generalizations, the book develops its topics by relying almost exclusively on particular examples. Each chapter consists of a number of sections, each of which presents a particular physical problem, some special techniques to generate solutions, and, often, physical consequences of the results. My own pedagogical tastes certainly run towards the particular, well-chosen example, although I felt this was perhaps carried to an extreme here. What is often lacking is any kind of general framework for the particular methods introduced, or a discussion of how to ever decide which of the many techniques available to apply to a new problem. Of course, in many cases, this approach is necessitated by the nature of the subject; many of the methods only work in particular instances, and (as in much of applied mathematics) one learns primarily through example. Only in the final section on symmetry groups is there an attempt to develop a general theory which can be readily ported to other contexts. Students especially will profit from the wide repertoire of methods and applications, although I would find it hard to use this book in a course other than as a supplement to more systematic texts. Nevertheless, I can recommend the book to anyone seeking to enlarge their "bag of tricks" for tackling complicated nonlinear problems.

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28[15–02, 65F50].—I. S. DUFF, A. M. ERISMAN & J. K. REID, *Direct Methods for Sparse Matrices*, Monographs on Numerical Analysis, Clarendon Press, Oxford University Press, New York, 1989, xiv + 341 pp., 23 $\frac{1}{2}$ cm. Price $22.50 paperback.

This is a paperback edition (with corrections) of the 1986 edition of the book. See [1] for a review of the original edition.

W. G.

1. K. Turner, Review **3**, Math. Comp. **52** (1989), 250–252.

29[53–01, 65D05, 65D07, 65D10, 68U05].—GERALD FARIN, *Curves and Surfaces for Computer Aided Geometric Design—A Practical Guide*, Computer Science and Scientific Computing, Academic Press, Boston, 1988, xv + 334 pp., 23 $\frac{1}{2}$ cm. Price $39.95.

This book consists of a collection of material on parametric curves and surfaces used in fields known variously as "Computer Aided Design" and "Computer Aided Geometric Design". The topics covered are, in order of the chapters: the de Casteljau algorithm, Bézier curves, polynomial interpolation, *B*-spline curves, geometric continuity for curves, conic sections, rational Bézier and *B*-spline curves, tensor product and composite surface patches. Included

also in the text are two guest chapters on differential geometry, written by W. Boehm.

I have mixed reactions to this book. It is difficult to assess in what capacity the book would be most valuable. It is neither an undergraduate text, teaching curve and surface algorithm design, nor comprehensive enough to be a graduate text. Perhaps, its best use is as a browser to quickly gather working knowledge of some of the approaches taken in this rapidly advancing field.

The exposition is quite clear and understandable. There are also numerous figures and color pictures to add to the clarity. However, I find the book severely lacking in its attempt to provide a unified treatment of the main topics of geometric design. Most of the book deals with parametric Bézier and B-spline curves, with parametric surfaces treated only at the very end. What is even more disappointing is the lack of precise statements, backed up with proofs. Rare mention is made of the more general implicit form of curves and surfaces. Only scant statements are made of the type "A surface may be given by an implicit form $f(x, y, z) = 0$ or, more useful for CAGD, by its parametric form." This statement is never elaborated further in the text.

The introductory Chapters 11 and 21 on Differential Geometry, though well written, lack references where the interested reader may further his study. Theorems such as Meusnier's and Euler's are explained by examples, with no formal statement of the theorems or indication where the proofs may be found.

The book lacks a binding theme and comes across as a potpourri of facts, piled one upon the other. A more modular approach would be highly desirable. Introductory facts about general curves and surfaces, leading to appropriate representations and data structures for them, and followed by fundamental algorithmic paradigms for manipulating those representations, would be a better way to organize the material.

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30[49–06, 65K05, 90Cxx].—MASAO IRI & KUNIO TANABE (Editors), *Mathematical Programming: Recent Developments and Applications*, Mathematics and Its Applications (Japanese Series), Kluwer, Dordrecht, 1989, ix + 382 pp., 23 $\frac{1}{2}$ cm. Price $139.00/Dfl.290.00.

This volume contains the texts of one Plenary Lecture, two Memorial Lectures (in memory of Martin Beale and L. V. Kantorovich, respectively) and 10 Tutorial-and-Survey Lectures highlighting the state of the art in Mathematical Programming and its applications as of 1988. The lectures were delivered at