The authors and their titles are as follows:

Carl de Boor, Approximation order without quasi-interpolants
Charles K. Chui, Wavelets and signal analysis
Albert Cohen, Wavelet bases, approximation theory, and subdivision schemes
Bo Gao, Donald J. Newman, and Vasil Popov, Approximation with convex rational functions
Martin Gutknecht, Block structure and recursiveness in rational interpolation
Kurt Jetter, Multivariate approximation from the cardinal interpolation point of view
Will Light, Ridge functions, sigmoidal functions, and neural networks
Tom Lyche, Knot removal for spline curves and surfaces
Vilmos Totik, Approximation by algebraic polynomials

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7[65-01, 65Mxx, 65Nxx].—William F. Ames, *Numerical Methods for Partial Differential Equations*, 3rd ed., Computer Science and Scientific Computation, Academic Press, Boston, 1992, xvi+451 pp., $23\frac{1}{2}$ cm. Price $59.95.

This is a third and significantly updated edition of a well-known textbook which first appeared in 1969, with a second edition in 1977. Of the six chapters of the second edition, the last one, "Weighted residuals and finite elements", has been disassembled and its contents, to quote the author, "... merged with the material on finite differences", so that "... they now constitute equal partners". Further, "Additional material has been added in the areas of boundary elements, spectral methods, the method of lines, and invariant methods."

The book covers a large number of topics of interest for applications in science and engineering, and contains about 300 problems and 650 references. The presentation is more descriptive than analytic, and thus introduces and discusses concepts and gives many recipes for numerical approaches but provides little in terms of theory and proofs.

In spite of the author's claim for equal partnership between finite differences and finite elements, the text is still strongly founded in the finite difference ideology of the time of its first edition, and many important new points of view and developments are omitted such as, e.g., the variational approach to boundary value problems, and domain decomposition and multigrid methods. The first sentence of the introduction, "Numerical calculation is commonplace today in fields where it was virtually unknown before 1950" is taken over from an earlier time and gives an antiquated impression, and the author's claim in the preface that "the references have been brought up to date" is not quite justified: among the 134 references in the chapter on "Elliptic Equations", 95 are from before 1969 and only 19 from the 1970s and 20 from 1980 and later.

In summary, in the opinion of the reviewer, the updating of this classical book from almost 25 years ago has not resulted in a text that is representative of today's philosophy and technology for the numerical solution of partial differential equations. In view of the rapid and fundamental development of this field during the last decades it would, in fact, have been very difficult to achieve such a goal.

V. T.

8[35-06, 35J60, 65-06, 65K10, 65L05, 65N06].—Randolph E. Bank (Editor), *Computational Aspects of VLSI Design with an Emphasis on Semiconductor Device Simulation*, Lectures in Applied Mathematics, vol. 25, Amer. Math. Soc., Providence, RI, 1990, xiii+190 pp., $23\frac{1}{2}$ cm. Price $56.00.

These are the proceedings of the eighteenth AMS-SIAM Summer Seminar on Applied Mathematics, held at the Institute for Mathematics and Its Applications from 30 April to 7 May 1987.

The primary focus of the book is on process or device simulation in the design of VLSI (Very Large Scale Integrated circuits, such as the computer chips that make up a personal computer, workstation, or even supercomputer). Topics related to circuit-level simulations are also presented.

The so-called drift-diffusion model used in device simulations is a system of nonlinear partial differential equations. Several papers are devoted to an asymptotic analysis of the singular limit of these systems as one of the physical parameters (which is usually small in typical applications) tends to zero. There is also some work on existence theory for such systems.

The numerical treatment of the drift-diffusion models is not extensive in the book, although substantial examples are presented in the papers dealing with the asymptotic behavior of the singular limit. These models exhibit internal layers (and possibly boundary layers), and the asymptotic analysis is intended to improve numerical methods for such problems as well as provide qualitative information of independent interest.

The drift-diffusion model is known to be insufficiently detailed for some VLSI designs of current interest. Two papers explore more detailed models. One is based on the Boltzmann equation and involves no less than seven independent variables: space, time, and wave numbers. The relationship between this model and the drift-diffusion model is reviewed and some numerical experiments on a simplified model problem are presented. Another paper explores the inclusion of quantum mechanical effects that are influential especially for VLSI chips made of gallium arsenide. A model consisting of a system of nonlinear partial differential equations, not unlike the drift-diffusion system, is derived and numerical experiments are described.

One paper considers block Gauss-Seidel iterative algorithms for solving the steady-state version of the drift-diffusion model. Another considers parameter-continuation methods (together with multigrid solution of the linearized equations) for solving them.

One paper is devoted to solving the basic algebraic-ODE equations that comprise the circuit-level model of VLSI. These models arise via spatial averaging of the device-level description of VLSI, reducing an entire device to discrete point values of current or voltage.