Rezensionen

Bürgel, R.:
Festigkeitslehre und Werkstoffmechanik
Vieweg Verlag 2005,
Band 1: ISBN 3-8348-0077-5,
€ 25,90, 256 S., 181 Abb., 10 Tab.
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€ 25,90, 236 S., 152 Abb., 26 Tab.

Es ist leider eine eingefahrene Tradition im deutschen akademischen Bereich, dass die Werkstoffwissenschaften und die Mechanik wie zwei voneinander getrennte Wissensgebiete behandelt werden, was im klaren Widerspruch zu den vielfältigen inhaltlichen Zusammenhängen zwischen ihnen steht. Um so positiver sind deshalb alle Versuche zu bewerten, hier Gräben zuzuschütten oder Brücken zu bauen. In der letzten Zeit ist dies durch mindestens zwei Buchveröffentlichungen versucht worden, nämlich durch Rösler/ Harders/ Bäker: *Mechanisches Verhalten der Werkstoffe* (s. Besprechung in Band 24, Heft 4/2004) und das vorliegende zweibändige Werk. In beiden Fällen sind die Autoren Werkstoffwissenschaftler und keine Mechaniker, was dann auch nicht ohne Wirkung auf das Produkt bleibt.

Ralf Bürgel lehrt an der Fachhochschule Osnabrück und bringt seine Lehrerfahrungen in die Darstellung dieser beiden vorliegenden Bücher ein. Der erste Band behandelt die Grundlagen der Festigkeitslehre. Diese wird an den Grundbelastungszuständen wie Zug/Druck, Scherung, Torsion und Biegung entwickelt, wobei bereits umfangreiche Anmerkungen zu den experimentellen und werkstoffkundlichen Zusammenhängen gemacht werden. Der zweite Band widmet sich dann insbesondere der für Maschinenbauer wichtigsten Materialklasse der Metalle und geht tiefer in die werkstoffkundlichen Erklärungen von Deformationen und Versagen ein. Insbesondere die Ermüdung, die Wirkung von Spannungskonzentrationen, Risse und unterschiedlichste Versagensmechanismen werden ausführlich erläutert.

Nun ist es ein alter Streit unter den Lehrenden, ob ein induktives oder ein deduktives Vorgehen sinnvoller ist. Der Autor hat sich klar für ersteres entschieden. Die Gefahr ist dabei groß, dass der prinzipielle Zusammenhang in der Fülle der Einzelheiten nicht genügend klar wird. Konkret: dass die vielen speziellen Deformations- und Spannungszustände, die diskutiert werden, den Blick auf den allgemeinen dreidimensionale Zustand verstellen.

Wir wollen auch nicht verschweigen, dass viele Behauptungen in den beiden Bänden mutig, vielleicht sogar waghalsig, in jedem Falle aber unbewiesen sind. Es seien einige Beispiele gegeben.

Auf Seite 8 wird behauptet, dass Normalspannungen zu Dehnungen und Schubspannungen zu Scherungen führen, und zwar exklusiv. Stimmt dies auch für anisotrope Materialien?
Auf Seite 18 wird behauptet, dass die Querkontraktionszahl immer positiv sei. Gibt es wirklich keine auxenischen Materialien?
Auf Seite 47 wird behauptet, dass es sich bei einer Scherung immer um einen mehrachsigen Spannungszustand handele. Zwei Seiten später wird dann schon das Gegenbeispiel geliefert.
Auf Seite 129 wird folgende gewagte Behauptung aufgestellt: Während abhängig von der Belastungsart (...) ein-, zwei- oder dreiachsige Spannungszustände auftreten können, ist der Verformungszustand in der Regel dreiachsig. Ist das so?
Manche Definition in dem Buch wiederholt auch einfach nur triviale Unwahrheiten. So ist die Spannung i. A. nicht "Kraft durch Fläche" (S. 6), und die Arbeit gerade nicht "Kraft mal Weg" (S. 164).

