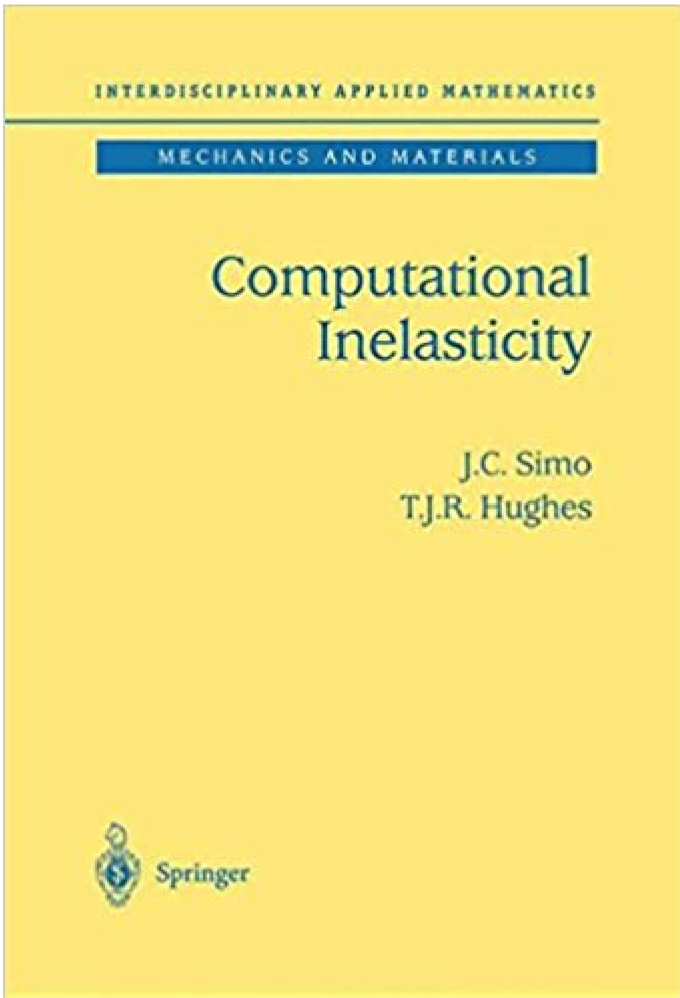
Computational Inelasticity (Interdisciplinary Applied Mathematics) (v. 7)



Synopsis

A description of the theoretical foundations of inelasticity its numerical formulation and implementation constituting a representative sample of state of the art methodology currently used in inelastic calculations Among the numerous topics covered are small deformation plasticity and viscoplasticity convex optimisation theory integration algorithms for the constitutive equation of plasticity and viscoplasticity the variational setting of boundary value problems and discretization by finite element methods Also addressed are the generalisation of the theory to non smooth yield surface mathematical numerical analysis issues of general return mapping algorithms the generalisation to finite strain inelasticity theory objective integration algorithms for rate constitutive equations the theory of hyperelastic based plasticity models and small and large deformation viscoelasticity Of great interest to researchers and graduate students in various branches of engineering especially civil aeronautical and mechanical and applied mathematics This book goes back a long way There is a tradition of research and teaching in inelasticity at Stanford that goes back at least to Wilhelm Flugge and Erastus Lee I joined the faculty in 1980 and shortly thereafter the Chairman of the Applied Mechanics Division George Herrmann asked me to present a course in plasticity I decided to develop a new two quarter sequence entitled Theoretical and C putational Plasticity which combined the basic theory I had learned as a graduate student at the University of California at Berkeley from David Bogy James Kelly Jacob Lubliner and Paul Naghdi with new computational techniques from the nite element literature and my personal research I taught the course a couple of times and developed a set of notes that I passed on to Juan Simo when he joined thefacultyin1985 IwasChairmanatthattimeandIaskedJuantofurtherdevelop the course into a full year covering inelasticity from a

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Customer Reviews

A description of the theoretical foundations of inelasticity, its numerical formulation and implementation, constituting a representative sample of state-of-the-art methodology currently used in inelastic calculations. Among the numerous topics covered are small deformation plasticity and viscoplasticity, convex optimisation theory, integration algorithms for the constitutive equation of plasticity and viscoplasticity, the variational setting of boundary value problems and discretization by finite element methods. Also addressed are the generalisation of the theory to non-smooth yield surface, mathematical numerical analysis issues of general return mapping algorithms, the generalisation to finite-strain inelasticity theory, objective integration algorithms for rate constitutive equations, the theory of hyperelastic-based plasticity models and small and large deformation viscoelasticity. Of great interest to researchers and graduate students in various branches of engineering, especially civil, aeronautical and mechanical, and applied mathematics.

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the bible in the material modeling.

the book is in excellent condition and reached me well before the estimated time. Worth the money...Great transaction and look forward for many more ahead on .

I bought this book several years ago, and keep going back and study more in it. As usual, I didn’t read it from front to back. Instead I started from the middle, jumped around and then settled for chapter 7. That’s mainly a review of continuum mechanics, and one of the reasons I keep this book handy. It is very comprehensive and very clear. I think the reason Simo and Hughes could explain things so clear is because they just really deeply understood it. There is hardly any superfluous talking or name dropping, it’s all just clear, well printed math and neat little diagrams that lets you get the point. Somehow I understood chapters 8 and 9 much better by first reading chapter 10 on nonlinear viscoelasticity, finally getting the idea of dissipative processes in solids, and how one can actually compute all this. Recently I studied more of the first part of the book: finally this stuff about yield surfaces makes sense. It’s a real mystery buster. Another thing that makes this book very useful are the boxes: detailed algorithms, neatly printed, that actually work if you turn them into computer code. In general, this book is not for total beginners, but if you understand the very basic mathematical underpinnings for continuum mechanics, this will bring you to the next level. If you get stuck, read around in other books, but go back to this one, because that’s were you will understand.

The book had been in the making at Stanford for some time. I happened to use a manuscript of it in 1991 at Virginia Tech. I was pleasantly surprised how quickly a student could pick up relevant aspects of compuatational plasticity from this book; the book has a style of its own. We have successfully used the book in programming the integral (or endochronic) hardening rule with the incremental theory of plasticity. The book surely makes a useful companion to a plasticity textbook.It is disheartening to see that the numerical schemes for the integration of the constitutive equations of the endochronic theory are missing from the book.

This textbook covers very classical areas of solid mechanics. But it differs from the previous texts in providing the right numerical framework for the implementation of these classical ideas. It also contains some very recent results in constitutive modelling developed by the authors (eminent Stanford University academicians).For all those in the Finite Element industry, doing numerical modelling work, this will be an excellent text/reference.

Pros: gives numerical solution algorithms for isotropic and kinematic hardening, etc; covers a wide range of plasticity problems.Cons: lack of detailed step by step deduction for some important equations, difficult to swallow by first time learners

I strongly recommend this book. It gives insights that no other books give. A solid mathematical background and a wide scope are the fundamental book characteristics.

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