One deals with multi-fractal analysis of nonstationary and intermittent geophysical analysis. One area where this will find immediate application is in the stochastic description of sea floor and other geologic structures. Traditional methods based on the assumption of stationarity can be avoided by using wavelet based techniques. The last paper considers noise suppression and signal compression and is the only paper that shows an example from exploration seismology. For the migrated seismic section example, a compression ratio of 20.34 was obtained, which resulted in 93.24% of the original data being discarded. This result is of particular importance for data transmittal and archiving, as a modern seismic surveying for exploration continues to demand an increase in the information required to accurately image subsurface structures in detail.

Thus, this book is very timely; the papers cover a wide range of applications and the results are well presented. We recommend this book without hesitation to any researcher, practitioner or student in geophysics.

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10[41-02, 41A17, 26C05, 26C10, 26Dxx]—*Topics in polynomials: extremal problems, inequalities, zeros*, by G. V. Milovanović, D. S. Mitrinović, and Th. M. Rassias, World Scientific, Singapore, 1994, xiv + 821 pp., $22\frac{1}{2}$ cm, $115.00

This is a remarkable book, offering a cornucopia of results, all connected by their involvement with polynomials. The scope of the volume can be conveyed by citing some statistics: there are 821 pages, 7 chapters, 20 sections, 108 subsections, 95 pages of references (distributed throughout the book), a name index of 16 pages, and a subject index of 19 pages. A brief description of each chapter follows.

Chapter 1 concerns generalities and discusses algebraic polynomials in one or several variables, as well as trigonometric polynomials. The Fejér-Riesz representation of nonnegative trigonometric polynomials is proved, as are representations for nonnegative algebraic polynomials on the real line or the half-line. Orthogonal systems are briefly dealt with, but the authors wisely do not attempt to include that vast subject in their book. Multivariable polynomials of various types are considered, such as symmetric polynomials and homogeneous polynomials. Resultants and discriminants are discussed.

Chapter 2 addresses polynomial inequalities for algebraic and trignonometric polynomials. Here we find inequalities satisfied by the zeros, by the moments, by the coefficients, by derivatives, and so on.

Chapter 3 is on the zeros of polynomials, and includes classical results such as the Gauss-Lucas Theorem and much very recent work (109 pages of text and 15 pages of references).

Chapter 4 is on inequalities involving trigonometric sums. Classical work by many persons is presented in a section of 33 pages. Another section of 40 pages emphasizes positivity results, mostly of recent origin.

Chapter 5 concerns extremum problems, particularly minimum norm problems. Incomplete polynomials receive the attention of one section, and inequalities involving trigonometric polynomials with different norms (inequalities of the Nikolskii type) are the subject of another section.

Chapter 6, having 200 pages, is on the extremal problems exemplified by the Markoff and Bernstein inequalities. The inequalities are given for various domains, various norms and for various subclasses of polynomials, both algebraic and trigonometric.

Chapter 7 sets forth some interesting applications: least squares approximation with constraints, simultaneous approximation, the Bernstein conjecture, and computer-aided design.

The book is written in a gentle style: one can open it anywhere and begin to understand, without encountering unfamiliar notation and terminology. It is strongly recommended to individuals and to libraries.

E.W.C.

11[49-02, 49J10, 65K10]—*Optimization and nonstandard analysis*, by J. E. Rubio, Monographs and Textbooks in Pure and Applied Mathematics, Vol. 184, Dekker, New York, 1994, xii + 356 pp., $23\frac{1}{2}$ cm, $135.00

Nonstandard analysis not only provides powerful tools for simplifying standard proofs and for proving or refuting new conjectures; it also gives precise meaning to many informal and intuitive notions. For example, in nonstandard analysis, each real-valued objective function with a lower bound has near-minimizers, even if—like the exponential function $x \mapsto e^x$ whose near-minimizers are large and negative—it has no minimizer. These near-minimizers provide a theoretical counterpart to the approximations to minimizers obtained by optimization algorithms in finitely many iterations.

While Rubio introduces near-minimizers on page 15 of his text, more than a hundred pages pass before they are mentioned again. In the interim, Rubio succinctly summarizes a considerable part of set theory, topology, model theory, and measure theory, both standard and nonstandard. He has organized this text into six chapters:

1. Optimization and Nonstandard Analysis, with a now typical ultrapower approach to nonstandard analysis and a proof of the transfer theorem;
2. Further Concepts and Applications, defining internal sets, enlargements of superstructures, and saturation;
3. Measure Theory and Infinite-Dimensional Linear Programming, presenting the theory of Loeb measure and a nonstandard characterization of realcompact spaces;
4. Linear Spaces, A Variational Principle and Penalties, with applications to optimal control and simple variational problems;
5. The Control of Homogenized Systems, deriving the homogenized nonlinear diffusion equation; and
6. Distributions, using certain optimal control problems to illustrate the nonstandard theory.