6. Orthonormal Bases of Compactly-Supported Wavelets. 7. More About the Regularity of Compactly Supported Wavelets. 8. Symmetry for Compactly Supported Wavelet Bases. 9. Characterization of Function Spaces by Means of Wavelets. 10. Generalizations and Tricks for Orthonormal Wavelet Bases.

About two-thirds of the book (by the author's estimate) is devoted to the tutorial aspects of her project. The remaining third delves into various special topics of current research. A special section of nine pages precedes Chapter 1, and reviews the "prerequisites" for reading the book. These include Fourier transform theory, operators on Hilbert space, and integration theory. The interests of nonexperts seem to be well served by the inclusion of detailed proofs, frequent diagrams, and asides referring to the real world of signal processing and so on.

E. W. C.

38[41-02, 41A10, 42A10, 41A15, 41A44].—N. Korneichuk, *Exact Constants in Approximation Theory* (Translated from the Russian by K. Ivanov), Encyclopedia of Mathematics and its Applications, Vol. 38, Cambridge Univ. Press, Cambridge, 1991, xii + 452 pp., 24 cm. Price $89.50.

In both numerical analysis and approximation theory, there are many results giving bounds on some kind of approximation process. In most cases, one is content with knowing the order of the approximation, and is willing to accept some fixed (and sometimes not precisely specified) constant in front of the error bound. In such cases, the natural question always arises: can one find the best possible constant? This is often a difficult question to answer, but over the past decade or two, quite a lot of new results have been obtained.

This book provides a comprehensive and detailed treatment of best-constant problems for approximation of smooth functions by polynomials, trigonometric polynomials, and splines. It is divided into eight chapters and an appendix. The first chapter provides background and general theory, including duality theory from convex analysis and the introduction of various standard smoothness classes. The second chapter reviews results on polynomial and spline approximation. Chapter 3 goes into comparison theorems and the construction of standard comparison functions (such as perfect splines, Euler splines, Bernoulli monosplines, etc.). Chapter 4 discusses polynomial and trigonometric approximation, while Chapter 5 is devoted to spline approximation. Jackson inequalities are treated in Chapter 6 for both polynomials and splines. Spaces of functions whose moduli of smoothness have prescribed behavior are discussed in Chapter 7, using certain rearrangement results. Finally, in Chapter 8 the theory of n-widths is investigated.

The book is well organized and well written (the English reads smoothly). The bibliography consists of approximately 400 entries, and is especially valuable because of its concentration on the Russian literature in the area. Each chapter concludes with remarks and historical notes, along with (a limited) set of exercises. While there is no particular computational flavor to the material presented here, the book should be of considerable general interest to numerical analysts and approximation theorists, and of great interest to connoisseurs.

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39[65–06, 65D17].—HANS HAGEN (Editor), *Topics in Surface Modeling*, Geometric Design Publications, SIAM, Philadelphia, PA, 1992, x + 219 pp., $25\frac{1}{2}$ cm. Price: Softcover $45.50.

This is a collection of ten papers that evolved from a SIAM Conference on Geometric Design held at Tempe, Arizona between November 6 and 10, 1989. Some of the papers were presented there, and others were invited subsequently for this volume. The book is divided into three parts: I. Algebraic Methods, II. Variational Surface Design, and III. Special Applications.

In Part I (73 pages), all three papers concern surfaces in implicit form, $F(x, y, z) = 0$. Here we find mainly local methods that employ blending techniques to represent highly irregular surfaces. These may have holes, bumps, and other characteristics that preclude the use of anything global.

In Part II (13 pages), the first paper concerns estimating the twist vector of a surface. This estimator is then used advantageously in a patch scheme for surface representation. The second paper discusses an alternative to the Bezier patches, arrived at by direct variational methods.

In Part III (123 pages), there are five chapters. The first of these discusses at an abstract level the design problem of creating a surface that satisfies a number of nonlinear criteria (including aesthetic ones) by choosing values for a large number of parameters. The complexity of the computation and its resulting cost are troublesome aspects of this activity. The second paper addresses problems of conversion between different CAGD systems. The third again attacks the problems connected with the highly irregular surfaces that predominate in most manufacturing enterprises, such as the production of automobiles. In the latter industry, only a small proportion of parts conform to smooth free-flowing surfaces amenable to global representation. The fourth paper concerns contour representation problems that arise, for example, in medical imaging. The central question here is how to reconstruct a solid from a knowledge of some of its contours ("level sets"). Topological considerations (Morse theory) bear heavily on this topic. The final paper is devoted to problems of making C^1- and C^2-continuity connections between local surface patches.

The book should be useful to theoreticians and practitioners in Computer Aided Design.

E. W. C.

40[65–06, 65Y25].—HANS HAGEN (Editor), *Curve and Surface Design*, Geometric Design Publications, SIAM, Philadelphia, PA, 1992, x + 205 pp., $25\frac{1}{2}$ cm. Price: Softcover $44.50.

This is a collection of ten papers, some invited by the editor especially for this volume, and others arising from a SIAM conference on geometric design (Tempe, Arizona, November 1989). Among them are two papers on minimal-energy splines, three on weighted splines, one on geometric-continuous