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## KEY=FRACTURE - HAMILTON DUNCAN

**Deformation and Fracture Mechanics of Engineering Materials** "*The sixth edition provides supplemental materials to enhance both the learning and teaching experiences of students and faculty. A number of video recordings have been added to the text to flesh out certain topics; these recordings have been well received in both Lehigh University classrooms and industrial short courses given throughout the world. Special attention is given to discussions and their interpretation of fatigue fracture surface markings in metals and engineering plastics. A new video recording has been created expressly for this edition that eerily connects works of fiction with real events; in one case, a 1949 novel describes a fictional account of the fatigue failure of an imagined commercial airliner that predated the 1954 catastrophic fatigue failure of the da Havilland Comet commercial airliner. Then again, an 1898 novel described the sinking of an imagined cruise liner, named Titan, 14-years before the sinking of the R.M.S. Titanic. The similarities in the sinking of both Titan and Titanic vessels are mesmerizing*"-- **Deformation and Fracture Mechanics of Engineering Materials John Wiley & Sons Incorporated** *This edition comprehensively updates the field of fracture mechanics by including details of the latest research programmes. It contains new material on non-metals, design issues and statistical aspects. The application of fracture mechanics to different types of materials is stressed.* **Deformation and Fracture Mechanics of Engineering Materials John Wiley & Sons Incorporated** *This Third Edition of the well-received engineering materials book has been completely updated, and now contains over 1,100 citations. Thorough enough to serve as a text, and up-to-date enough to serve as a reference. There is a new chapter on*

*strengthening mechanisms in metals, new sections on composites and on superlattice dislocations, expanded treatment of cast and powder-produced conventional alloys, plastics, quantitative fractography, JIC and KIEAC test procedures, fatigue, and failure analysis. Includes examples and case histories.* **Mechanical Behavior of Materials Engineering Methods for Deformation, Fracture, and Fatigue** *Covers stress-strain equations, mechanical testing, yielding and fracture under stress, fracture of cracked members, and fatigue of materials.* **Deformation and Fracture Mechanics of Engineering Materials Deformation and Fracture Behaviour of Polymers Springer Science & Business Media** *This book gives an overview of recent advances in the fracture mechanics of polymers, morphology property correlations, hybrid methods for polymer testing and polymer diagnostics, and biocompatible materials and medical prostheses, as well as application examples and limits.* **INSTRUCTOR'S MANUAL T/A DEFORMATION 4ED HERTZBERG Fracture Mechanics Integration of Mechanics, Materials Science and Chemistry Cambridge University Press** *Fracture and 'slow' crack growth reflect the response of a material (i.e. its microstructure) to the conjoint actions of mechanical and chemical driving forces and are affected by temperature. There is therefore a need for quantitative understanding and modeling of the influences of chemical and thermal environments and of microstructure, in terms of the key internal and external variables, and for their incorporation into design and probabilistic implications. This text, which the author has used in a fracture mechanics course for advanced undergraduate and graduate students, is based on the work of the author's Lehigh University team whose integrative research combined fracture mechanics, surface and electrochemistry, materials science, and probability and statistics to address a range of fracture safety and durability issues on aluminum, ferrous, nickel, and titanium alloys and ceramics. Examples are included to highlight the approach and applicability of the findings in practical durability and reliability problems.* **Multiscale Deformation and Fracture in Materials and Structures The James R. Rice 60th Anniversary Volume Springer Science & Business Media** *Modern Solid Mechanics considers phenomena at many levels, ranging from nano size at atomic scale through the continuum level at millimeter size to large structures at the tens of meter scale. The deformation and fracture behavior at these various scales are inextricably related to interdisciplinary methods derived from applied mathematics, physics, chemistry, and engineering mechanics. This book, in honor of James R. Rice, contains articles from his colleagues and former students that bring these sophisticated methods to bear on a wide range of problems. Articles discussing problems of deformation include topics of dislocation mechanics, second particle effects, plastic yield criterion on porous materials, hydrogen embrittlement, solid state sintering, nanophases at surfaces, adhesion and contact mechanics, diffuse instability in geomaterials, and percolation in metal deformation. In the fracture area, the topics include: elastic-plastic crack growth, dynamic fracture, stress intensity and J-integral analysis, stress-corrosion cracking, and fracture in single crystal, piezoelectric, composite and cementitious materials. The book will be a valuable resource for researchers in modern solid mechanics and can be used as reference or supplementary text in mechanical and civil engineering, applied mechanics, materials science, and engineering graduate courses on fracture mechanics, elasticity, plasticity, mechanics of materials or the*

