of citations (sometimes near stated results, sometimes in remarks spread throughout chapters) as well as more significant ones such as omission of references (for example, to the concepts of probing and polynomial preconditioning in Chapter 8). As a consequence, I believe it will be somewhat difficult to follow up in the published literature.

Despite this flaw, I believe the book will serve as an excellent reference on the subject of iterative methods. It is a good introduction to the topic albeit at a fairly advanced level, and it is also a potential source of new ideas.

References

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H. E.

22[15A06, 65F05, 68Q25]—*Polynomial and matrix computations: Fundamental algorithms,* Vol. 1, by Dario Bini and Victor Y. Pan, Progress in Theoretical Computer Science, Vol. 12, Birkhäuser, Boston, 1994, xvi+415 pp., 24 cm, $64.50

Bini and Pan describe their book as being "about algebraic and symbolic computation and numerical computing (with matrices and polynomials)", and they note that it extends the study of these topics found in the classic 1970s books by Aho, Hopcroft and Ullman [1] and Borodin and Munro [2]. A great deal of research has been done since the 1970s, and the authors state that most of the material they present has not previously appeared in textbooks. For a taster of the book's subject matter, see Pan's paper [3], which is mentioned in the preface as surveying a substantial part of the material of the book.

The book achieves its goals of presenting a "systematic treatment of algorithms and complexity in the areas of matrix and polynomial computations", as would be expected in view of the authors' eminence in the field. Both serial and parallel algorithms are described, the latter in the fourth and final chapter. There is very little treatment of computation in floating-point arithmetic, and the emphasis is on the computational complexity of algorithms rather than their actual cost in a computer implementation. The book can be described as being more theoretical than a numerical analysis textbook, but more practical than a textbook in computational complexity, and it makes contributions to both areas.

A strength is the treatment of structured matrices. Toeplitz, Hankel, Hilbert, Sylvester, Bézout, Vandermonde and Frobenius matrices are given a unified treatment and their connection with polynomial computations is explored.

The organization of the book is a little unusual in that important topics are often relegated to appendices and exercises. For example, the fast Fourier transform (FFT) is used and analyzed, but the statement and derivation of the algorithm appears in an exercise, and a discussion of floating-point numbers and error analysis appears in an appendix to Chapter 3, "Bit-Operation (Boolean) Cost of Arithmetic Computations". Unfortunately, solutions or references are rarely given to the many interesting exercises, so the reader struggling with a proof or wanting to know more will need to look elsewhere.

A full rounding error analysis is given for the FFT (Proposition 4.1 of Chapter 3) and claimed to be new, but several similar results have been published in the last 30 years and are referenced in [4, §1.4].

The presentation is good, the book having been prepared with TeX, but it could be improved. The numbering of equations, theorems and so on does not reflect the chapter number, which makes cross-referencing difficult. Some grammatical errors are present, and "Cholesky" is misspelled "Choleski" on page 100. Citations are given using an ugly alphanumeric scheme, under which the book under review would be cited as [BP94]; this makes finding a reference in the extensive bibliography more difficult than if numbers were used.

Volume 2 is referred to on page 94 in a reference to "Chapter 5", but the contents and publication date of the second volume are not mentioned. It appears that Volume 2 will include a treatment of fast matrix multiplication, which is only briefly considered in Volume 1.

Bini and Pan's book fills a gap in the literature and can be recommended as an accessible presentation of much recent research in computations with matrices and polynomials.

References

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2. A. Borodin and I. Munro, *The computational complexity of algebraic and numeric problems*, American Elsevier, New York, 1975. MR **57:**8145
3. Victor Pan, *Complexity of computations with matrices and polynomials*, SIAM Rev. **34** (1992), 225–262. MR **93g:**65179
4. Charles F. Van Loan, *Computational frameworks for the Fast Fourier Transform*, Society for Industrial and Applied Mathematics, Philadelphia, PA, 1992. ISBN 0-89871-285-8, xiii + 273 pp. MR **93a:**65186

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23[65-02, 65D17]—*Mathematical aspects of geometrical modeling*, by Charles A. Micchelli, CBMS-NSF Regional Conference Series in Applied Mathematics, Vol. 65, SIAM, Philadelphia, PA, 1995, x+256 pp., 25 cm, softcover, $37.50

This monograph grew out of the author's 1990 lectures at a Regional Conference sponsored by the Conference Board of the Mathematical Sciences. This was held at Kent State University, and had as its theme, "Curves and Surfaces: An Algorithmic Approach". The book, however, concentrates on the content of only a portion of the lectures, and enters into considerable detail on the chosen topics. These topics are quickly enumerated by giving the chapter headings: 1. Matrix Subdivision, 2. Stationary Subdivision, 3. Piecewise Polynomial Curves, 4. Geometric Methods for Piecewise Polynomial Surfaces, and 5. Recursive Algorithms for Polynomial Evaluation. Chapter 1 begins with the Casteljau subdivision algorithm