

Mathematical Theory of Dislocations and Fracture

R. W. LARDNER



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John Price Hirth, Jens Lothe



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Mathematical Theory of Dislocations and Fracture R. W. Lardner, 1971-12 Concise logical and mathematically rigorous this introduction to the theory of dislocations is addressed primarily to students and researchers in the general areas of mechanics and applied mathematics Its scope encompasses those aspects of dislocation theory which are closely related to the theories of elasticity and macroscopic plasticity to modern continuum mechanics and to the theory of cracks and fracture The volume incorporates several new and original pieces of work including a development of the theory of dislocation motion and plastic strain for non linear materials a new discussion of the line tension model revised calculations of the Peierls resistance and a new development of the van der Merwe theory of crystal interfaces *Mathematical Theory of Dislocations and Fracture* R. W. Lardner, 1974 Concise logical and mathematically rigorous this introduction to the theory of dislocations is addressed primarily to students and researchers in the general areas of mechanics and applied mathematics Its scope encompasses those aspects of dislocation theory which are closely related to the theories of elasticity and macroscopic plasticity to modern continuum mechanics and to the theory of cracks and fracture The volume incorporates several new and original pieces of work including a development of the theory of dislocation motion and plastic strain for non linear materials a new discussion of the line tension model revised calculations of the Peierls resistance and a new development of the van der Merwe theory of crystal interfaces **Theory of Dislocations** Peter M. Anderson, John P. Hirth, Jens Lothe, 2017-01-16 This book provides a comprehensive understanding of the nucleation motion and interaction between crystalline defects called dislocations **Mathematical Theory of Dislocations** Toshio Mura, 1969 Theory of Electroelasticity Zhen-Bang Kuang, 2013-08-04 Theory of Electroelasticity analyzes the stress strain electric field and electric displacement in electroelastic structures such as sensors actuators and other smart materials and structures This book also describes new theories such as the physical variational principle and the inertial entropy theory It differs from the traditional method by using the physical variational principle to derive the governing equations of the piezoelectric material whereas the Maxwell stress is obtained automatically By using the inertial entropy theory the temperature wave equation is obtained very easily The book is intended for scientists researchers and engineers in the areas of mechanics physics smart material and control engineering as well as mechanical aeronautical and civil engineering etc Zhen Bang Kuang is a professor at Shanghai Jiao Tong University **Physics of Elasticity and Crystal Defects** Adrian P. Sutton, 2024 Properties of crystalline materials are almost always governed by the defects within them The ability to shape metals and alloys into girders furniture automobiles and medical prostheses stems from the generation motion and interaction of these defects Crystal defects are also the agents of chemical changes within crystals enabling mass transport by diffusion and changes of phase The distortion of the crystal created by a defect enables it to interact with other defects over distances much greater than the atomic scale The theory of elasticity is used to describe these interactions Physics of Elasticity and Crystal Defects 2nd Edition is an

introduction to the theory of elasticity and its application to point defects dislocations grain boundaries inclusions and cracks A unique feature of the book is the treatment of the relationship between the atomic structures of defects and their elastic fields Another unique feature is the last chapter which describes five technologically important areas requiring further fundamental research with suggestions for possible PhD projects There are exercises for the student to check their understanding as they work through each chapter with detailed solutions There are problems set at the end of each chapter also with detailed solutions In this second edition the treatment of the Eshelby inclusion has been expanded into a chapter of its own with complete self contained derivations of the elastic fields inside and outside the inclusion This is a textbook for postgraduate students in physics engineering and materials science Even students and professionals with some knowledge of elasticity and defects will almost certainly find much that is new to them in this book