*application of solid mechanics to processing, and reliability of life predictions.* **Mechanical Behavior of Materials Pearson** *For upper-level undergraduate and graduate level engineering courses in Mechanical Behavior of Materials. Predicting the mechanical behavior of materials Mechanical Behavior of Materials, 5th Edition introduces the spectrum of mechanical behavior of materials and covers the topics of deformation, fracture, and fatigue. The text emphasizes practical engineering methods for testing structural materials to obtain their properties, predicting their strength and life, and avoiding structural failure when used for machines, vehicles, and structures. With its logical treatment and ready-to-use format, the text is ideal for upper-level undergraduate students who have completed an elementary mechanics of materials course. The 5th Edition features many improvements and updates throughout including new or revised problems and questions, and a new chapter on Environmentally Assisted Cracking.* **Mechanisms of Deformation and Fracture Proceedings of the Interdisciplinary Conference Held at the University of Luleå, Luleå, Sweden, September 20-22, 1978 Pergamon Mechanical Behavior of Materials, Global Edition** *For upper-level undergraduate and graduate level engineering courses in Mechanical Behavior of Materials. Predicting the mechanical behavior of materials Mechanical Behavior of Materials, 5th Edition introduces the spectrum of mechanical behavior of materials and covers the topics of deformation, fracture, and fatigue. The text emphasizes practical engineering methods for testing structural materials to obtain their properties, predicting their strength and life, and avoiding structural failure when used for machines, vehicles, and structures. With its logical treatment and ready-to-use format, the text is ideal for upper-level undergraduate students who have completed an elementary mechanics of materials course. The 5th Edition features many improvements and updates throughout including new or revised problems and questions, and a new chapter on Environmentally Assisted Cracking.* **Mechanical Behavior and Fracture of Engineering Materials Springer Nature** *This book presents the theoretical concepts of stress and strain, as well as the strengthening and fracture mechanisms of engineering materials in an accessible level for non-expert readers, but without losing scientific rigor. This volume fills the gap between the specialized books on mechanical behavior, physical metallurgy and material science and engineering books on strength of materials, structural design and materials failure. Therefore it is intended for college students and practicing engineers that are learning for the first time the mechanical behavior and failure of engineering materials or wish to deepen their understanding on these topics. The book includes specific topics seldom covered in other books, such as: how to determine a state of stress, the relation between stress definition and mechanical design, or the theory behind the methods included in industrial standards to assess defects or to determine fatigue life. The emphasis is put into the link between scientific knowledge and practical applications, including solved problems of the main topics, such as stress and strain calculation. Mohr's Circle, yield criteria, fracture mechanics, fatigue and creep life prediction. The volume covers both the original findings in the field of mechanical behavior of engineering materials, and the most recent and widely accepted theories and techniques applied to this topic. At the beginning of some selected topics that by the author's judgement are transcendental for this field of study, the prime references are*

