Mathematica Bohemica

Book reviews

BOOK REVIEWS

T. Andreescu, Z. Feng: A PATH TO COMBINATORICS FOR UNDERGRADU-
ATES. Birkhäuser, Basel, 2004, ISBN 3-7643-4288-9.

This book is a collection of combinatorial problems focused on various counting methods.
The problems are on the level of high school competitions; in addition to original problems,
many indeed come from mathematical olympiads, Putnam competitions, etc.

The drawback of the collection is that some significant parts of combinatorics are com-
pletely ignored, among them graph theory, extremal problems, constructions of designs
and other combinatorial objects, probabilistic arguments, infinite combinatorics. A com-
prehensive treatment cannot be expected from a book of this size, however, at least an
existence of some of the areas above could be mentioned with pointers to more advanced
literature. A complete omission gives the impression that combinatorics is only problem
solving with not much theory behind it, which is certainly not the case. With this in mind,
to undergraduates I would recommend a book with broader and deeper coverage. This can
be achieved even in books explaining combinatorics through problems, as demonstrated
already in *Combinatorial Problems and Exercises* by Lovász—strangely enough, this classic
book is not even mentioned in the Further Reading section.

Despite this criticism, the book provides quite an amazing collection of combinatorial
problems, many of them original, and many of them from hard to find sources like Russian
olympiads. The covered topics are carefully organized, so that the solved problems provide
a good introduction to the covered area of combinatorics. The presentation of the solutions
is very clear and instructive, with emphasis on common mistakes. Overall, the book may be
very useful for improving problem-solving skills, in particular it is very nice for interested
high-school students.

Jiří Sgall, Praha

S. D. Eidelman, S. D. Ivasyshen, A. N. Kochubei: ANALYTIC METHODS IN THE
THEORY OF DIFFERENTIAL AND PSEUDO-DIFFERENTIAL EQUATIONS OF
PARABOLIC TYPE. Birkhäuser, Operator Theory, Advances and Applications, vol. 152,
Basel, 2004, pages 400, ISBN 3-7643-7115-3, price CHF 228,–/EUR 138,–.

The book is devoted to the theory of equations that generalize in various directions the
classical parabolic equations and systems.

It starts with the basic notions on parabolic systems in the Petrovsky sense and then
exposes the following four classes of linear parabolic equations with coefficients depending
on all variables:

1. Parabolic equations of a quasi-homogeneous structure
2. Degenerate equations of the Kolmogorov type
3. Pseudo-Differential parabolic equations with quasi-homogeneous symbols
4. Fractional diffusion equations.

These classes provide mathematical models for various diffusion phenomena and are
investigated by the same general scheme. As the first step, fundamental solutions of the
Cauchy problem are constructed and their properties as functions of parameters are studied.
These properties are then used to obtain estimates and complete analytical description of

a fundamental solution of the Cauchy problem for a model equation. The fundamental solution is then used for finding classes of existence, uniqueness and correctness. The simultaneous treatment of the four substantially different generalizations of the classical definition of parabolic equations makes it possible to give an interesting comparative analysis of the methods and results.

In spite of a number of research papers on the subject, this is the first book devoted to the topic. It will be useful for mathematicians interested in these types of equations and physicists specializing in diffusion processes.

Hana Petzeltová, Praha

C. Bandt, U. Mosco, M. Zähle (eds.): FRACTAL GEOMETRY AND STOCHASTICS III. Birkhäuser, Basel, 2004, 272 pages, hardcover, ISBN 3-7643-7070-X, CHF 148.–/EUR 88.–.

The purpose of the proceedings from the conference on Fractal Geometry and Stochastics (Friedrichroda, Germany, 2003) is to present main directions of contemporary research in this area to a rather large audience. The particular contributions are mostly survey papers written in a comprehensible style.

The book splits into five parts and each of them amounts to from three to four papers. The first part is entitled "Fractal sets and measures" and deals with connections between (semi)fractals and invariant measures of Markov operators, spectra of Schroedinger operators, and multifractal spectra arising from Hausdorff dimension and the principle of large deviations.

Second part attacs some problems on the edge of fractals and dynamical systems such as flows in small-scale structures, Hausdorff dimension of hyperbolic attractors of differentiable maps, Kleinian groups on hyperbolic spaces and Kleinian limit sets, or Lyapunov exponents of random walks.

The third part regards random fractals, stochastic processes, multiplicative chaos, multifractal spectra of measures on Brownian paths, or capacity and Hausdorff dimension of additive Lévy processes.

The fourth and the fifth part deal with topics in fractal analysis covering fractal Laplacian of random measures in the plane, fractal measures, currents, distributions, fractal layers, stochastic processes on fractals, Dirichlet forms on Sierpinski gasket function spaces, or spectral functions on fractals.

The overview style of the book renders its contents accesible to a wide range of specialists as well as non-experts interested in the recent issues of fractional geometry.

Martin Ondreját, Praha