Buchanzeigen

Buchanzeigen

Chaos in Discrete Dynamical Systems. A Visual Introduction in 2 Dimensions. By Ralph Abraham, Laura Gardini, and Christian Mira. (Springer-Verlag, Berlin Heidelberg 1997.) xxv, 246 pp., 153 fig.; sFR 81.00 – ISBN 3-540-94300-5.

Chaos Theory is a synonym for dynamical systems theory, a branch of mathematics. Dynamical systems come in three flavors: Flows (continuous dynamical systems), cascades (discrete, reversible dynamical systems), and semi-cascades (discrete, irreversible dynamical systems). Flows and cascades are the classical systems introduced by Poincaré a century ago, and are the subject of the extensively illustrated book: "Dynamics: The Geometry of Behavior", Addison-Wesley 1992, authored by Ralph Abraham and Shaw. Semi-cascades, also known as iterated function systems, are a recent innovation, and have been well-studied only in one dimension (the simplest case) since about 1950. The two-dimensional case is the current frontier of research. And from the computer graphics of the leading researchers come astonishing views of the new landscape, such as the Julia and Mandelbrot sets in the beautiful books by Heinz-Otto Peitgen and his co-workers. Now, the new theory of critical curves developed by Mira and his students at Toulouse provides a unique opportunity to explain the basic concepts of the theory of chaos and bifurcations for discrete dynamical systems in two dimensions.

The materials in the book and on the accompanying disk are not solely developed with the researcher and professional in mind, but also with consideration for the student. The book is replete with some 100 computer graphics to illustrate the material, and the CD-ROM contains full-color animations that are tied directly into the subject matter of the book itself. In addition, much of this material has also been class-tested by the authors. The cross-platform CD also contains a software program called ENDO, which enables users to create their own two-dimensional imagery with X-Windows.

Complex Analysis. By Joseph Bak and Donald J. Newman. (Springer-Verlag, Berlin Heidelberg 1996.) x, 294 pp., 69 fig.; sFr. 62.00 – ISBN 0-387-94756-6.

This unusually lively textbook on complex variables introduces the theory of analytic functions, explores its diverse applications and shows the reader how to harness its powerful techniques. *Complex Analysis* offers new and interesting motivations for classical results and introduces related topics that do not appear in this form in other texts. Stressing motivation and technique, and containing a large number of problems and their solutions, this volume may be used as a text both in classrooms and for self-study. For this second edition, the authors have revised some of the existing material and have provided new exercises and solutions.

From the contents: The complex numbers — functions of a complex variable — analytic functions — line integrals and entire functions — properties of entire functions and of analytic functions — simply connected domains — isolated singularities — the residue theorem and applications — contour integral techniques — conformal mapping and the Riemann mapping theorem — maximum-modulus theorems for unbounded domains — harmonic functions — forms of analytic functions — analytic continuation — the gamma and zeta functions — application to other areas of mathematics.

Functional Analysis, Vol. 1 and Vol. 2. By Y. M. Berezansky, G. G. Us, and Z. G. Sheftel. (Birkhäuser Verlag, Basel Boston Berlin 1996.) Vol. 1: 448 pp., sFr. 178.00 – ISBN 3-7643-5244-9. Vol. 2: 312 pp., sFr. 148.00 – ISBN 3-7643-5345-7.

Functional Analysis is a comprehensive, two-volume treatment of a subject lying at the core of modern analysis and mathematical physics. The first volume reviews basic concepts such as the measure, the integral, Banach spaces, bounded operators and generalized functions.

Volume 2 moves on to more advanced topics including unbounded operators, spectral decomposition, expansion in generalized eigenvectors, rigged spaces, and partial differential operators.

This text provides students of mathematics and physics with a clear introduction into the above concepts, with the theory well illustrated by a wealth of examples. Researchers will appreciate it as a useful reference manual.

Introduction to Difference Equations. By Saber N. Elaydi. (Springer-Verlag, Berlin Heidelberg 1996.) xiii, 389 pp., 64 fig.; sFr. 60.00 – ISBN 0-387-94582-2.

This book combines both analytic and geometric (topological) approaches to studying difference equations. It integrates both classical and modern treatments of the subject. The book has the most updated and comprehensive material in stability, z-transform, discrete control theory, and asymptotic theory. Yet the presentation is simple enough so that the book can be used for advanced undergraduate and beginning graduate students in mathematics, engineering, science, and economics. Moreover, scientists and engineers who are interested in discrete mathematical models will find it useful as a reference. The book contains a large set of applications in a variety of disciplines including neural networks, feedback control, Markov chains, trade models, heat transfer, propagation of plants, etc. Each section of the book ends with an extensive and highly selected set of exercises.

An Accompaniment to Higher Mathematics. By George Exner. (Springer-Verlag, Berlin Heidelberg 1996.) xvii, 198 pp., 7 fig.; sFr. 43.00 – ISBN 0-387-94617-9.

This text is designed for students preparing to engage in their first struggles to understand and write proofs and to read mathematics independently. Intended for use as a supplementary test in courses on introductory real analysis, advanced calculus, abstract algebra, or topology, the book teaches in detail how to construct examples and non-examples to help understand a new theorem or definition; it shows how to discover the outline of a proof in the form of the theorem and how logical structures determine the forms that proofs may take. The text is meant to be used interactively, frequently asking the reader to pause and work on an example or a problem before continuing, and encouraging the student to engage the topic at hand and to learn from failed attempts at solving problems. The book may also be used as the main text for a "transitions" course bridging the gap between calculus and higher mathematics.

The Gelfand Mathematical Seminars, 1993 – 1995. Edited by I. M. Gelfand, J. Lepowsky, and M. Smirnov. (Birkhäuser Verlag, Basel Boston Berlin 1996.) 274 pp., sFr. 88.00 – ISBN 3-7643-3816-4.

The Gelfand Mathematical Seminars are one of the world celebrated seminars. Started more than forty years ago in Moscow, the seminars stimulated and continue to stimulate a birth of many significant ideas in contemporary mathematics.

The Gelfand Seminars are held now at Rutgers University in New Brunswick, and at IHES in Bures-sur-Yvette. This is the second Gelfand Seminar volume, the first having covered the years 1990–1992. As before, the papers are devoted to a broad range of mathematical areas, including: nonlinear evolution equations, noncommutative algebra, Chern-Simons classes, Radon transform, statistical mechanics, plane curves, evolution of solids, an application of modern homological algebra to mathematical physics, and hypergeometric functions.

Contributors: F. Almgren, V. I. Arnold, J. Bourgain, J-L. Brylinski, A. S. Fokas, I. M. Gelfand, A. Kazarnovsky-Krol, T. Kimura, G. Kuhn, A. A. Migdal, V. Retakh, S. Semmes, M. Shubin, M. Smirnov, J. Stasheff, A. Vershik, A. Voronov.