*given, as well as a brief biographical semblance of those who were the pioneers or original contributors. Finally, the intention of this book is to be a textbook for undergraduate and graduate courses on Mechanical Behavior, Mechanical Metallurgy and Materials Science, as well as a consulting and/or training material for practicing engineers in industry that deal with mechanical design, materials selection, material processing, structural integrity assessment, and for researchers that incursion for the first time in the topics covered in this book.* **Deformation and Fracture Behaviour of Polymer Materials Springer** *This book covers the most recent advances in the deformation and fracture behaviour of polymer material. It provides deeper insight into related morphology–property correlations of thermoplastics, elastomers and polymer resins. Each chapter of this book gives a comprehensive review of state-of-the-art methods of materials testing and diagnostics, tailored for plastic pipes, films and adhesive systems as well as elastomeric components and others. The investigation of deformation and fracture behaviour using the experimental methods of fracture mechanics has been the subject of intense research during the last decade. In a systematic manner, modern aspects of fracture mechanics in the industrial application of polymers for bridging basic research and industrial development are illustrated by multifarious examples of innovative materials usage. This book will be of value to scientists, engineers and in polymer materials science.* **Mechanical Properties of Materials Based on Deformation and Fracture Mechanics of Engineering Materials by Richard W. Hertzberg, 4th Ed.; MS4011 Fracture Mechanics of Concrete Applications of Fracture Mechanics to Concrete, Rock and Other Quasi-Brittle Materials John Wiley & Sons** *FRACTURE MECHANICS OF CONCRETE AND ROCK This book offers engineers a unique opportunity to learn, frominternationally recognized leaders in their field, about the latesttheoretical advances in fracture mechanics in concrete, reinforcedconcrete structures, and rock. At the same time, it functions as asuperb, graduate-level introduction to fracture mechanics conceptsand analytical techniques. Reviews, in depth, the basic theory behind fracture mechanics * Covers the application of fracture mechanics to compressionfailure, creep, fatigue, torsion, and other advanced topics * Extremely well researched, applies experimental evidence ofdamage to a wide range of design cases * Supplies all relevant formulas for stress intensity * Covers state-of-the-art linear elastic fracture mechanics (LEFM)techniques for analyzing deformations and cracking * Describes nonlinear fracture mechanics (NLFM) and the latestRILEM modeling techniques for testing nonlinear quasi-brittlematerials * And much more Over the past few years, researchers employing techniques borrowedfrom fracture mechanics have made many groundbreaking discoveriesconcerning the causes and effects of cracking, damage, andfractures of plain and reinforced concrete structures and rock.This, in turn, has resulted in the further development andrefinement of fracture mechanics concepts and tools. Yet, despitethe field's growth and the growing conviction that fracturemechanics is indispensable to an understanding of material andstructural failure, there continues to be a surprising shortage oftextbooks and professional references on the subject. Written by two of the foremost names in the field, FractureMechanics of Concrete fills that gap. The most comprehensive bookever written on the subject, it consolidates the latest theoreticalresearch from around the world in a single reference that can beused by students and*

*professionals alike. Fracture Mechanics of Concrete is divided into two sections. In thefirst, the authors lay the necessary groundwork with an in-depthreview of fundamental principles. In the second section, theauthors vividly demonstrate how fracture mechanics has beensuccessfully applied to failures occurring in a wide array ofdesign cases. Key topics covered in these sections include: * State-of-the-art linear elastic fracture mechanics (LEFM)techniques for analyzing deformations and cracking * Nonlinear fracture mechanics (NLFM) and the latest RILEM modelingtechniques for testing nonlinear quasi-brittle materials * The use of R-Curves to describe cracking and fracture inquasi-brittle materials * The application of fracture mechanics to compression failure,creep, fatigue, torsion, and other advanced topics The most timely, comprehensive, and authoritative book on thesubject currently available, Fracture Mechanics of Concrete is botha complete instructional tool for academics and students instructural and geotechnical engineering courses, and anindispensable working resource for practicing engineers.* **Introduction to Fracture Mechanics Elsevier** *Introduction to Fracture Mechanics presents an introduction to the origins, formulation and application of fracture mechanics for the design, safe operation and life prediction in structural materials and components. The book introduces and informs the reader on how fracture mechanics works and how it is so different from other forms of analysis that are used to characterize mechanical properties. Chapters cover foundational topics and the use of linear-elastic fracture mechanics, involving both K-based characterizing parameter and G-based energy approaches, and how to characterize the fracture toughness of materials under plane-strain and non plane-strain conditions using the notion of crack-resistance or R-curves. Other