

## BOOK REVIEWS

Book Review Editor: Walter Van Assche

### *Books*

Ward Cheney and Will Light, *A Course in Approximation Theory*, Brooks/Cole, Pacific Grove, 2000, xiv + 359 pp.

Introductory books in approximation theory are relatively rare. During the past 20 years we have seen the appearance of *An Introduction to the Approximation of Functions*, by T. J. Rivlin, *Approximation Theory and Methods*, by M. J. D. Powell, both from 1981, and *Constructive Approximation*, by R. A. DeVore and G. G. Lorentz from 1993, as books that cover general basic aspects of approximation theory. Most other recent books deal with more advanced or specialized topics. Hence, as a new introductory book the present book, written by two distinguished experts in the field, fills a definite gap in the literature.

The book consists of 36 chapters. Most of the chapters are short, or even very short (5 pages). The emphasis of the book is on multivariate interpolation and approximation, although univariate theory is necessarily touched upon as well. The 10 starting chapters focus on polynomial interpolation. These chapters are easy to follow, since the concepts are carefully explained and motivated, and the mathematical techniques are basic linear algebra and analysis. The following chapters deal with interpolation by translates of a single function, by positive definite functions, and by radial basis functions. Here the mathematical tools are more demanding. Use is made of Fourier analysis, measure theory, and functional analysis. The book goes on to discuss approximation by positive definite functions and ridge functions, neural networks, optimal recovery of functions, various types of spline functions, and (univariate) wavelets.

The book is easy to read. The treatment of each topic is necessarily limited, but the authors have been successful in providing an introduction to the main ideas and techniques. The book is recommended as a text for a graduate course in approximation theory. Every chapter is accompanied by a large collection of problems, as well as its own list of references, thus making the book a source of information for (beginning) researchers who want to find their way in a certain area.

The future will tell whether this book will become as influential as Cheney's classical monograph *Introduction to Approximation Theory*, that already dates back to 1966.

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doi:10.1006/jath.2001.3601

C. F. Dunkl and Y. Xu, *Orthogonal Polynomials of Several Variables*, Encyclopedia of Mathematics and Its Applications **81**, Cambridge University Press, Cambridge, UK, 2001, xv + 390 pp.

The theory of orthogonal polynomials of one variable is a classical and well documented subject in mathematical analysis. In this theory the Jacobi, Laguerre, and Hermite polynomials, known as the classical orthogonal polynomials, play a special role due to their wide variety of applications. Much less literature is available on the theory of orthogonal polynomials of several variables. This subject has not progressed as quickly as the one-variable theory, probably due to the complication that a basis of orthogonal polynomials is no longer uniquely defined. Despite this problem, there have been exciting new developments in this field of research, some of which are treated in detail in the book under review.

