and "La Sapienza".

The IUTAM Symposium on Rheology of Bodies with Defects was held in Beijing in September, 1997. It was aimed at the development of Rheology in Solid Mechanics. Rheology is classified in Applied Mechanics Review under fluid mechanics, however, in its broadest content as was envisaged in its earlier days, it covers the whole spectrum of material behavior from elasticity, plasticity, and fluid mechanics to gas dynamics. It was thought of as a branch of continuum mechanics, but emphasized the physical aspects of different materials, and frequently proceeded from basic physical principles. As the temperature rises, the distinction between solid and fluid, and the distinction between their micro-mechanical movements, become blurred. The physical description of such materials and their movements must be based on the thermodynamic principles of state variable theory; the classical division between solid and fluid mechanics disappears. Under the classification adopted by Applied Mechanics Reviews, the subjects dealt with in this symposium come closer to viscoelasticity and viscoplasticity, especially close to the subdivision of creep dealing with creep rupture. The symposium focused at building a bridge between macroscopic and microscopic research on damage and fracture behavior of defective bodies made of metal, polymer, composite and other viscoelastic materials. Two different approaches are presented at the symposium. The first is a continuum damage theory for time-dependent evolution of defects at the macro/meso/microscopic levels.

This volume contains papers presented at the 11th International Conference on Jet Cutting Technology, held at St. Andrews, Scotland, on 8-10 September 1992. Jetting techniques have been successfully applied for many years in the field of cleaning and descaling. Today, however, jet cutting is used in operations as diverse as removing cancerous growths from the human body, decommissioning sunsea installations and disabling explosive munitions. The diversity is reflected in the papers presented at the conference. The papers were divided into several main sections: jetting basics -- materials; jetting basics -- fluid mechanics; mining and quarrying; civil engineering; new developments; petrochem; cleaning and surface treatment; and manufacturing. The high quality of papers presented at the conference has further reinforced its position as the premier event in the field. The volume will be of interest to researchers, developers and manufacturers of systems, equipment users and contractors.

Jet Cutting Technology

Vibration Analysis of Rotors

Applied High-Speed Plate Penetration Dynamics

Flow Visualization and Image Analysis

Proceedings of the IUTAM Symposium held in Hong Kong, China, 31 May - 4 June, 2004

IUTAM Symposium on Computational Methods for Unbounded Domains

The IUT AM Symposium on "Micromechanics of Plasticity and Damage of Multiphase Materials" was held in Sevres, Paris, France, 29 August - 1 September 1995. The Symposium was attended by 83 persons from 18 countries. In addition 17 young French students attended the meeting. During the 4 day meeting, a total of 55 papers were presented, including 24 papers in the poster sessions. The meeting was divided into 7 oral and 3 poster sessions. The 7 oral sessions were the following: - Plasticity and Viscoplasticity I and II; - Phase transformations; - Damage I and II; - Statistical and geometrical aspects; - Cracks and interfaces. Each poster session was introduced by a Rapporteur, as follows: - Session I (Plasticity and Viscoplasticity): G. Cailletaud; - Session 2 (Damage): D. Franc;:ois; - Session 3 (Phase transformation; statistical and geometrical aspects): D. Jeulin. The main purpose of the Symposium was the discussion of the state of the art in the development of micromechanical models used to predict the macroscopic mechanical behaviour of mUltiphase solid materials. These materials consist of at least two chemically different phases, present either initially or formed during plastic

deformation, when a strain-induced phase transformation takes place. One session was devoted to the latter case. Continuously strengthened composite materials, containing long fibers, were out of the scope of the Symposium.