sections cover far more complex nonlinear-elastic fracture mechanics based on the use of the J-integral and the crack-tip opening displacement. These topics largely involve continuum mechanics descriptions of crack initiation, slow crack growth, eventual instability by overload fracture, and subcritical cracking. Presents how, for a given material, a fracture toughness value can be measured on a small laboratory sample and then used directly to predict the failure (by fracture, fatigue, creep, etc.) of a much larger structure in service Covers the rudiments of fracture mechanics from the perspective of the philosophy underlying the few principles and the many assumptions that form the basis of the discipline Provides readers with a "working knowledge" of fracture mechanics, describing its potency for damage-tolerant design, for preventing failures through appropriate life-prediction strategies, and for quantitative failure analysis (fracture diagnostics)* **Fatigue of Materials Cambridge University Press** *Written by a leading researcher in the field, this revised and updated second edition of a highly successful book provides an authoritative, comprehensive and unified treatment of the mechanics and micromechanisms of fatigue in metals, non-metals and composites. The author discusses the principles of cyclic deformation, crack initiation and crack growth by fatigue, covering both microscopic and continuum aspects. The book begins with discussions of cyclic deformation and fatigue crack initiation in monocrystalline and polycrystalline ductile alloys as well as in brittle and semi-/non-crystalline solids. Total life and damage-tolerant approaches are then introduced in metals, non-metals and composites followed by more advanced topics. The book includes an extensive bibliography and a problem set for each chapter, together with worked-out example problems and*

*case studies. This will be an important reference for anyone studying fracture and fatigue in materials science and engineering, mechanical, civil, nuclear and aerospace engineering, and biomechanics.* **Deformation and Fracture Mechanics of Engineering Materials Solutions Manual Wiley Mechanical Behaviour of Engineering Materials Metals, Ceramics, Polymers, and Composites Springer Science & Business Media** *How do engineering materials deform when bearing mechanical loads? To answer this crucial question, the book bridges the gap between continuum mechanics and materials science. The different kinds of material deformation are explained in detail. The book also discusses the physical processes occurring during the deformation of all classes of engineering materials and shows how these materials can be strengthened to meet the design requirements. It provides the knowledge needed in selecting the appropriate engineering material for a certain design problem. This book is both a valuable textbook and a useful reference for graduate students and practising engineers.* **Deformation and Fracture of Solid-State Materials Field Theoretical Approach and Engineering Applications Springer** *This volume introduces a comprehensive theory of deformation and fracture to engineers and applied scientists. Here “comprehensive” means that the theory can describe all stages of deformation from elastic to plastic and plastic to fracturing stage on the same basis (equations). The comprehensive approach is possible because the theory is based on a fundamental physical principle called the local symmetry, or gauge invariance, as opposed to phenomenology. Professor Yoshida explains the gist of local symmetry (gauge invariance) intuitively so that engineers and applied physicists can digest it easily, rather than describing physical or mathematical details of the principle. The author also describes applications of the theory to practical engineering, such as nondestructive testing in particular, with the use of an optical interferometric technique called ESPI (Electronic Speckle-Pattern Interferometry).The book is not a manual of applications. Instead, it provides information on how to apply physical concepts to engineering applications.* **Time-Dependent Fracture Mechanics Springer Science & Business Media** *Intended for engineers, researchers, and graduate students dealing with materials science, structural design, and nondestructive testing and evaluation, this book represents a continuation of the author's "Fracture Mechanics" (1997). It will appeal to a variety of audiences: The discussion of design codes and procedures will be of use to practicing engineers, particularly in the nuclear, aerospace, and pipeline industries; the extensive bibliography and discussion of recent results will make it a useful reference for academic researchers; and graduate students will find the clear explanations and worked examples useful for learning the field. The book begins with a general treatment of fracture mechanics in terms of material properties and loading and provides up-to-date reviews of the ductile-brittle transition in steels and of methods for analyzing the risk of fracture. It then discusses the dynamics of fracture and creep in homogeneous and isotropic media, including discussions of high-loading-rate characteristics, the behavior of stationary cracks in elastic media under stress, and the propagation of cracks in elastic media. This is followed by an analysis of creep and crack initiation and propagation, describing, for example, the morphology and incubation times of crack initiation and growth and the effects of high temperatures. The book concludes with treatments of cycling deformation and fatigue,*

