ful 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