This text is intended for use as an advanced course in either rotordynamics or vibration at the graduate level. This text has mostly grown out of the research work in my laboratory and the lectures given to graduate students in the Mechanical Engineering Department, KAIST. The text contains a variety of topics not normally found in rotordynamics or vibration textbooks. The text emphasizes the analytical aspects and is thus quite different from conventional rotordynamics texts; potential readers are expected to have a firm background in elementary rotordynamics and vibration. In most previously published rotordynamics texts, the behavior of simple rotors has been of a primary concern, while more realistic, multi-degree-f-freedom or continuous systems are seldom treated in a rigorous way, mostly due to the difficulty of a mathematical treatment of such complicated systems. When one wanted to gain a deep insight into dynamic phenomena of complicated rotor systems, one has, in the past, either had to rely on computational techniques, such as the transfer matrix and finite element methods, or cautiously to extend ideas learned from simple rotors whose analytical solutions are readily available. The former methods are limited in the interpretation of results, since the calculations relate only to the simulated case, not to more general system behavior. Ideas learned from simple rotors can, fortunately, often be extended to many practical rotor systems, but there is of course no guarantee of their validity.

Designing new structural materials, extending lifetimes and guarding against fracture in service are among the preoccupations of engineers, and to deal with these they need to have command of the mechanics of material behaviour. The first volume of this two-volume work deals with elastic and elastoplastic behaviour; this second volume continues with viscoelasticity, damage, fracture (resistance to cracking) and contact mechanics. As in Volume I, the treatment starts from the active mechanisms on the microscopic scale and develops the laws of macroscopic behaviour. Chapter I deals with viscoplastic behaviour, as shown, for example, at low temperatures by the effects of oscillatory loads and at high temperatures by creep under steady load. Chapter 2 treats damage phenomena encountered in all materials - for example, metals, polymers, glasses, concretes - such as cavitation, fatigue and stress-corrosion cracking. Chapter 3 treats those concepts of fracture mechanics that are needed for the understanding of resistance to cracking and Chapter 4 completes the volume with a survey of the main concepts of contact mechanics. As with Volume I, each chapter has a set of exercises, either with solutions or with indications of how to attack the problem; and there are many explanatory diagrams and other illustrations.

Advanced Mechanics of Composite Materials and Structural Elements analyzes contemporary theoretical models at the micro- and macro levels of material structure. Its coverage of practical methods and approaches, experimental results, and optimization of composite material properties and structural component performance can be put to practical use by researchers and engineers. The third edition of the book consists of twelve chapters progressively covering all structural levels of composite materials from their constituents through elementary plies and layers to laminates and laminated composite structural elements. All-new coverage of beams, plates and shells adds significant currency to researchers. Composite materials have been the basis of many significant breakthroughs in industrial applications, particularly in aerospace structures, over the past forty years. Their high strength-to-weight and stiffness-to-weight ratios are the main material characteristics that attract the attention of the structural and design engineers. Advanced Mechanics of Composite Materials and Structural Elements helps ensure that researchers and engineers can continue to innovate in this vital field. Detailed physical and mathematical coverage of complex mechanics and analysis required in actual applications - not just standard homogeneous isotropic materials Environmental and manufacturing discussions enable practical implementation within manufacturing technology, experimental results, and design specifications. Discusses material behavior impacts in-depth such as nonlinear elasticity, plasticity, creep, structural nonlinearity enabling research and application of the special problems of material micro- and macro-mechanics

Eurocode 3: Design of Steel Structures, Part 1-1: General Rules and Rules for Buildings

Advances in Turbulence IV

Proceedings of the IUTAM Symposium held in Beijing, China, 2-5 September 1997

Elements of Structural Optimization

IUTAM Symposium on Analytical and Computational Fracture Mechanics of Non-Homogeneous Materials

Elasticity, Plasticity and Structure of MatterCambridge University Press

In the last decades, new experimental and numerical techniques have taken many advanced features of porous media mechanics down to practical engineering applications. This happened in areas that sometimes were not even suspected to be open to engineering ideas at all. The challenge that often faces engineers in the field of geomechanics, biomechanics, rheology and materials science is the translation of ideas existing in one field to solutions in the other. The purpose of the IUTAM symposium from which this proceedings volume has been compiled was to dive deep into the mechanics of those porous media that involve mechanics and chemistry, mechanics and electromagnetism, mechanics and thermal fluctuations of mechanics and biology. The different sections have purposely not been formed according to field interest, but on the basis of the physics involved.