*creep-fatigue fractures, and crack initiation and propagation. Problems at the end of each chapter serve to reinforce and test the student's knowledge and to extend some of the discussions in the text. Solutions to half of the problems are provided.* **High Temperature Deformation and Fracture of Materials Elsevier** *The energy, petrochemical, aerospace and other industries all require materials able to withstand high temperatures. High temperature strength is defined as the resistance of a material to high temperature deformation and fracture. This important book provides a valuable reference to the main theories of high temperature deformation and fracture and the ways they can be used to predict failure and service life. Analyses creep behaviour of materials, the evolution of dislocation substructures during creep, dislocation motion at elevated temperatures and importantly, recovery-creep theories of pure metals Examines high temperature fracture, including nucleation of creep cavity, diffusional growth and constrained growth of creep cavities A valuable reference to the main theories of high temperature deformation and fracture and the ways they can be used to predict failure and service life* **Deformation and Fracture Mechanics of Engineering Materials Fundamentals of Fracture Mechanics Gruppo Italiano Frattura Analysis of Engineering Structures and Material Behavior John Wiley & Sons** *Analysis of Engineering Structures and Material Behavior Professor Josip Brnic, University of Rijeka, Croatia Theoretical and experimental study of the mechanical behavior of structures under load Analysis of Engineering Structures and Material Behavior is a textbook covering introductory and advanced topics in structural analysis. It begins with an introduction to the topic, before covering fundamental concepts of stress, strain and information about mechanical testing of materials. Material behaviors, yield criteria and loads imposed on the engineering elements are also discussed. The book then moves on to cover more advanced areas including relationships between stress and strain, rheological models, creep of metallic materials and fracture mechanics. Finally, the finite element method and its applications are considered. Key features: Covers introductory and advanced topics in structural analysis, including load, stress, strain, creep, fatigue and finite element analysis of structural elements. Includes examples and considers mathematical formulations. A pedagogical approach to the topic. Analysis of Engineering Structures and Material Behavior is suitable as a textbook for structural analysis and mechanics courses in structural, civil and mechanical engineering, as well as a valuable guide for practicing engineers.* **Mechanics of Materials A Modern Integration of Mechanics and Materials in Structural Design Academic Press** *&Quot;The unifying treatment of structural design presented here should prove useful to any engineer involved in the design of structures. A crucial divide to be bridged is that between applied mechanics and materials science. The onset of specialization and the rapid rise of technology, however, have created separate disciplines concerned with the deformation of solid materials. Unfortunately, the result is in many cases that society loses out on having at their service efficient, high-performance material/structural systems.". "We follow in this text a very methodological process to introduce mechanics, materials, and design issues in a manner called total structural design. The idea is to seek a solution in "total design space."". "The material presented in this text is suitable for a first course that encompasses both the traditional mechanics of materials and properties of materials*

