Shannon sampling theory, and between some specific nonorthogonal wavelets and Gabor functions. The last contribution by K. Seip proposes a complete description of sampling and interpolation in the Bargmann–Fock space and in weighted Bergman spaces.

7. *Applications to Numerical Analysis and Signal Processing*: In the seventh section, the reader will find four chapters devoted to various applications of the wavelet techniques. S. Jaffard and Ph. Laurençot have written a very complete survey of the application of wavelets to the analysis of operators and numerical analysis in general, and more particularly to the theoretical and numerical treatment of partial differential equations. An exhaustive list of constructions, specific properties, and open problems is given. R. A. Gopinath and C. S. Burrus present the filter bank theory of frequency decompositions. J. Froment and S. Mallat expose an image coding algorithm that separates the edge from the texture information. The coding precision may be adapted to the properties of the human visual perception. The last contribution, due to M. V. Wickerhauser, discusses the application of wavelet packets (of which he is one of the contributors in collaboration with R. Coifman, Y. Meyer, and S. Quake) to acoustic signal compression.

To conclude, this book gives a good idea of the recent developments in wavelet theory, and the reviewer believes that the editor's ambition to present a tutorial in this field is achieved. Of course, it is not an exhaustive review on wavelet research but the good bibliography will provide the curious reader with the means to find more information. This book is meant to be a complement of C. K. Chui's introductory book on wavelets (see the previous review), and also recommended is the excellent book by I. Daubechies, *Ten Lectures on Wavelets* (Regional Conference Series in Applied Mathematics, Vol. 61, SIAM, 1992) which could not be mentioned in the book under review since it has also appeared in 1992.

FRÉDÉRIQUE PLANTEVIN

M. B. RUSKAI, G. BEYLKIN, R. COIFMAN, I. DAUBECHIES, S. MALLAT, Y. MEYER, AND L. RAPHAEL, Eds., *Wavelets and Their Applications*, Jones and Bartlett, 1992, xiii + 474 pp.

Wavelet theory became popular in the late eighties, although it has much older roots in fields such as harmonic analysis, quantum mechanics, and signal processing. There is no precise, overall valid, definition of a wavelet function, but the general idea is that wavelets are the translates and dilates of one particular function, which is commonly referred to as the *mother wavelet*. Wavelets can be used efficiently for analyzing and representing general functions. They typically are local both in time and frequency which makes them suited for a wide variety of applications. They are already considered as valuable alternatives to Fourier analysis in many cases.

The idea of this book originated at the NSF/CBMS wavelet conference held at the University of Lowell in 1990. As usual for such conferences, the lectures of the main speaker, in this case Ingrid Daubechies, were published by SIAM. This edited volume contains contributions from other speakers at the conference, as well as from leading researchers in different branches of the field. Mary Beth Ruskai wrote a very informative introduction where she describes the development of the field and points out the connections between the contributions in the book. The rest of the book is then divided into subsections, each containing papers in one area. Each paper can be read separately, but requires some familiarity with the basic ideas of wavelets. Note also that these papers do not follow one general terminology or notation.

The most extensive section is on *signal analysis*. Two papers point out the connection between wavelet filters and subband coding, both in one and two dimensions. There is one paper on wavelet packets, a powerful extension of wavelets which is particularly suited for data compression and time-frequency analysis. One contribution points out the connection between the local maxima of the wavelet transform of an image and its multiscale edges. It

is shown how one can use these to represent the image corresponding to a conjecture of David Marr. Finally, one paper uses wavelets for ridge and skeleton extraction.

The *numerical analysis* section contains discussions on the representation and compression of operators using wavelets which leads to fast algorithms for linear algebra and on wavelets for the solution of nonlinear, time-dependent PDE's. In the *other applications* section topics such as the optical wavelet transform, along with connections between wavelets and turbulent flows, and wavelets and quantum mechanics are addressed.

Finally, the *theoretical developments* section has papers on spline wavelets, Gabor expansions, and the ϕ-transform, an independent development based on the same principles as the wavelet transform.

This book has some of the founders and top wavelet researchers among its editors and contributors. The quality of the papers is very high and they were chosen to cover the different developments in the field. It should be clear that this volume cannot be seen as an introduction to wavelets. It is ideal for people who are familiar with the basics of wavelets and want to find out more about the state of the art and the directions in which the field is moving. Be aware however of the fact that, as this is a rapidly evolving area, some very recent developments are unavoidably not covered.

WIM SWELDENS

Proceedings

A. A. GONCHAR AND E. B. SAFF, Eds., *Progress in Approximation Theory*, Springer-Verlag, New York/Berlin, 1992, xviii + 455 pp.

These are the proceedings of an international conference on approximation theory that was held March 19–22, 1990, at the University of South Florida, Tampa. The conference was the first U.S.A.–U.S.S.R. meeting with various approximators from the U.S.A. and the (former) U.S.S.R., together with a delegation of scientists from Europe, North America, and Asia. The 19 contributions in this volume are by invitation of the editors. All these contributions give a clear overview of current research and the authors have been given enough room to present not only new results but also detailed perspectives and open problems. Subjects covered are q-hypergeometric functions, orthogonal polynomials and expansions, Padé and Hermite–Padé approximation, wavelets and fractals, approximation by entire functions, inequalities for univalent functions, rearrangements of functions, harmonic analysis, estimates of the de Bruijn–Newman constant, and approximation by weighted polynomials.

A. A. GONCHAR AND E. B. SAFF, Eds., *Methods of Approximation Theory in Complex Analysis and Mathematical Physics*, Nauka, Moscow, 1992, 222 pp.; will also appear in Lecture Notes of Mathematics, Vol. 1550, Springer-Verlag.

The international conference in Tampa (see the previous review) was followed by a second conference in Leningrad (St. Petersburg, Russia), May 13–26, 1991. This volume contains 19 selected papers on orthogonal polynomials, wavelets, rational approximation, harmonic functions, and constructive approximation theory.

S. BARON AND D. LEVIATAN, Eds., *Approximation, Interpolation and Summability*, Israel Mathematical Conference Proceedings, Bar-Ilan University, 1991, xvi + 284 pp.; available from American Mathematical Society.

These are the proceedings of an international conference held at Tel-Aviv University and Bar-Ilan University, Israel, on June 4–8, 1990, in honor of Amnon Jakimovski on his 65th