thus many of the papers remain valuable. In this short review we will simply list the topics covered, since the number of papers is too large to mention each one individually.

In the section on matrix computations there are papers on block algorithms for dense matrix problems, sparse ordering and factorization algorithms, symmetric and nonsymmetric eigenvalue problems using QR, Lanczos, and bisection algorithms, and condition estimation.

The numerical methods papers cover bifurcation computations, asynchronous PDE solvers, linear and nonlinear optimization, homotopy methods, weather modeling, Navier-Stokes solvers, power-flow computations, ODE solvers, and parallel FFTs.

The differential equations papers cover multicolor elliptic solvers, fast Poisson solvers, elliptic solvers using domain decomposition, implicit and explicit parabolic solvers, stiffness matrix generation, nonlinear hyperbolic solvers, and aerodynamic applications.

The section on massive parallelism includes finite element computations, computational fluid dynamics, computing sparse approximate inverses, transportation optimization and molecular dynamics on the CM-2, load balancing, interprocessor connection networks, scheduling recurrence solvers, solving systems of conservation laws, the DINO language, and systolic arrays.

The section on performance and tools covers the PARTI runtime support system, automatic blocking of linear algebra codes, the CONLAB parallel simulator, the Linda coordination language, the Seymour data parallel language, performance modeling, and workload metrics.

J. W. D.

6[65D07, 65Dxx, 41A15].—WILLARD M. SNYDER & RICHARD H. MCCUEN, *Numerical Analysis With Sliding Polynomials*, Lighthouse Publications, Mission Viejo, California, 1991, x + 561, pp., $25\frac{1}{2}$ cm. Price. $58.00.

"Sliding polynomials" are piecewise polynomial functions of a special form. The authors emphasize two types, the "four-point" and the "six-point". The former can be described as follows. An increasing set of knots x_i is given, accompanied by corresponding ordinates, y_i. On a typical interval $[x_i, x_{i+1}]$, the four-point sliding polynomial will be a cubic polynomial p determined by the four conditions $p(x_i) = y_i$, $p(x_{i+1}) = y_{i+1}$, $p'(x_i) = a$, $p'(x_{i+1}) = b$. Here a is the slope at x_i of the quadratic interpolant of the ordinates at x_{i-1}, x_i, and x_{i+1}. The value b is the slope at x_{i+1} of the quadratic that interpolates the given ordinates at x_i, x_{i+1}, and x_{i+2}. The definition leads to a composite function that is of class C^1. The six-point sliding polynomial is similar; it is a piecewise quintic polynomial and is of class C^2.

The book emphasizes the case of equally-spaced knots, and provides formulas and codes for doing various tasks with these sliding polynomials in the equally-spaced case. There are ten chapters, dealing with such topics as numerical differentiation, numerical integration, smoothing, contouring, differential equations, integral equations, and finite elements. Multidimensional sliding polynomials are needed for the latter. Each chapter contains many examples employing realistic data. Appendix A (17 pages) gives numerical constants useful in working with these functions. Appendix B (140 pages) gives program listings in the language BASIC.

E. W. C.

7[65-06, 65D07, 65D17, 68U05].—GERALD FARIN (Editor), *NURBS for Curve and Surface Design*, SIAM, Philadelphia, PA, 1991, ix + 161 pp., $25\frac{1}{2}$ cm. Price: Softcover $33.50.

This book contains a collection of twelve papers on the theory and application of NURBS. Most of the papers are based on lectures given at a SIAM conference on geometric design held in Tempe, Arizona, in 1990.

The word NURBS is an acronym for *nonuniform rational B-splines*. The use of this name perpetuates a problem of nomenclature which has arisen regarding the term B-spline. Strictly speaking, B-splines are nonnegative locally supported, smooth piecewise polynomial functions with some very special properties which make them ideal *basis* functions for certain linear spaces S of polynomial splines. They go back to a paper of Schoenberg in 1946. The idea is that each spline s in S can be written uniquely as a linear combination of the given B-splines. Unfortunately, for many in the CAGD community, a B-spline is the linear combination itself. To help avoid confusion, such an object is sometimes referred to as a *B-spline curve*. They are of considerable interest as tools for CAGD. For many applications, however, it turns out to be useful to consider the more general class of curves which arise when each coefficient c_i in the B-spline expansion is multiplied by a weight w_i, and the overall expansion is divided by the weighted sum of the basis functions. Curves of this type are called NURBS. They are piecewise rational functions, where the term *nonuniform* refers to the fact that the basis splines may be constructed on a nonuniform knot sequence. Surfaces can also be modelled using NURBS in a standard tensor-product framework.

NURBS have several advantages for CAGD applications, such as the fact that conics can be exactly represented, and there are many who would argue that they are becoming the standard working tool in industry. The aim of this collection of papers is to contribute to the mathematical development of the theory of NURBS. Topics treated include Bézier patches on quadrics, G^1 surface interpolation over irregular meshes, curves and surfaces on projective domains, reparameterization and degree elevation, constrained interpolation, parametric triangular patches based on generalized conics, generalized NURBS surfaces, the rational Overhauser curve, B-spline and Bézier representations, linear fractional transformations, curvature-continuous NURBS, and approximation of NURBS by polynomial curves. The authors of the individual papers are W. Boehm & D. Hansford, H. Chiyokura, T. Takamura, K. Konno & T. Harada, T. DeRose, G. Farin & A. Worsey, T. Goodman, B. Ong & K. Unsworth, B. Hamann, G. Farin & G. Nielson, D. Hoitsma & M. Lee, J. Jortner, D. Lasser & A. Purucker, M. Lucian, H. Pottmann, and T. Sederberg & M. Kakimoto.

LARRY L. SCHUMAKER

Department of Mathematics
Vanderbilt University
Nashville, TN 37235