*courses. The text is also appropriate for a second course in mechanics of materials or a follow-on course in design of structures, taken after the typical introductory mechanics and properties courses. This text can be adapted to several different curriculum formats, whether traditional or modern. Instructors using the text for a traditional course may find that the text in fact facilitates transforming their course over time to a more modern, integrated approach."--BOOK JACKET.* **Advances in Fracture Research Elsevier** *Fracture is a major cause of failure in metallic and non-metallic materials and structures. An understanding of the micro- and macro-mechanisms of fracture enables materials scientists to develop materials with high fracture resistance, which in turn helps engineers and designers to ensure the soundness and integrity of structures made from these materials. The International Congress on Fracture is held every four years and is an occasion to take stock of the major achievements in the broad field of fracture, to honour those who have made lasting contributions to this field, and to reflect on the future directions. ICF9 is published in six volumes covering the areas of:- - Failure Analysis, Remaining Life Assessment, Life Extension and Repair - Failure of Multiphase and Non-Metallic Materials - Fatigue of Metallic and Non-Metallic Materials and Structures - Theoretical and Computational Fracture Mechanics and New Directions - Testing and Characterization Methods, and Interfacial Fracture Mechanics - High Strain Rate Fracture and Impact Mechanics.* **Physics of Strength and Fracture Control Adaptation of Engineering Materials and Structures CRC Press** *Still passive and for the most part uncontrollable, current systems intended to ensure the reliability and durability of engineering structures are still in their developmental infancy. They cannot make corrections or recondition materials, and most material and structural failures cannot be predicted. Accidents-and catastrophes-result. Physics of Strength and Fracture Control: Adaptation of Engineering Materials and Structures introduces a new physical concept in the science of the resistance of materials to external effects, a concept that opens completely new avenues for improving the strength and safety of engineered objects. Based on a thermodynamic equation of state of solids derived by the author, the approach provides a general methodology for treating all the physical and mechanical properties of materials, regardless of their nature and physical state. The author shows that this approach enables the control of the stressed-deformed state both to prevent failures and fractures and to promote them for easier shaping of materials. He uses this methodology to present and discuss non-traditional but practical ways of solving real-world problems. Of enormous theoretical and practical significance, this groundbreaking work ushers in a new stage in the science of material strength. It opens the door to systematic ways to design materials, control their operating properties, and predict their behavior under specific operating conditions.* **Mechanical Behavior of Materials Fundamentals, Analysis, and Calculations Springer Nature** *This textbook supports a range of core courses in undergraduate materials and mechanical engineering curricula given at leading universities globally. It presents fundamentals and quantitative analysis of mechanical behavior of materials covering engineering mechanics and materials, deformation behavior, fracture mechanics, and failure design. This book provides a holistic understanding of mechanical behavior of materials, and enables critical thinking through mathematical modeling and problem solving. Each of the 15 chapters first introduces*

*readers to the technologic importance of the topic and provides basic concepts with diagrammatic illustrations; and then its engineering analysis/mathematical modelling along with calculations are presented. Featuring 200 end-of-chapter calculations/worked examples, 120 diagrams, 260 equations on mechanics and materials, the text is ideal for students of mechanical, materials, structural, civil, and aerospace engineering.* **Engineering Solid Mechanics Fundamentals and Applications Routledge** *Engineering Solid Mechanics bridges the gap between elementary approaches to strength of materials and more advanced, specialized versions on the subject. The book provides a basic understanding of the fundamentals of elasticity and plasticity, applies these fundamentals to solve analytically a spectrum of engineering problems, and introduces advanced topics of mechanics of materials - including fracture mechanics, creep, superplasticity, fiber reinforced composites, powder compacts, and porous solids. Text includes: stress and strain, equilibrium, and compatibility elastic stress-strain relations the elastic problem and the stress function approach to solving plane elastic problems applications of the stress function solution in Cartesian and polar coordinates Problems of elastic rods, plates, and shells through formulating a strain compatibility function as well as applying energy methods Elastic and elastic-plastic fracture mechanics Plastic and creep deformation Inelastic deformation and its applications This book presents the material in an instructive manner, suitable for individual self-study. It emphasizes analytical treatment of the subject, which is essential for handling modern numerical methods as well as assessing and creating software packages. The authors provide generous explanations, systematic derivations, and detailed discussions, supplemented by a vast variety of problems and solved examples. Primarily written for professionals and students in mechanical engineering, Engineering Solid Mechanics also serves persons in other fields of engineering, such as aerospace, civil, and material engineering.