Ansonsten handelt es sich aber sicherlich um gut zu lesende Lehrbücher, die viele interessante Zusammenhänge aufzeigen, wie es nur jemand kann, der über viel Erfahrung auf diesen Gebieten verfügt. Auch dienen die zahlreichen Aufgaben und Fragestellungen in ihrer Mehrzahl der besseren Verständnis einer komplizierten und komplexen Materie. Insofern kann man diese Bücher sicherlich zum Studium empfehlen. Es sei dem Autor jedoch angeraten, vor einer eventuellen Neuauflage die beiden Bücher von einem Mechaniker gegenlesen zu lassen, um derartige Fragwürdigkeiten - von denen es sehr viele gibt - zu eliminieren. Dasselbe gilt i. Ü. auch für das oben angeführte Buch von Rösler et al. Es wurde ein Brückenschlag zwischen zwei Wissenschaften versucht, und das ist sicherlich lobenswert. Aber leider ist der Brückenkopf auf dem mechanischen Ufer noch erheblich weniger belastbar geraten, als der auf dem werkstoffkundlichen. Ersterer könnte noch ausgebaut werden.

A. Bertram

Timoshenko, S. P.:
Erinnerungen – Eine Autobiographie
übersetzt aus dem Russischen und herausgegeben von Albert Duda
Verlag Ernst & Sohn, Berlin 2006, 374 Seiten,
ISBN 3-433-01816-2, € 49,90

Stepan P. Timoshenko (1878 – 1972) schrieb im Winter 1962/63, d.h. im Alter von 85 Jahren, nach langen Diskussionen mit seinem ehemaligen Schüler vom Polytechnischen Institut St. Petersburg und langjährigem Vorsitzenden der Absolventenvereinigung des St. Petersburger Instituts seine Lebenserinnerungen nieder. Die 1. Originalausgabe in russischer Sprache erschien 1963 in Paris. Den Erlös aus diesem Buch stiftete Timoshenko für die Kasse der gegenseitigen Hilfe der Absolventen des

St. Petersburger Polytechnikums. 1968 erschien im New Yorker Verlag Van Nostrand unter dem Titel „As I Remember" eine englische Buchübersetzung.

Nun liegt diese Autobiografie einer außergewöhnlichen Ingenieur- und Wissenschaftlerpersönlichkeit auch in deutscher Sprache vor. Zu danken ist dies den Diskussionen der Mechanikprofessoren der TU Berlin über die Herausgabe der „Erinnerungen" als deutschsprachige Übersetzung, dem Verlag Ernst & Sohn und vor allem Albert Duda, der mit großem Sachverstand und Einfühlungsvermögen eine hervorragende Übersetzung vorgelegt hat. Dabei hat er sich nicht nur streng an den Text der ersten russischen Originalausgabe gehalten, sondern auch durch zahlreiche Fußnoten zum besseren Verständnis historischer Zusammenhänge, besonderer Ereignisse oder auch fachlichen Aussagen beigetragen.

Stepan P. Timoshenko gehört zu den herausragenden Vertretern der Technischen Mechanik im 20. Jahrhundert. An allen seinen Hochschulwirkungsstätten in St. Petersburg, Kiew, Zagreb, Michigan und Stanfort aber auch bei der Firma Westinghouse in Philadelphia hinterließ er bleibende Spuren. Seine Lebenserinnerungen umfassen eine außergewöhnliche Zeit. Sie beginnen im zaristischen Russland, beschreiben die Zeit der Revolution und geben einen Einblick in die Lebens- und Arbeitsverhältnisse in den USA der 20er Jahre, der Vor- und der Nachkriegszeit. Durch seine zahlreichen fachlichen Kontakte und Studien- bzw. Kongressreisen nach Europa erhält man auch einen guten Einblick in die Wissenschafts- und Lebenskultur Europas in diesem Zeitraum.