Computational Methods in Elasticity and Plasticity: Solids and Porous Media presents the latest developments in the area of elastic and elasto-plastic finite element modeling of solids, porous media and pressure-dependent materials and structures. The book covers the following topics in depth: the mathematical foundations of solid mechanics, the finite element method for solids and porous media, the theory of plasticity and the finite element implementation of elasto-plastic constitutive models. The book also includes: -A detailed coverage of elasticity for isotropic and anisotropic solids. -A detailed treatment of nonlinear iterative methods that could be used for nonlinear elastic and elasto-plastic analyses. -A detailed treatment of a kinematic hardening von Mises model that could be used to simulate cyclic behavior of solids. -Discussion of recent advances in the analysis of porous media and pressure-dependent materials in more detail than other books currently available. Computational Methods in Elasticity and Plasticity: Solids and Porous Media also contains problem sets, worked examples and a solutions manual for instructors.

This book introduces the fundamental design concept of Eurocode 3 for current steel structures in building construction, and their practical application. Following a discussion of the basis of design, including the principles of reliability management and the limit state approach, the material standards and their use are detailed. The fundamentals of structural analysis and modeling are presented, followed by the design criteria and approaches for various types of structural members. The theoretical basis and checking procedures are closely tied to the Eurocode requirements. The following chapters expand on the principles and applications of elastic and plastic design, each exemplified by the step-by-step design calculation of a braced steel-framed building and an industrial building, respectively. Besides providing the necessary theoretical concepts for a good understanding, this manual intends to be a supporting tool for the use of practicing engineers. In order of this purpose, throughout the book, numerous worked examples are provided, concerning the analysis of steel structures and the design of elements under several types of actions. These examples will facilitate the acceptance of the code and provide for a smooth transition from earlier national codes to the Eurocode.

Advances in Turbulence V

Solution of Crack Problems

Elasticity and Plasticity of Large Deformations

Mechanics of Materials and Structures

IUTAM Symposium on Physicochemical and Electromechanical, Interactions in Porous Media

Proceedings of the IUTAM Symposium held in Magdeburg, Germany, 26–29 September 2000

In recent years there have been a number of catastrophic floods that have resulted in a tragic loss of life. These natural disasters highlight the need to further understand the occurrence phenomena, to improve forecasting techniques, and to develop procedures and contingency plans to minimise the flood impact. This volume contains contributions from the 3rd International Conference on Floods and Flood Management held in Florence in November 1992. The volume is timely and provides an important overview for engineers, scientists, managers and researchers of the latest developments in technology, analysis and management.

This careful and detailed introduction to non-linear continuum mechanics and to elasticity and platicity, with a unique mathematical foundation, starts right from the basics. The general theory of mechanical behaviour is particularized for the broad and important classes of elasticity and plasticity. Brings the reader to the forefront of today's knowledge. A list of notations and an index help the reader finding specific topics.

This volume constitutes the proceedings of the 1997 IUTAM Symposium, where invited researchers in acoustics, aeronautics, elastodynamics, electromagnetics, hydrodynamics, and mathematics discussed non-reflecting computational boundaries. The participants formulated benchmark problems for evaluating computational boundaries, as described in the first article.

This book develops methods to simulate and analyze the time-dependent changes of stress and strain states in engineering structures up to the critical stage of creep rupture. The objective of this book is to review some of the classical and recently proposed approaches to the modeling of creep for structural analysis applications. It also aims to extend the collection of available solutions of creep problems by new, more sophisticated examples.

Technical Abstract Bulletin

Dictionary Catalog of the Research Libraries of the New York Public Library, 1911-1971

Deformation Theory of Plasticity

Foundations of the Theory of Elasticity, Plasticity, and Viscoelasticity

Solids and Porous Media

IUTAM Symposium on Smart Structures and Structronic Systems

The third edition of this book contains authoritative contributions from specialists in the various fields of rheology.