Mathematical Theory of Elasticity of Quasicrystals and Its Applications Tianyou Fan, 2011-05-25 This interdisciplinary work covering the continuum mechanics of novel materials condensed matter physics and partial differential equations discusses the mathematical theory of elasticity of quasicrystals a new condensed matter and its applications by setting up new partial differential equations of higher order and their solutions under complicated boundary value and initial value conditions The new theories developed here dramatically simplify the solving of complicated elasticity equation systems Large numbers of complicated equations involving elasticity are reduced to a single or a few partial differential equations of higher order Systematical and direct methods of mathematical physics and complex variable functions are developed to solve the equations under appropriate boundary value and initial value conditions and many exact analytical solutions are constructed The dynamic and non linear analysis of deformation and fracture of quasicrystals in this volume presents an innovative approach It gives a clear cut strict and systematic mathematical overview of the field Comprehensive and detailed mathematical derivations guide readers through the work By combining mathematical calculations and experimental data theoretical analysis and practical applications and analytical and numerical studies readers will gain systematic comprehensive and in depth knowledge on continuum mechanics condensed matter physics and applied mathematics

Bulletin of the American Mathematical Society American Mathematical Society, 1976

Unified Theory of the Mechanical Behavior of Matter M. J. Marcinkowski, 1979

Theory of Dislocations John Price Hirth, Jens Lothe, 1992 Presents a comprehensive treatment of the fundamentals of dislocations This book covers the elastic theory of straight and curved dislocations and includes a chapter on elastic anisotropy It also presents applications to the theory of dislocation motion at low and high temperatures

Mathematical Theory Of Elasticity And Generalized Dynamics Of Quasicrystals And Its Applications Tian-you Fan, Xian-fang Li, Xiao-hong Sun, Ming-jun Huang, Yu-chu Liu, 2023-12-27 This book gives a detailed description on mathematical theory of elasticity and generalized dynamics of solid quasicrystals and its applications The Chinese edition of the book *Mathematical Theory of Elasticity of Quasicrystals and Its Applications* was published by the Beijing Institute of

Technology Press in 1999 written by Prof Tian You Fan In this English edition of the book the phonon phason dynamics defect dynamics and hydrodynamics of solid quasicrystals are included so the scope of the book is beyond elasticity Hence the title in this edition is changed to Mathematical Theory of Elasticity and Generalized Dynamics of Quasicrystals and Its Applications This book is the first and only monograph in the scope of quasicrystals since first published in 1999 in China and worldwide In this edition the two dimensional quasicrystals of second kind soft matter quasicrystals and photonic bade gap and application of photonic quasicrystals are added This book combines the mechanical and physical behavior of quasicrystals and mathematical physics which may help graduate students and researchers in the fields of new materials condensed matter physics applied mathematics and engineering science

Proceedings of the ... Congress of the Indian Society of Theoretical and Applied Mechanics Indian Society of Theoretical and Applied Mechanics.

Congress,1975 **The American Mathematical Monthly** ,1976 Includes articles as well as notes and other features about mathematics and the profession *Dislocations in Solids* Xanthippi Markenscoff,1984 **Physics in Canada** ,1975

Gauge Theory and Defects in Solids D.G.B. Edelen,D.C. Lagoudas,1988-02 This new series Mechanics and Physics of Discrete Systems aims to provide a coherent picture of the modern development of discrete physical systems Each volume will offer an orderly perspective of disciplines such as molecular dynamics crystal mechanics and or physics dislocation etc Emphasized in particular are the fundamentals of mechanics and physics that play an essential role in engineering applications Volume 1 Gauge Theory and Defects in Solids presents a detailed development of a rational theory of the dynamics of defects and damage in solids Solutions to field equations are used to determine stresses dislocation densities and currents that arise from histories of loading of boundaries of bodies Analysed in detail is a gauge theory with a gauge group that is not semi simple and whose action occurs at the classical macroscopic level Yang Mills theory is applied where the state variables are elastic displacements in solids determination of mechanical and electromagnetic observables by choice of gauge conditions is demonstrated and practices of classical dislocation theory are derived from first principles **Theory of Earthquake Premonitory and Fracture Processes** Roman Teisseyre,1995 *Recent Developments in Elasticity* American Society of Mechanical Engineers. Winter Annual Meeting,1991 The Publishers' Trade List Annual ,1980 **Subject Catalog, 1975** Library of Congress,1975

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