Für den Rezensenten sind folgende Aussagen des Buches besonders interessant:

- Timoshenko hat einen großen Anteil an der mathematisch-theoretischen Bearbeitung von Ingenieuraufgaben und an der Weiterentwicklung der Ingenieurmechanik von einer mehr empirischen zu einer wissenschaftlichen Arbeit, wobei experimentelles und mathematisches Lösen von Ingenieuraufgaben für ihn immer eine Einheit darstellten.
- Timoshenko verkörpert in seiner Arbeit die Einheit von Forschung und Lehre, wobei die Ausarbeitung von Lehrbüchern und Monographien eine große Rolle spielen. Man erlebt in den Lebenserinnerungen, unter welchen oft schwierigen Bedingungen die in der ganzen Fachwelt anerkannten Bücher zur Festigkeitslehre, zur Elastizitätstheorie, zur Theorie der Platten und Schalen u.a.m. entstanden sind.
- Timoshenko hat an den Universitäten in Michigan und Stanford sich in besonderer Weise um die Heranbildung des wissenschaftlichen Nachwuchses auf dem Gebiet der Ingenieurmechanik bemüht. Viele Teilnehmer seiner berühmten „Sommerschulen" wurden bekannte Wissenschaftler der Ingenieurmechanik.

Besonders interessant ist auch die Beschreibung einer Reise Timoshenkos im Jahre 1958 in die Sowjetunion, um eine vergleichende Analyse der amerikanischen und der russischen Ingenieurausbildung zu erarbeiten. Die Ergebnisse dieser Reise hat er in einem Buch „Education in Russia", McGraw-Hill, New York, 1959 zusammengefasst. Die von ihm besuchten Mechanikinstitute in Charkow, Kiew, Moskau und Leningrad sind dem Rezensenten gut bekannt und man kann der positiven Einschätzung des hohen Niveaus der theoretischen Ingenieurausbildung im allgemeinen und der Technischen Mechanik im besonderen voll zustimmen. Die von Timoshenko konsultierten Fachkollegen wie Pisarenko in Kiev, Wlassow, Iljuschin, Ischlinski, Ponomarjow, Rabotnow in Moskau oder Lurje in Leningrad waren herausragende Wissenschaftler, die wesentliche Beiträge zur Mechanik geleistet haben. Auch der Rezensent hatte bei Studien- und Kongressreisen öfter Gelegenheit mit diesen Fachkollegen zu diskutieren.

Es ist zu wünschen, dass die Autobiografie Timoshenkos einen breiten Leserkreis findet. Natürlich sind viele Ausführungen von besonderem Interesse für mit der Mechanik vertraute Leser. Aber das Buch gibt auch auf der Grundlage der Schilderung eines persönlichen Lebensweges einen Einblick in das gesellschaftliche Leben in Russland, in zahlreichen europäischen Ländern und in den USA im 20. Jahrhundert und ist somit auch für der Mechanik weniger verbundenen Leser eine empfehlenswerte Lektüre.

J. Altenbach

Sadd, M. H.:
Elasticity (Theory, Applications and Numerics)
Elsevier Butterworth-Heinemann, 461 pp., 192 (main text) + 35 (exercises) figs.,
ISBN 0-12-605811-3, 66.95 €