This book contains the edited version of invited lectures presented at the IUTAM-Sym- sium Synthesis in Bio Solid Mechanics, held at Hotel Frederiksdal, Virum (Copenhagen), Denmark, May 24 to May 27, 1998. The symposium was attended by 48 scientist from 14 countries. Biomechanics has been a very active research area in the last 25 years and covers a very broad class of problems. The present symposium concentrated on the solid mechanics - main of biomechanics, where important problems of synthesis presently are an active and challenging part. Characteristics of biomechanical materials are not only the inhomogeneity and anisotropy, but also the capability to change in relation to actual use. These living materials call for new methods of analysis and also new methods for synthesis. By the synthesis in this context is meant design of implants or artificial control of material growth. Bone mechanics is closely related to recent work on analysis and design of microstructural anisotropic materials. Also, recent work in shape design can to some extent be useful in the more complicated problems of biomechanics. Here interface problems play an essential role. The symposium brought together scientists from mechanics, mathematics and medicine.
High-speed impact dynamics is of interest in the fundamental sciences, e.g., astrophysics and space sciences, and has a number of important applications in military technologies, homeland security and engineering. When compared with experiments or numerical simulations, analytical approaches in impact mechanics only seldom yield useful results. However, when successful, analytical approaches allow us to determine general laws that are not only important in themselves but also serve as benchmarks for subsequent numerical simulations and experiments. The main goal of this monograph is to demonstrate the potential and effectiveness of analytical methods in applied high-speed penetration mechanics for two classes of problem. The first class of problem is shape optimization of impactors penetrating into ductile, concrete and some composite media. The second class of problem comprises investigation of ballistic properties and optimization of multi-layered shields, including spaced and two-component ceramic shields. Despite the massive use of mathematical techniques, the obtained results have a clear engineering meaning and are presented in an easy-to-use form. One of the chapters is devoted solely to some common approximate models, and this is the first time that a comprehensive description of the localized impactor/medium interaction approach is given. In the monograph the authors present systematically their theoretical results in the field of high-speed impact dynamics obtained during the last decade which only partially appeared in scientific journals and conferences proceedings.
The purpose of this monograph is to show how a compliant offshore structure in an ocean environment can be modeled in two and three di mensions. The monograph is divided into five parts. Chapter 1 provides the engineering motivation for this work, that is, offshore structures. These are very complex structures used for a variety of applications. It is possible to use beam models to initially study their dynamics. Chapter 2 is a review of variational methods, and thus includes the topics: princi ple of virtual work, D'Alembert's principle, Lagrange's equation, Hamil ton's principle, and the extended Hamilton's principle. These methods are used to derive the equations of motion throughout this monograph. Chapter 3 is a review of existing transverse beam models. They are the Euler-Bernoulli, Rayleigh, shear and Timoshenko models. The equa tions of motion are derived and solved analytically using the extended Hamilton's principle, as outlined in Chapter 2. For engineering purposes, the natural frequencies of the beam models are presented graphically as functions of normalized wave number and geometrical and physical pa rameters. Beam models are useful as representations of complex struc tures. In Chapter 4, a fluid force that is representative of those that act on offshore structures is formulated. The environmental load due to ocean current and random waves is obtained using Morison's equa tion. The random waves are formulated using the Pierson-Moskowitz spectrum with the Airy linear wave theory.
Proceedings of the IUTAM Symposium held in Sèvres, Paris, France, 29 August – 1 September 1995
General Register
Floods and Flood Management
IUTAM Symposium on Micromechanics of Plasticity and Damage of Multiphase Materials
Elasticity, Plasticity and Structure of Matter
Design of Steel Structures
Annotation This is the first monograph devoted to the foundation of the theory of composite anisotropic thin-walled beams and to its applications in various problems involving the aeronautical/aerospace, helicopter, naval and mechanical structures. Throughout the theoretical part, an effort was made to provide the treatment of the subject by using the equations of the 3-D elasticity theory. Non-classical effects such as transverse shear, warping constraint, anisotropy of constituent materials yielding the coupling of twist-bending (lateral), bending (transversal)-extension have been included and their implications have been thoroughly analyzed. Thermal effects have been included and in order to be able to circumvent their deleterious effects, functionally graded materials have been considered in their construction. Implications of the application of the tailoring technique and of the active feedback control on free vibration, dynamic response, instability and aeroelasticity of such structures have been amply investigated. Special care was exercised throughout this work to address and validate the adopted solution methodologies and the obtained results against those available in the literature and obtained via numerical or experimental means.
This book is concerned with the numerical solution of crack problems. The techniques to be developed are particularly appropriate when cracks are relatively short, and are growing in the neighbourhood of some stress raising feature, causing a relatively steep stress gradient. It is therefore practicable to represent the geometry in an idealised way, so that a precise solution may be obtained. This contrasts with, say, the finite element method in which the geometry is modelled exactly, but the subsequent solution is approximate, and computationally more taxing. The family of techniques presented in this book, based loosely on the pioneering work of Eshelby in the late 1950's, and developed by Erdogan, Keer, Mura and many others cited in the text, present an attractive alternative. The basic idea is to use the superposition of the stress field present in the unfiawed body, together with an unknown distribution of 'strain nuclei' (in this book, the strain nucleus employed is the dislocation), chosen so that the crack faces become traction-free. The solution used for the stress field for the nucleus is chosen so that other boundary conditions are satisfied. The technique is therefore efficient, and may be used to model the evolution of a developing crack in two or three dimensions. Solution techniques are described in some detail, and the book should be readily accessible to most engineers, whilst preserving the rigour demanded by the researcher who wishes to develop the method itself.
Foundations of the Theory of Elasticity, Plasticity, and Viscoelasticity details fundamental and practical skills and approaches for carrying out research in the field of modern problems in the mechanics of deformed solids, which involves the theories of elasticity, plasticity, and viscoelasticity. The book includes all modern methods of research as well as the results of the authors' recent work and is presented with sufficient mathematical strictness and proof. The first six chapters are devoted to the foundations of the theory of elasticity. Theory of stress-strain state, physical relations and problem statements, variation principles, contact and 2D problems, and the theory of plates are presented, and the theories are accompanied by examples of solving typical problems. The last six chapters will be useful to postgraduates and scientists engaged in nonlinear mechanics of deformed inhomogeneous bodies. The foundations of the modern theory of plasticity (general, small elastoplastic deformations and the theory of flow), linear, and nonlinear viscoelasticity are set forth. Corresponding research of three-

