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The aim of the book is the presentation of the fundamental mathematical and physical concepts of continuum mechanics of solids in a unified description, so as to bring the young researchers rapidly closer to their research area.

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Nonlinear Continuum Mechanics



Yavuz Başar
Dieter Weichert

Nonlinear Continuum Mechanics of Solids

Fundamental mathematical and physical concepts



Springer

Yavuz Başar · Dieter Weichert

Nonlinear Continuum Mechanics of Solids

Fundamental Mathematical and Physical Concepts

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Nonlinear Continuum Mechanics Of Solids:

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Hernández, Arturo N. Fontan, 2021-06-28 Deformable solids that is to say those which undergo changes in geometry when subjected to external loads or other types of solicitations as well as other related topics are the focus of this book Within the main field this text deals with advanced linear elasticity and plasticity approaches and the behavioural study of more complex types of materials This includes composites of more recent manufacture and others whose material characterisation has only recently been possible It also describes how linear elastic behaviour extends to anisotropic materials in general and how deformations can result in small or large strain components The information on plastic behaviour expands to include strain

hardening of the materials Amongst other new topics incorporated into this volume are studies of hyperelastic materials which can represent elastomeric and some types of biological materials A section of the book deals with viscoelastic materials i e those who deform when subjected to long term loads The behaviour of viscoplasticity as well as elasto viscoplasticity describes well other types of materials including those present in many geotechnical sites The objective of this volume is to present material that can be used for teaching continuum mechanics to students of mechanical civil or aeronautical engineering In order to understand the contents the reader only needs to know linear algebra and differential calculus Examples have been included throughout the text and at the end of each chapter exercises are presented which can be used to check on comprehension of the theoretical information presented

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of the boundary changing its position during crack propagation with the related configurational force typically the J integral driving its evolution thereby consuming power typically expressed as the energy release rate Taken together configurational mechanics is an unconventional branch of continuum physics rationalising and unifying the tendency of a continuum body to change its material configuration It is thus the ideal formulation to tackle sophisticated problems in continuum defect mechanics Configurational mechanics is entirely free of restrictions regarding geometrical and constitutive nonlinearities and offers an accompanying versatile computational approach to continuum defect mechanics In this monograph I present a detailed summary account of my approach towards configurational mechanics thereby fostering my view that configurational forces are indeed dissipation consistent to configurational changes

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