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Applied analysis. Mathematical methods in natural science. 2nd ed.

Hackensack, NJ: World Scientific (ISBN 978-1-84816-652-3/hbk). xiv, 515 p. (2011).

This volume provides a general introduction to applied analysis. The authors are mainly concerned with vector analysis and its physical motivation, calculus of variations, Fourier analysis, eigenfunction expansion, and distribution of eigenvalues. The main mathematical fields present in this volume are topological spaces, complex function theory, real analysis, and abstract analysis. Several tools in linear and nonlinear partial differential equations theory, such as fundamental solutions, Perron's method, layer potentials, and iteration schemes, are described, as well as systematic descriptions of the recent study of the blowup of the solution. This book also uses fundamental ideas of applied mathematics to discuss recent developments in nonlinear science, such as mathematical modeling of reinforced random motion of particles, the semiconductor device equation in applied physics, and chemotaxis in biology. Other relevant applications include forward and backward self-similar transformations; Michaelis-Menten reduction; Smoluchowski-Poisson equation. The content of the book is divided into eight main chapters, as follows: I. Field Formation; II. Geometric Objects; III. Calculus of Variations; IV. Infinite-Dimensional Analysis; V. Scattering; VI. Random Motion of Particles; VII. Linear PDE; VIII. Nonlinear PDE. Additional material may be found in the three appendices of this volume: A. Catalogue of Mathematical Theories; B. An Elliptic-Parabolic System; C. Commentary. This well-written volume contains a large amount of material. The clear style of exposition is worth noting because of the necessarily technical nature of the subject matter. The book under review is mainly addressed to students in higher-level undergraduate courses and for self-study for both graduate and higher-level undergraduate students. *Vicenţiu D. Rădulescu (Craiova)*

Classification: M15 I95 U25
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