layered circular plates of various materials is included to illustrate methods of problem solving. Analytical solutions and numerical results for elastic, elastoplastic, lineaer viscoelastic and viscoelastoplastic plates are also given. Thermoviscoelastoplastic characteristics of certain materials needed for numerical account are presented in the eleventh chapter. The informative book is intended for scientists, postgraduates and higher-level students of engineering spheres and will provide important practical skills and approaches.

The field of structural optimization is still a relatively new field undergoing rapid changes in methods and focus. Until recently there was a severe imbalance between the enormous amount of literature on the subject, and the paucity of applications to practical design problems. This imbalance is being gradually redressed. There is still no shortage of new publications, but there are also exciting applications of the methods of structural optimizations in the automotive, aerospace, civil engineering, machine design and other engineering fields. As a result of the growing pace of applications, research into structural optimization methods is increasingly driven by real-life problems. t-.Jost engineers who design structures employ complex general-purpose software packages for structural analysis. Often they do not have any access to the source program, and even more frequently they have only scant knowledge of the details of the structural analysis algorithms used in this software packages. Therefore the major challenge faced by researchers in structural optimization is to develop methods that are suitable for use with such software packages. Another major challenge is the high computational cost associated with the analysis of many complex real-life problems. In many cases the engineer who has the task of designing a structure cannot afford to analyze it more than a handful of times.

