Mladen Rogina, Saša Singer:

Geometric algorithms and splines, 60 hours

The aim ot this course is to let student learn the basics of the modern theory of spline functions, and algorithms for construction of B-spline curves and surfaces. The accent lies on geometric techniques and algorithms, with the elements of the approximation theory. Therefore, the course is an introduction to computer aided geometric design, but can also serve as a preliminary study of spline functions.

Contents

Polynomial splines. Basis of spline function spaces, construction of the local basis of B-splines. Algorithms for calculating with polynomial splines, deBoor's subroutine package, dual basis of polynomial spline spaces, Lagrange and Hermite interpolation. Degree raising algorithms.

Blossoming and algorithms for knot insertion and deletion. Blossoming of polynomial splines, algorithms of de Boor, Ramshaw, Sabloniere; Oslo algorithm. Lyche-Mörken subroutine package for knot insertion and deletion. Control polygons of Bezier and spline curves, construction of B-spline curves and surfaces.

Bibliography

(i) C. deBoor: A Practical Guide to Splines, Springer-Verlag, N.Y., (1978)

(ii) E. Cohen, T. Lyche, R. Riesenfeld: Discrete B-splines and Subdivision Techniques in Computer-Aided Geometric Deign and Computer Graphics, Computer Graphics and Image processing, 87-111, (1980).

(iii) Marie-Laurence Mazure: Chebyshev Blossoming, Rapport de Recherche (1996)

(iv) L. L. Schumaker: Spline Functions: Basic Theory, John Wiley and Sons, N.Y., (1981)

(v) G. Nürnberger: Approximation by Spline Functions, Springer-Verlag, N.Y., (1980)

(vi) L. Ramshaw: Blossoming: A Connect-the-Dots Approach to Splines, Digital Systems Research Center, Palo Alto, California 94301, (1987)

(vii) Knot Insertion and Deletion Algorithms for B-spline Curves and Surfaces, R.N.Goldman, T.Lyche eds., SIAM 1993.

Complete bibliography from spline function theory is available on the Web:
`http://www.math.ohio-state.edu/JAT/DATA/TOC/toc.html`