* **Mechanics and Mechanisms of Fracture An Introduction ASM International Fracture Mechanics Academic Press** *Fracture Mechanics covers classical and modern methods and introduce new/unique techniques, making this text an important resource for anyone involved in the study or application of fracture mechanics. Using insights from leading experts in fracture mechanics, it provides new approaches and new applications to advance the understanding of crack initiation and propagation. With a concise and easily understood mathematical treatment of crack tip fields, this book provides the basis for applying fracture mechanics in solving practical problems. It features a unique coverage of bi-material interfacial cracks, with applications to commercially important areas of composite materials, layered structures, and microelectronic packaging. A full chapter is devoted to the cohesive zone model approach, which has been extensively used in recent years to simulate crack propagation. A unified discussion of fracture criteria involving nonlinear/plastic deformations is also provided. This book offers a problem-solving approach to engineering thermodynamics supported with motivational case studies, historical vignettes, and applications to modern engineering issues, accompanied by a separate thermodynamic tables booklet. It will be an invaluable resource for mechanical, aerospace, civil, and biomedical engineers in the field of mechanics as well as for graduate students and researchers studying mechanics. Concise and easily understood mathematical treatment of crack tip fields (chapter 3)*

*provides the basis for applying fracture mechanics in solving practical problems Unique coverage of bi-material interfacial cracks (chapter 8), with applications to commercially important areas of composite materials, layered structures, and microelectronic packaging A full chapter (chapter 9) on the cohesive zone model approach, which has been extensively used in recent years to simulate crack propagation A unified discussion of fracture criteria involving nonlinear/plastic deformations* **Micro- and Macromechanical Properties of Materials CRC Press** *This is an English translation of a Chinese textbook that has been designated a national planned university textbook, the highest award given to scientific textbooks in China. The book provides a complete overview of mechanical properties and fracture mechanics in materials science, mechanics, and physics. It details the macro- and micro-mechanical properties of metal structural materials, nonmetal structural materials, and various functional materials. It also discusses the macro and micro failure mechanism under different loadings and contains research results on thin film mechanics, smart material mechanics, and more.* **The Physics of Deformation and Fracture of Polymers Cambridge University Press** *Demonstrating through examples, this book presents a mechanism-based perspective on the broad range of deformation and fracture response of solid polymers. It draws on the results of probing experiments and considers the similar mechanical responses of amorphous metals and inorganic compounds to develop advanced methodology for generating more precise forms of modelling. This, in turn, provides a better fundamental understanding of deformation and fracture phenomena in solid polymers. Such mechanism-based constitutive response forms have far-reaching application potential in the prediction of structural responses and in tailoring special microstructures for tough behaviour. Moreover, they can guide the development of computational codes for deformation processing of polymers at any level. Applications are wide-ranging, from large strain industrial deformation texturing to production of precision micro-fluidic devices, making this book of interest to both advanced graduate students and to practising professionals.* **Fracture Mechanics With an Introduction to Micromechanics Springer Science & Business Media** *- self-contained and well illustrated - complete and comprehensive derivation of mechanical/mathematical results with enphasis on issues of practical importance - combines classical subjects of fracture mechanics with modern topics such as microheterogeneous materials, piezoelectric materials, thin films, damage - mechanically and mathematically clear and complete derivations of results* **Fracture of Non-Metallic Materials Proceeding of the 5th Advanced Seminar on Fracture Mechanics, Joint Research Centre, Ispra, Italy, 14–18 October 1985 on collaboration with the European Group on Fracture Springer Science & Business Media** *This book contains the lectures of the 5th Advanced Seminar on Fracture Mechanics (ASFM 5) held at the Joint Research Centre, Ispra, on 14-18 October 1985. The series of the ASFMs is one of the two main regularly scheduled international events sponsored by the European Group on Fracture (EGF) , alternating with the European Conferences of Fracture (ECFS). Whereas ECFs are held in a different place on even years (the last. ECF6,was in Amsterdam in June 1986), ASFMs are hosted at the JRC Ispra on odd years. This establishment belonging to the Commission of the European Communities performs research work of common interest to the EC*