Advanced Mechanics of Composite Materials and Structural Elements

A Unified Approach for Linear, Nonlinear, Static and Dynamic Systems

IUTAM Symposium on Synthesis in Bio Solid Mechanics

Mechanics of Fretting Fatigue

Mechanical Behaviour of Materials

Asymptotic Methods for Elastic Structures

This volume constitutes the Proceedings of the IUTAM Symposium on "Analytical and Computational Fracture Mechanics of Non-homogeneous Materials", held in Cardiff from 18th to 22nd June 2001. The Symposium was convened to address and place on record topical issues in analytical and computational aspects of the fracture of non-homogeneous materials as they are approached by specialists in mechanics, materials science and related fields. The expertise represented in the Symposium was accordingly very wide, and many of the world's greatest authorities in their respective fields participated. Given the extensive range and scale of non-homogeneous materials, it had to be focussed to enhance the quality and impact of the Symposium. The range of non-homogeneous materials was limited to those that are inhomogeneous at the macroscopic level and/or exhibit strain softening. The issues of micro to macro scaling were not excluded even within this restricted range which covered materials such as rock, concrete, ceramics and composites on the one hand, and, on the other, those metallic materials whose ductile fracture is strongly influenced by the presence of inhomogeneities. The Symposium remained focussed on fundamental research issues of practical significance. These issues have many common features among seemingly disparate non-homogeneous materials.

Proceedings of the IUTAM Symposium on Smart Structures and Structronic Systems, held in Magdeburg, Germany, 26-29 September 2000

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.

The European Turbulence Conferences have been organized under the auspices of the European Mechanics Committee (Euromech) to provide a forum for discussion and exchange of recent and new results in the field of turbulence. The first conference was organized in Lyon in 1986 with 152 participants. The second and third conferences were held in Berlin (1988) and Stockholm (1990) with 165 and 172 participants respectively. The fourth was organized in Delft from 30 June to 3 July 1992 by the J.M. Burgers Centre. There were 214 participants from 22 countries. This steadily growing number of participants demonstrates both the success and need for this type of conference. The main topics of the Fourth European Turbulence Conference were: Dynamical Systems and Transition; Statistical Physics and Turbulence; Experiments and Novel Experimental Techniques; Particles and Bubbles in Turbulence; Simulation Methods; Coherent Structures; Turbulence Modelling and Compressibility Effects. In addition a special session was held on the subject of CeBular Automata. Each of the sessions was introduced with a survey lecture. The lecturers were: W. Eckhaus, AJ. Libchaber, L. Katgerman, F. Durst, M. Lesieur, B. Legras, D.G. Dritschel and P. Bradshaw. The contributions of the participants were subdivided into oral and poster presentations. In addition to the normal program, some Speciai Interest Groups of Ercoftac (European Research Community on Flow, Turbulence and Combustion) presented their research activities in the form of a poster.

Reanalysis of Structures

Elasticity and Plasticity / Elastizität und Plastizität

IUTAM Symposium on Size Effects on Material and Structural Behavior at Micron- and Nano-Scales

Theory and Application
Dynamic Structure of Detonation in Gaseous and Dispersed Media
Elasticity, Plasticity and Structure of Matter ... With a chapter on the plasticity of crystals by Dr. W. G. Burgers ... Second edition. [Translated by H. E. Teves-Acly.].

Announcements for the following year included in some vols.

Progress in fluid mechanics depends heavily on the availability of good experimental data which can inspire new ideas and concepts but which are also necessary to check and validate theories and numerical calculations. With the advent of new recording and image analysis techniques new and promising experimental methods in fluid flows have presented themselves which are rather newly developed techniques such as particle tracking velocimetry (PTV), particle image velocimetry (PIV) and laser fluorescene (LIF). This volume presents state-of-the-art research on these techniques and their application to fluid flow. Selected papers from the EUROMECH conference on Image Analysis are published in this volume.

Of late the demands of industry in creating new composite and functional materials with present properties stimulated an increased interest to the investigation of processes which occur in the detonation technologies of complex chemical composition with an additive of disperse particles. The collection includes a series of papers presented at the 3d International Conference "Lavrentyev Readings on Mathematics, Mechanics, and Physics" (Novosibirsk, 1990),was held by the Hydrodynamics Institute under the support of the Presidium of the Siberian Branch of the USSR Academy of Sciences to stimulate the international cooperation of the leading international centers. In the framework of this Conference the Round Table seminar was held by Prof. A. Borissov and Prof. V. Mi trofanov devoted to "Dynamic Structure of Detonation in Gaseous and Dispersed Media". The idea to hold such Round Table was supported by Chairman of Organizing Committee academician Prof. V.Titov from Hydrodynamics Institute, and academician Prof. V. Nakoryakov and also his Institute of Thermophysics. The main ideas discussed at the Round Table were presented in the form of papers which reflected present situation of the problem of dynamic structure of the detonation waves in gaseous and dispersed media. The basic experimental facts concerning of complicated mul ti dimensional non-stationary structure both of the detonation wave and its front surface, generation of the cell structure, the effect of transverse waves, obstacles, channel geometry etc. on the transition from dynamic regime to stationary structure are represented in the fist three papers.

