Mathematica Bohemica

Book Reviews

BOOK REVIEWS

T. Myint-U, L. Debnath: LINEAR PARTIAL DIFFERENTIAL EQUATIONS FOR
SCIENTISTS AND ENGINEERS. Birkhäuser, Boston, 2007, 778 pages, EUR 78.–.

The book presents a variety of methods of solving boundary value problems for ordinary
and partial differential equations. It is a very useful textbook for students as well as a re-
search reference for scientists and engineers. The book provides information that puts the
reader at the forefront of current research. A wide spectrum of exercises has been included
at the end of each chapter. The first chapter gives an introduction to partial differential
equations. The second chapter is concerned with first-order, quasi-linear and linear partial
differential equations and their solution via the Lagrange method of characteristic and its
generalizations. The third chapter deals with mathematical models representing physical
and engineering problems that lead to the three basic types of partial differential equations.
Chapter 4 constitutes an account of the classification of linear partial differential equations
of second order in two independent variables into hyperbolic, parabolic, and elliptic types
and, in addition, illustrates the determination of the general solution for a class of relatively
simple equations. Cauchy's problem, the Goursat problem, and the initial boundary-value
problems involving hyperbolic equations of the second order are presented in Chapter 5.
Chapter 6 is devoted to the theory of Fourier series and integrals. The method of sep-
aration of variables is discussed in Chapter 7. This is followed by the vibrating string
problem, by the heat conduction problem and also by problems for the Laplace and beam
equations on special domains. Chapter 8 treats Sturm-Liouville systems. Chapter 9 deals
with boundary value problems for the Laplace equation in two-dimensional domains. The
Maximum principle and the Mean value theorem are stated here. The Dirichlet and the
Neumann problems for circular and rectangular domains are solved. Chapter 10 studies
boundary value problems for the Laplace, wave, heat and Schrödinger equations in special
three-dimensional domains. Chapter 11 deals with fundamental solution of partial differ-
ential equations and construction of Green's function for the Dirichlet problem, Neumann
problem and the mixed problem for the Laplace equation and for the Dirichlet problem for
the Helmholtz equation. Chapter 12 provides an introduction to the use of integral trans-
form methods and their applications to boundary value problems of partial differential
equations. The fundamental properties of Fourier, Laplace, Hankel and Mellin transforms
are discussed. First- and second-order nonlinear partial differential equations are covered
in Chapter 13. Chapter 14 is devoted to major numerical and approximation methods for
solving boundary value problems. Chapter 15 contains tables of integral transforms.

Dagmar Medková, Praha

K. Boulabiar, G. Buskes, A. Triki: POSITIVITY. Birkhäuser, Basel, 2007, 290 pages,
ISBN 978-3-7643-8477-7, EUR 99.–.

The book contains nine survey articles in positivity. The paper "B. Banerjee, M. Henrik-
sen: Ways in which $C(X)$ mod a prime ideal can be a valuation domain; something old and
something new" studies $C(X)/P$, where $C(X)$ is the ring of continuous real-valued functions
on a Tychonoff space X and P is a prime ideal of $C(X)$. It is reviewed what is known about
SV-spaces. Further the paper focuses on new research of almost SV-spaces. D. P. Blecher's

paper "Positivity in operator algebras and operator spaces" begins with a quick review of facts on quantum positivity. Then some basics of C^*-algebras are discussed. Complete positivity is also treated. The paper "K. Boulabiar, G. Buskes, A. Triki: Results in f-algebras" links averaging, Reynolds and Seever operators on f-algebras. Then it deals with square-mean closed and geometric-mean closed f-algebras. The extended orthomorphisms are also discussed. Then the authors turn to the maximal ring of quotient of a commutative semiprime ring. In the end they give a characterization of order bounded operators on Archimedean f-algebras which are disjointness preserving. The starting point of the paper "Q. Bu, G. Buskes, A. G. Kusraev: Bilinear maps on products of vector lattices: a survey" is a construction of the Archimedean tensor product of two Archimedean vector lattices. Then triadjoints of bilinear maps on products of vector lattices are treated. Orthosymmetric maps are presented and their connection with squares and powers are studied. In the final part of the paper the authors discuss the tensor product of Banach lattices and the Radon-Nikodym property of such tensor products. The paper "G. P. Curbera, W. J. Ricker: Vector measures, integration and applications" deals with integration of scalar-valued functions with respect to vector measures. The theoretical developments over the past 15 years are presented. Two relevant applications are given: the extension of certain operators to their optimal domain and aspects of spectral integration. The paper "J. Martínez: The role of frames in the development of lattice-ordered groups: a personal account" begins with the theorem of Conrad on finite-valued l-groups. This is followed by an account of the dimension theory, particularly as it applies to the z-dimension of rings of continuous functions. The paper ends with an account of the recent work on the epicompletion in a category of regular frames, and related issues concerning archimedean frames. The paper "B. de Pagter: Non-commutative Banach function spaces" reviews some of the basic features of the classical Banach function spaces associated with a measure space and some basic facts concerning von Neumann algebras. The τ-measurable operators are discussed. Particular attention is paid to the properties of the order structure of the space of all such τ-measurable operators. The measure topology on this space is introduced and its properties are studied. A. R. Schep in "Positive operators on L^p-spaces" presents results related to the boundedness of positive linear operators on L^p-spaces, particularly the Schur criterion for boundedness. Then it is shown that Schur's criterion is closely related to the question whether a given positive linear operator attains its norm. The properties of norm attaining operators on L^p-spaces are discussed in detail. Number of proofs presented here are new. The paper "A. W. Wickstead: Regular operators between Banach lattices" studies conditions under which all bounded linear operators or all order bounded linear operators from a Banach lattice X into a Banach lattice Y are regular. Then the author finds conditions under which the space of all regular linear operators from a Banach lattice X into a Banach lattice Y forms a vector lattice. The dual operators of regular operators are investigated.

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