*Member countries. One of the activities of the JRC-Ispra is the organization of Ispra-Courses aiming at the transfer of knowledge and the strengthening of exchanges and ties between European scientific workers. ASFMs are designed to give an advanced level treatment in selected areas of fracture mechanics. Previous ASFMs had been devoted to elastic-plastic fracture mechanics and to subcritical crack growth due to fatigue, stress corrosion and creep. In the early stages of preparation of ASFM5 it was decided to concentrate on a new theme, the fracture phenomena and fracture mechanics of non-metallic materials. Whereas fracture mechanics started with the study of glass by Griffith, its later developments centered predominantly on metallic alloys. However, in recent years non-metallic materials have found increasing uses and correspondingly efforts have been made to develop testing and prediction methods for these materials.* **Mechanics of Strain Gradient Materials Springer Nature** *Over the past 50 years, strain gradient material theories have been developed for the continuum modeling of size effects in materials and structures in terms of their elasticity, plasticity and fracturing. This book puts forward a unifying perspective to combine existing theories involving the higher order gradient of the strain tensor, or of plastic strain. It begins by reviewing experimental findings on the existence (or non-existence) of size effects on the mechanics of materials. In turn, the book devises first, second and higher order strain gradient theories from general principles, and presents constitutive frameworks that satisfy thermodynamic requirements. The special case of strain gradient plasticity is then developed and illustrated via computational analyses of size effects on the plasticity of metals at small scales. In closing, the book explains the origin of gradient effects in the case of lattice structures by drawing on homogenization theory.* **Mechanics of Finite Deformation and Fracture CRC Press** *This important work covers the fundamentals of finite deformation in solids and constitutive relations for different types of stresses in large deformation of solids. In addition, the book covers the fracture phenomena in brittle or quasi-brittle materials in which large deformation does not occur. The book provides a thorough understanding of fracture mechanics as well. Since mathematical proof with full derivation is demonstrated throughout the book, readers will gain the skills to understand and drive the basic concepts on their own, enabling them to put forward new ideas and solutions. Finite deformations in material can occur with change of geometry such that the deformed shape may not resemble the initial shape. Analyzing these types of deformations needs a particular mathematical tool that is always associated with tensor notations. In general the geometry may be non-orthogonal, and the use of covariant and contra-variant tensor concepts to express the finite deformations and the associated mechanical strains are needed. In addition, it is obvious that in large deformations, there are several definitions for stress, each depending on the frame of the stress definitions. The constitutive equations in material also depends on the type of stress that is introduced. In simulation of the material deformation, components of the deformation tensor will be transformed from one frame to another either in orthogonal or in non-orthogonal coordinate of geometry. This informative book covers all this in detail.* **Fracture Mechanics Springer Science & Business Media** *Intended for engineers from a variety of disciplines dealing with structural materials, this text describes the current state of knowledge. It begins by describing the fracture*

*process at the two extremes of scale: first in the context of atomic structures, then in terms of a continuous elastic medium. Treating the fracture process in increasingly sophisticated ways, the book then considers plastic corrections and the procedures for measuring the toughness of materials. Practical considerations are then discussed, including crack propagation, geometry dependence, flaw density, mechanisms of failure by cleavage, the ductile-brittle transition, and continuum damage mechanics. The whole is rounded off with discussions of generalised plasticity and the link between the microscopic and macroscopic aspects, and problems are provided at the end of each chapter.*