The book is devoted to the linear theory of elasticity. It consists of two parts. Part I serves as an introduction to the theory and formulation and, in addition, it provides solutions to some basic problems. Chapter 1 is a self-contained review on mathematical principles and notation needed in the text. Special emphasis is given to a short overview of tensor algebra and analysis in Cartesian index notations which are preferred in the text. Chapter 2 covers the small deformation theory including the equations of compatibility and strain transformation. Chapter 3 examines the stress distribution in solids undergoing small deformation and the equilibrium conditions. In Chapter 4 the linear elastic behavior leading to the generalized Hook's law is presented both for isotropic and for anisotropic materials. The thermoelastic constitutive forms are also discussed. Chapter 5 collects all of the previous theory and equations in order to formulate the basic boundary value problems regarding (a) the displacements (displacement formulation) and (b) the stresses (stress formulation) as fundamental variables. In addition, general solution techniques and strategies are presented. The solution methods are explicitly demonstrated in later chapters. Chapter 6 is devoted to strain energy and related principles, i.e., the uniqueness of the boundary-value problem in elasticity, the reciprocal theorem, integral formulation of elasticity boundary value problems, the principle of virtual work, and principles of minimum potential and complimentary energy. Chapter 7 establishes the standard two-dimensional theories of plane strain, plane stress and generalized plane stress. The Airy stress function solution methodology is also covered, and is later used to develop several analytical solutions in Chapter 8, which collects and presents two-dimensional solutions for various problems including beam examples, axisymmetric problems, stress concentration in an infinite medium with a hole, half space examples, curved beam problems and two disk problems. The Saint-Venant extension, torsion and flexure problems are formulated and solved analytically. The material covered by Part I can be regarded as the core of a sound first semester course in elasticity offered to graduate students at the beginning of their study.

Part II turns to more advanced topics which together can constitute the material for a second course in elasticity. In Chapter 10 the powerful method of complex variables (developed by Muskhelisvili) is presented with applications including problems of fracture mechanics. Based on the original work of Lekhnitskii Chapter 11 investigates the fundamentals of the anisotropic case and then develops applications for particular elasticity problems such as torsion, plane and fracture problems. Chapter 12 is an introduction to thermoelasticity which provides a brief formulation of the uncoupled problems and presents solutions to some plane problems of interest in engineering. Using the displacements potentials and stress functions Chapter 13 develops solutions of three-dimensional problems. Methods related to the displacement formulation include scalar and vector potentials from the Helmholtz decomposition, Galerkin vector and Papkovich-Neuber functions, each providing general solution to the Navier's equations. The stress function solution of the equilibrium equations with no body forces is also included in the text with an emphasis on the Maxwell and Morera stress representation. Chapter 14 is special in that it provides an introduction to the use of elasticity theory in micromechanical modeling of materials. Various topics are covered in order to present a background for the more common and popular theories that have been developed in the literature. No other elasticity book provides such a presentation, and this material should be especially useful for those taking an interest in material modeling. The last Chapter outlines the most important features of the numerical finite and boundary elements methods. Two-dimensional formulations are developed for each method, and the example applications provided can be compared with previously established analytical solutions from Chapter 8. The text is closed by three Appendices.

An important feature of the book is that numerous MATLAB applications are used throughout the text for applications such as stress and strain transformations, evaluation and graphic plotting of stress and displacements solutions, finite element and boundary element calculations for two dimensional problems, and comparisons between analytical and numerical elasticity solutions.

As is well known there are several books on the market dealing with elasticity. Most of these focus on specialized topics such as mathematical foundations, anisotropic materials, two-dimensional problems, thermoelasticity, non-linear theory, etc. As a result, they are not appropriate candidates for a general textbook. On the contrary, this book provides a concise and well organized presentation and development of linear theory of elasticity. In my opinion complemented by a Solutions Manual and including MatLab codes and coding -- these can be downloaded from the home page of the Publisher -- the book is an excellent textbook which provides sound foundation and knowledge of linear elasticity.

On the other hand, this is what we miss: (a) Cezaro's formulae for multiply connected regions. (b) Tonti's scheme for linear elasticity corrected and supplemented by Kozák [1, p. 198, Table 7. Duality in linear elasticity]. This would clarify how the three independent compatibility equations and the three non identically zero stress functions can be selected, and also inform the reader about the compatibility and strain boundary conditions; the latter should be satisfied in stress (or stress function) formulations of elasticity boundary value problems provided that displacements are imposed on a part of the boundary surface. (c) A discussion of the fact that the stress representation in terms of stress functions (13.6.4) is complete if and only if the body is bounded by one surface. (If the body is bounded by more than one closed surface, the stress representation mentioned can not be complete since it is self equilibrated on each closed surfaces.)

