dimensions. In Chapter 6, some notions from algebraic geometry are discussed, such as Sturm sequences, resultants, and discriminants.

Most of the results are proved in full, and a praiseworthy effort has been made to avoid excessive generality and complexity. The bibliography is much too brief, however. Furthermore, the publisher is to be seriously faulted for poor typesetting, copyediting, and proofreading. Some Gallicisms should have been excised in the editorial process, for example, "inferior" and "superior" triangular matrices and "application" (for "mapping").

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32[65-02, 65D17, 68U05].—J.-C. Fiorot & P. Jeannin, *Rational Curves and Surfaces: Applications to CAD* (translated from the French by M. C. Harrison), Wiley, Chichester, 1992, xiv+322 pp., $23\frac{1}{2}$ cm. Price \$69.95.

If a curve (similarly for surface) is written in Bernstein-Bézier (BB) form

$$p(t) = \sum_{i=0}^{n} P_i B_i^{\lambda}(t),$$

then the position and shape of the curve (surface) is completely controlled by the vectors P_i (called control points). When a rational curve (similarly for surface) is written in BB form

$$p(t) = \frac{\sum_i \beta_i P_i B_i^n(t)}{\sum_i \beta_i B_i^n(t)},$$

then the curve (surface) can be controlled by the vectors (P_i, β_i) (called weighted control points) if $\beta_i \neq 0$. However, if some $\beta_i = 0$, then controlling the curve geometrically is a problem as some P_i become infinite.

This book presents a method for describing rational curves as well as surfaces based on projective geometry. The rational curve or surface are successfully controlled and determined by "massic vectors", a concept introduced by the authors. The "massic vector" is a weighted control point (P_i, β_i) if $\beta_i \neq 0$ or $\overline{U}_i$ if $\beta_i = 0$. By using the "massic vectors" the rational curve above can be rewritten as

$$p(t) = \frac{\sum_{i\in I} \beta_i B_i^n(t) P_i}{\sum_{i\in I} \beta_i B_i^n(t)} + \frac{\sum_{i\in \overline{I}} B_i^n(t) \overline{U}_i}{\sum_{i\in \overline{I}} \beta_i B_i^n(t)},$$

where $I \cup \overline{I} = \{0, 1, \dots, n\}$ and $\beta_i \neq 0$ for $i \in I$. Now "massic vectors" are $\{(P_i, \beta_i)\}_{i\in I} \cup \{\overline{U}_i\}_{i\in\overline{I}}$. By using the "massic vectors", the simplicity of several algorithms for polynomial BB forms are transferred to rational functions in BB form. Most importantly, the de Casteljau algorithm.

On the downside, one should mention that the projective geometric approach taken by the authors is overly complicated. There are far too many concepts and notations causing some propositions to become merely definitions. This complexity will definitely undermine the usage of the book, especially among students and engineering researchers in the areas of CAD, CAGD, and CAM. It should, however, be of keen interest to CAD mathematicians.

In summary, the book is valuable, but its presentation could be simplified. Some additional comments are as follows:

1. The curves and surfaces studied in this book are parametric. The proper concept for continuity should be reparametrization continuity rather than C^k.
2. The relationship between the parametric form and the implicit form are not mentioned. All genus-0 algebraic curves can be rationally parametrized. For example, the technique used in Chapter 4 also works for singular cubic curves.
3. For a rational curve (or surface), if some weights of the denominator are zero, one could use subdivision and then control the curve (or surface) in each of the subdomains. What tradeoffs exist between this approach and the approach expounded in the book?

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33[73-02, 65-02, 73V10, 73V20, 73M25, 65N30].—M. H. ALIABADI & D. P. ROOKE, *Numerical Fracture Mechanics*, Solid Mechanics and its Applications, Vol. 8, Kluwer, Dordrecht, 1991, 276 pp., 25 cm. Price $99.00/Dfl.190.00.

The purpose of this book is to present numerical algorithms for the solution of fracture mechanics problems.

The book begins with an introduction to basics of fracture mechanics. The first chapter includes topics on the concept of energy balance and the definition of stress intensity factors for sharp cracks.

In Chapter 2, the basic equations of linear elasticity are reviewed. Then the equivalence of the stress intensity factor and the energy release rate approaches is stated. The three-dimensional stress field near the crack front is given. Some fracture mechanics criteria for mixed-mode loading are discussed.

Chapter 3 is devoted to some numerical methods in linear elastic fracture mechanics. The boundary collocation technique and the finite element method are briefly described. The body force method, the method of lines, and the edge function method are also mentioned.

The remaining part of the book concentrates mainly on the use of the boundary element method in linear fracture analysis. In Chapter 4, the direct boundary element formulation for two- and three-dimensional elasticity problems is presented. Procedures for the assemblage of equation system and for the numerical evaluation of coefficient matrices are described in detail.

Chapter 5 pertains to boundary element techniques for the calculation of stress intensity factors. These techniques include special crack-tip elements, Green's functions, the energy compliance method, the J-integral, and a technique based on a subtraction of singularity. Numerical examples and the comparison with finite element results are provided. It is concluded that the most efficient technique is 'the subtraction of singularity'.

Chapter 6 is devoted to techniques for computing and using weight functions for the stress intensity factor evaluation. Several boundary element algorithms