Failures of many mechanical components in service result from fatigue. The cracks which grow may either originate from some pre-existing macroscopic defect, or, if the component is of high integrity but highly stressed, a region of localized stress concentration. In turn, such concentrators may be caused by some minute defect, such as a tiny inclusion, or inadvertent machining damage. Another source of surface damage which may exist between notionally 'bonded' components is associated with minute relative motion along the interface, brought about usually be cyclic tangential loading. Such fretting damage is quite insidious, and may lead to many kinds of problems such as wear, but it is its influence on the promotion of embryo cracks with which we are concerned here. When the presence of fretting is associated with decreased fatigue performance the effect is known as fretting fatigue. Fretting fatigue is a subject drawing equally on materials science and applied mechanics, but it is the intention in this book to concentrate attention entirely on the latter aspects, in a search for the quantification of the influence of fretting on both crack nucleation and propagation. There have been very few previous texts in this area, and the present volume seeks to cover five principal areas; (a) The modelling of contact problems including partial slip under tangentialloading, which produces the surface damage. (b) The modelling of short cracks by rigorous methods which deal effectively with steep stress gradients, kinking and closure. (c) The experimental simulation of fretting fatigue.

The Distributed Dislocation Technique
Proceedings of the International Conference, Lisbon, Portugal, October 4-8, 1993
An Introduction
Proceedings of the IUTAM Symposium held in Copenhagen, Denmark, 24-27 May 1998
Volume II: Viscoplasticity, Damage, Fracture and Contact Mechanics
Parallel Robots

Parallel robots are closed-loop mechanisms presenting very good performances in terms of accuracy, velocity, rigidity and ability to manipulate large loads. They have been used in a large number of applications ranging from astronomy to flight simulators and are becoming increasingly popular in the field of machine-tool industry. This book presents a complete synthesis of the latest results on the possible mechanical architectures, analysis and synthesis of this type of mechanism. It is intended to be used by students (with over 150 exercises and numerous internet addresses), researchers (with over 650 references and anonymous ftp access to the code of some algorithms presented in this book) and engineers (for which practical results, mistakes to avoid, and applications are presented). Since the publication of the first edition (2000) there has been an impressive increase in terms of study and use of this kind of structure that are reported in this book. This second edition has been completely overhauled. The initial chapter on kinematics has been split into Inverse Kinematics and Direct Kinematics. A new chapter on calibration was added. The other

chapters have also been rewritten to a large extent. The reference section has been updated to include around 45% new works that appeared after the first edition.

This volume is a collection of twenty five written contributions by distinguished invited speakers from seven countries to the IUTAM Symposium on Size Effects on Material and Structural Behavior at Micron- and Nano-scales. Size effects on material and structural behaviors are of great interest to physicists, material scientists, and engineers who need to understand and model the mechanical behavior of solids especially at micron- and nano-scales.

This book deals with various computational procedures for multiple repeated analyses (reanalysis) of structures, and presents them in a unified approach. It meets the need for a general text covering the basic concepts and methods as well as recent developments in this area. To clarify the presentation, many illustrative examples and numerical results are demonstrated. Previous books on structural analysis do not cover most of the material presented here.

Proceedings of the fourth European Turbulence Conference 30th June - 3rd July 1992

Proceedings of the Fifth European Turbulence Conference, Siena, Italy, 5–8 July 1994

Proceedings of the IUTAM Symposium held in Cardiff, U.K., 18–22 June 2001

Computational Methods in Elasticity and Plasticity

Thin-Walled Composite Beams

Nonlinear and Stochastic Dynamics of Compliant Offshore Structures