I recommend the book not only for graduate students but also for researchers working in this field or related fields such as the finite and boundary element methods.

1) G. Béda, I. Kozák & J. Verhás: Continuum Mechanics, Akadémiai Kiadó (Publisher of the Hungarian Academy of Sciences), Budapest, 1995.

G. Szeidl

Shakelford, J. F.:
Werkstofftechnologie für Ingenieure
Pearson-Studium, 2005, 6. überarbeitete Auflage, 1. deutsche Auflage, 1056 Seiten
ISBN-10: 3-8273-7159-7
ISBN-13: 978-3-8273-7159-1
€ 59,95

The meanwhile 6th and revised edition *Werkstofftechnologie für Ingenieure* is in essence an authorized translation of James F. Shakelford's textbook *Introduction to Materials Science for engineers*. The over 900 pages are structured into four large parts and further subdivided into 20 chapters which cover the broad spectrum of materials science from the fundamentals (part 1), structural und functional materials (parts 2 and 3) to materials design for applications in mechanical engineering (part 4).

Like the English (or better American) original the German version pleases with its clear presentation of matter, many well-described examples relevant to the current situation in the field, and exercises which enable both the lecturer as well as independently working student to control progress in work and learning. As an example one may read here chapter 20 (*materials selector*) which describes several case studies for appropriate materials selection by using Ashby's various diagrams as design approach. Also, the interested reader will benefit from many tables within the text and the extended appendix (about 100 pages) providing useful information which can be utilized later in problem solving.

However, the current edition lacks of several drawbacks which are mainly connected with the German translation of the current edition. This starts with the German title and subtitle which appear strongly application-oriented and may be misleading for the interested student, which is not the case for the original American version though. Likewise, chapter 6 (*mechanical properties*) may serve here as an example where several not only inappropriate but also wrong word choices could be found, see e.g. the mix-up of the terms "Streckgrenze" and "Dehngrenze" connected with Figs. 6.4 and following. Editorial revision is, thus, strongly recommended here.

To conclude, the 2005 edition is the latest textbook of topical interest for undergraduate students in mechanical engineering who want to get a first introduction into the wide field of materials science. It is not intended, however, for graduate students who want to specialise in materials science. It can, thus, be recommended as a textbook for introductory courses in materials science and engineering for undergraduate students.

M. Heilmaier

Sia Nemat-Nasser:
Plasticity
Cambridge Univ. Press 2004, 730 pp.
ISBN-10 0-521-83979-3
ISBN-13 978-0-521-83979-2
£ 85,00

Since plasticity theory of finite deformations is still far from being a completely developed and mature branch of mechanics, there are but only few textbooks on this important subject presently available. Nemat-Nasser is a well-known expert in this field who has published many important contributions to it during the last decades. Now he offers us by this voluminous book an extensive presentation of this subject.

The book contains not only a rather general overlook upon different models and aspects of finite plasticity and viscoplasticity, but also on many other related topics. One of them is a tensorial representation theory, which one will not find in this form in any other textbook. Another topic concerns numerical integration algorithms, which are rather important for computational purposes of such models, which always lead to highly non-linear problems. The models of plastic materials that are presented, are not restricted to the usual incompressible flows, but also include granular media, where density changes come into play.

The author also has a great expertise in homogenization methods. Accordingly, many interesting applications of micro macro transitions from dislocation or crystal plasticity to phenomenological plasticity are given. Also experimental techniques like Hopkinson bar tests and experiments on granular media are described.

