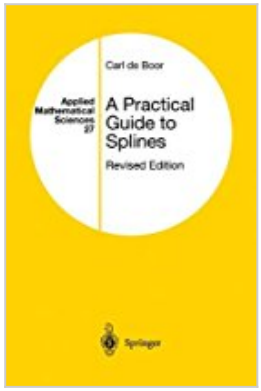

A Practical Guide to Splines (Applied Mathematical Sciences)

By Carl de Boor

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This book is based on the author's experience with calculations involving polynomial splines. It presents those parts of the theory which are especially useful in calculations and stresses the representation of splines as linear combinations of B-splines. After two chapters summarizing polynomial approximation, a rigorous discussion of elementary spline theory is given involving linear, cubic and parabolic splines. The computational handling of piecewise polynomial functions (of one variable) of arbitrary order is the subject of chapters VII and VIII, while chapters IX, X, and XI are devoted to B-splines. The distances from splines with fixed and with variable knots is discussed in chapter XII. The remaining five chapters concern specific approximation methods, interpolation, smoothing and least-squares approximation, the solution of an ordinary differential equation by collocation, curve fitting, and surface fitting. The present text version differs from the original in several respects. The book is now typeset (in plain TeX), the Fortran programs now make use of Fortran 77 features. The figures have been redrawn with the aid of Matlab, various errors have been corrected, and many more formal statements have been provided with proofs. Further, all formal statements and equations have been numbered by the same numbering system, to make it easier to find any particular item. A major change has occured in Chapters IX-XI where the B-spline theory is now developed directly from the recurrence relations without recourse to divided differences. This has brought in knot insertion as a powerful tool for providing simple proofs concerning the shape-preserving properties of the B-spline series.

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Editorial Review

Review

From the reviews of the first edition:

MATHEMATICAL REVIEWS

"This book is intended as a thorough presentation of those items from the theory and application of spline functions which are in a state that permits them to be offered to a prospective user under the title the author has chosen for his present publication. At several places even the expert, however, will find things elucidated in a way new to him. There are some fifty FORTRAN (sub) programs throughout the book together with an abundance of worked-out examples and many helpful comments (also in the case of pitfalls in computation) which reflect the author's ample experience in calculating with splines."

"This book is a classic reference in spline theory. It will be of great benefit to students as an introduction to the subject as well as to experts in the field." (Gerlind Plonka-Hoch, Mathematical Reviews, Issue 2003 f)

"This book is a classical one with respect to calculating polynomial splines. … The author is an outstanding spline expert. Thus the book ought to belong to every university library and to anyone interested in spline theory and applications." (Helmuth Späth, Zentralblatt MATH, Vol. 987 (12), 2002)

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