I must include some remarks on the book's infrastructure. On pp. 8 and 9, the authors present novel descriptions of the interdependence of sections. We find, on p. 8, a lower triangular matrix where the entry in the position (i, j) indicates the level of dependence of section i on section j. On p. 9, the authors explain the dependencies further with a series of detailed diagrams.

Throughout the book, each section is accompanied by a "Notes and References" section with further details and historical notes. At the end of the book, Appendix D presents a detailed subject classification of the theory of Korovkin-type theorems and a key that connects this classification to items in the bibliography. This bibliography is 50 pages long, contains about 700 entries, and appears to be comprehensive. An entry in the bibliography is often accompanied by its Mathematical Reviews number and its subject classification according to Appendix D. There is also a detailed index of symbols which I found useful in preparing this review.

It is clear from this impressive infrastructure that the authors have been meticulous in their efforts to produce this treatise on Korovkin-type approximation theory. The publishers have produced a book which is well bound, well printed, and pleasant to behold. This work by Altomare and Campiti is a comprehensive research monograph on Korovkin-type approximation theory. Since the authors go from the general to the particular, a graduate student starting out in the field may find it difficult to learn from this book in the initial stages of research. However, it would be a valuable reference to have available in the later stages of the project. University departments with active research workers in approximation theory should give serious consideration to including this book in the university's library.

TERRY M. MILLS

P. G. CIARLET AND J. L. LIONS (Eds.), *Handbook of Numerical Analysis*, Vol. III, North-Holland, Amsterdam, 1994, x + 778 pp., available in the USA/Canada from Elsevier, New York.

This book is the third in a sequence of volumes entitled *Handbook of Numerical Analysis*. I have not seen the first two volumes and I infer from the contents of this volume that there will be more in the sequence. In the general preface the editors write on p. v: "*The various volumes comprising the Handbook of Numerical Analysis will thoroughly cover all the major aspects of Numerical Analysis, by presenting accessible and in-depth surveys, which include the most recent trends.*" Perhaps the series would have been more appropriately named as "*Surveys in Numerical Analysis*" as the word "handbook" may suggest that this book is a compendium of algorithms or results.

Volume III contains five articles.

1. C. Brezinski, "*Historical perspective on interpolation, approximation and quadrature,*" pp. 3–46.
2. C. Brezinski and J. Van Iseghem, "*Padé approximations,*" pp. 47–222.
3. Bl. Sendov and A. Andreev, "*Approximation and interpolation theory,*" pp. 223–462.
4. P. Le Tallec, "*Numerical methods for nonlinear three-dimensional elasticity,*" pp. 465–622.
5. Bl. Sendov, A. Andreev, and N. Kjurkchiev, "*Numerical solution of polynomial equations,*" pp. 625–778.

Each article has its own subject index—a surprising but pleasing feature which was useful in preparing this review—and its own bibliography, which is extensive but not necessarily complete. The first article in this volume gives a brief overview of the historical development of the three topics: interpolation, quadrature, and approximation. It highlights contributions by key players in the field over several centuries. The author, C. Brezinski, is well known for the historical flavor of his writings in numerical analysis. This article would be useful reading for any graduate student in this general area because it gives the student some idea of the development of the field. Since it contains no proofs, the article is very easy to read. Also, the article would be a good source of historical notes for a university course on numerical analysis or approximation theory.

It was just a century ago when H. Padé wrote about matters which led to the development of the area now called Padé Approximation which is the topic of the second article in this volume. Since that time, the subject has blossomed into an important part of applicable analysis and now several good books on the subject exist, including one by C. Brezinski. The present article gives a brief survey of the topic up to recent developments. Numerical examples are used to illustrate some theorems. This article provides the newcomer to the field with an introduction which is authorative and substantial and which suggests some directions for research.

The third article deals with approximation and interpolation in four chapters. These chapters deal with (1) interpolation, (2) uniform approximation, (3) numerical integration, and (4) Hausdorff approximation, respectively. The chapters cover well-known topics, but I was surprised that about half of the chapter of numerical integration was devoted to Monte Carlo (MC) methods. I hasten to add that this is not a criticism as MC methods appeal to me and I often find that students enjoy their first encounter with these methods. The last chapter on Hausdorff approximation is an excellent introduction to that branch of mathematics which is strongly associated with the name of Bl. Sendov.

The purpose of the fourth article is, to quote the author, "*to give a general description of three dimensional finite elasticity and of its approximation*" (p. 470). This article is particularly well structured. It consists of two parts. The first part (Chapters I–IV) presents a tightly written survey of finite elasticity problems and covers modeling, the analysis of models, and description of associated algorithms. The second part (Chapters V–VII) describes several directions which one can pursue for further research. Each chapter opens with an introduction (of up to 2 pages) which explains the problem to be considered in the chapter, points to key results associated with the problem, and mentions a few key references. In fact, when first approaching this article, one could read the introductions to these seven chapters before tackling the entire article. In this sense, the structure of the article is very user-friendly.

The final article is the second in the *Handbook* which deals with the numerical solution of equations in $\mathbb{R}^n$. The first article on this general topic was written by A. Björk and appeared in Volume I. However, the article by Sendov *et al.* is independent of the one by Björk. The focus of this article is the solution of equations of the form $p(z) = 0$, where p is a polynomial and z is a complex (or sometimes real) number. The article takes us through classical results associated with famous names such as Cauchy, Bernoulli, Laguerre, up to modern ideas associated with works of the authors and others. Many ideas are illustrated with helpful examples based on numerical experiments. The final chapter deals with some aspects of the computational complexity of the approximate calculation of zeros of polynomials.

The publishers should be congratulated on the presentation of this book. The quality of the binding and of the printing are high. The value of the *Handbook* is that it contains survey articles which lie somewhere between the 1–2 page descriptions that one would find in a mathematics dictionary and the 400 page treatment that one would find in a monograph on the topic. Thus the surveys are neither exhaustive nor exhausting. The present volume does meet the editors' claim that it presents "*accessible and in-depth surveys.*" Hence it would be a suitable addition to the reference section of a university library.

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