In this variety the book is surely a rich source for researchers who want to obtain an overview over the vast literature in this field. The work, however, is not an axiomatic approach to plasticity, as it has once been favored by the school of Rational Mechanics. Instead, the style of presentation is rather pragmatic and poorly structured, often on the expense of mathematical precision and physical clearness. As the modeling is not performed in a purely material description but in a spatial one, many concepts become unnecessarily complicated and difficult to understand. In particular, we are confronted with rigid spins, total spins, material spins, plastic spins, etc., which tends to confuse the reader rather than helps to understand the physics behind these concepts.

A list of all cited authors is quite helpful for the reader, but also demonstrates how selective the author quotes. One does not even find names like, e.g., von Mises here. On the other hand, a list of notations would have been extremely helpful for an easier understanding of a book of over 700 pages, which hardly anybody will continuously read from the first till the last page.

In the Preface, the author states that this book has grown out of his lecture notes for graduate-level courses. The outcome, however, does not seem to have a level appropriate for students. We would instead recommend the book for experts in plasticity theory with a good background in non-linear continuum mechanics, but definitely not for students or beginners.

A. Bertram

Shorr, B. F.
The Wave Finite Element Method
Springer-Verlag, Berlin Heidelberg New York
2004, 352 pp.
ISBN: 3-540-41638-2, € 96,25
Series: Foundation of Engineering Mechanics

There are, broadly speaking, two distinct sets of numerical methods available to solve wave propagation problems. One is the standard FE transient solution and the other is a wave approach. In areas like acoustic simulation, seismic responses and others, wave approaches are very often used and have been integrated in established software packages. On the other hand transient structural dynamics simulation of solids is indeed mostly based on prevailing standard FE methods with semi-analytical time integration and identical element interpolation applied to displacements, velocities, and accelerations. Along with nodes assumed to be in equilibrium at any time, dynamic quantities that vary along the elements length without jumps, and nodal parameter changes propagating over the element with infinite speed. For problems excited by explosions, shocks, seismic waves, and structures with suddenly or rapidly varying mass or stiffness (in other words problems with a time-scale close to the time a wave takes to propagate over the structure), there is a difference between standard FE and wave-based solutions observable and there is a chance to obtain solutions in a different and more efficient manner, too. This is the essence of an idea advanced by Shorr, who suggest that a wave approach in such cases might be the better choice. This observation gave the impetus to develop his simulation method for wave propagation in solids called the wave finite element method (WFEM). The derivation is based on element-wise application of the momentum balance at differential instants (kind of time discretisation) leading to formulations that allow one to describe the wave propagation over the element with strong discontinuities. The author claims a novel wave approach to finite element modelling of transient processes in solids is introduced with his WFEM, which has been comprehensively presented in this book for the first time. It is the purpose of this book to address the numerical simulation of non-stationary dynamic responses in solids, using a wave approach, which takes into account strong discontinuities of stress, deformation and velocity wave fronts. With the book the author targets researchers, lecturers, and advanced students interested in problems of numerical modelling of non-stationary dynamic processes in deformable bodies and continua, and also engineers and researchers involved designing machines and structures, in which shock, vibro-impact, and other unsteady dynamics and wave processes play a significant role. All this is well beyond the realm of everyday problem solving.

In the first place a general critical observation: The book is not easily readable. This is not due to the demanding theory, but by the author's not always favourable chosen notation and figures. In parts the text is too particularized and a bit awkward in the structuring. It is even troublesome to read the first chapter intended to give an introduction to the problem by a very simple theory: It is more distracting than guiding. The reader is going to find it difficult to abstract the algorithm even for the 1-D case. From this methodological background I would not recommend the book to undergraduate students. The references to literature by non-Russian authors are rather old, and not much reference has been made to more resent research in related areas (impact, acoustic, and seismic simulations). What this book is about and who claims creatorship of the method is clear from the very beginning by reading the preface and the introduction; in that respect it is a bit annoying and unnecessary that the author stressed again and again that the method was "… proposed by Shorr and has been developed in Shorr…".

The book is divided into two major parts: The chapters 1 to 7 belong to the part "Theory" and the part "Applications" comprises chapters 8 to 14. Chapters 1 to 5 describe some theoretical background to reinforce understanding of wave propagation and wave solutions for 1-D rod and beam problems (called by the author *direct mathematical method* [DMM] and, if discretised into elements, *wave finite element method* [WFEM]). DMM is well known as d'Alembert's solution of the equation of rods in the form of two waves propagating from opposite ends with wave propagation speed c. Whereas usual FE solution corresponds more with the Bernoulli solution with separation of time and configuration values (with the consequence of infinite, frequency depending, series and a similar solution behaviour as shown in the comparisons of the methods in the book). The author gives very interesting insight into the response of (1-D) structures to wave propagation problems with many details not very often found in books. That is really the primary virtue of the book. He can obviously benefit from his rich experience gathered in that field. Even problems like elastic-plastic, visco-elastic and visco-plastic (Chapter 3) have been dealt with, even though only for rods longitudinal waves and not taken up again in the generalisation of the method. Furthermore, coupled longitudinal-torsional waves in pre-twisted rods (Chapter 4) have been treated. In all cases mentioned, numerical solutions are given and some have been compared to FEM solutions. However, it is not always clear from the solutions what the benefit of the wave approach really is. The part about rods and beams comprises 139 pages, that is about 70% of the "Theory" intended to substantiate the new wave finite element method - WFEM. Chapter 7 "Numerical Simulation of Multi-Dimensional Waves Processes" is more or less one-dimensional as well.

The generalisation of the approach to multidimensional waves to really establish a new method (besides some good numerical examples for 1-D and some 2-D problems, the primary virtues of the book) is limited to 26 pages and restricted to 2-D wave problems only. There is not even a hint as to how the 3-D problem has to be tackled. The book is conceived by the author as " The general WFEM approach … suitable for analysis of any multi-dimensional wave process …". From this ambitious intention Chapter 7 falls short compared to the 1-D problems which are tackled in a very detailed way. And the "simplicity and clearness" does not justify - if a novel and general approach is promised - that no attempt has been made to give a general algorithm and at least a glimpse of the 3-D case. As explained in the additional remarks on page 181, the choice of the right time step is crucial for the solution quality. However, this point is not given much attention further on in the book. Neither has a concise and comprehensible algorithm of the WFEM for the general case been worked out. A flow sheet like presentation over the time and element loops to explain operational steps would be a useful addition to reinforce understanding.

The part "Applications" is dominated by 1-D problems for obvious reasons. But nonetheless they provide valuable insight in diverse and technical relevant wave propagation (transient) problems. The application part is a treasure chest for all those who want to gain more understanding of transient problems with time-scales close to wave propagation speed. The author apparently can profit from a long-standing wealth of experience with such problems.

The Fortran programs at the end of the book do not contribute much support understanding.

To sum up, I can say that the book contains a valuable collection of 1-D and some 2-D solutions for wave propagation in solids, and it made a valuable contribution towards a new general-purpose transient wave approach for solids. Notwithstanding, the book does not systematically accommodate an approach towards a general WFEM. As pointed out before, the governing algorithm of the WFEM is difficult to extract, and the way this approach has been presented does not lead itself readily to the treatment of more sophisticated problems nor to write software based upon it. What happens in structures with branches and multiple coherent geometry? Comparisons with FE solutions do not make clear the advantage of the new approach. The extent of departure from the usual FE model cannot clearly be seen, and also a discussion of the trade-off between traditional and the proposed new method would have been desirable. Experimental solutions have not been taken into account for the validation of the results. The reviewer will leave to the judgment of the readers whether the attempts made in the book, producing very interesting and valuable solutions and examples, are general and comprehensive enough to establish a novel FE method . But the book is truly recommended for everybody involved in problems that include explosions, shocks, seismic waves, and structures with suddenly varying properties at a time-scale close to the time a wave takes to propagate over the structure.

M. W. Zehn