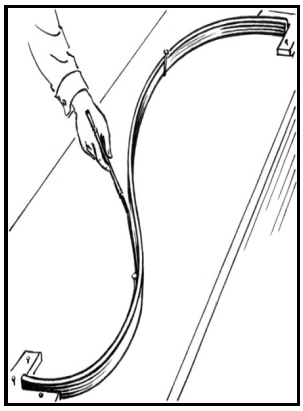
Geometric control of rational cubic B-splines

University of Birmingham - eScience Lectures Notes : Spline Curves, Bezier, B



Description: -
-Geometric control of rational cubic B-splines
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B

Rational B-splines are defined simply by applying the B-spline equation to homogeneous coordinates, rather than normal 3D coordinates. Then, we shall discuss the mathematics on Bézier and B-spline curves, which is the foundation of surface and solid modeling.

Rational B

The path-smoothing algorithm automatically detects and smoothes out the third order geometric discontinuities in the path of a cubic rational B-spline image curve. Non-rational B-splines are a special case of rational B-splines, just as uniform B-splines are a special case of non-uniform B-splines.

Geometric model & curve

Using the continuity condition 1. If the result is within the tolerance, the knot removal is successful.

Geometric model & curve

A curve with complex shape may be represented by a composite Bézier curve formed by joining a number of Bézier curves with some constraints at the joints. All we therefore need to determine is , the value of the odd numbered homogeneous co-ordinates. None of them pass through their control points except maybe the first and last control points.

Rational geometric splines

Moving the control points alters the magnitude and direction of the tangent vectors This is the basis of the intuitive 'feel' of a Bézier curve interface. An Introduction to Splines for Use in Computer Graphics and Geometric Modeling.

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I had the impression that that the b-spline will pass through each control point. How do you generalize that to curves, curved surfaces? We

discussed homogeneous coordinates in the IB course. However, their possibilities and advantages for representing geometric entities in a CAD environment were not known until the late 1950s.

Offsets of curves on rational B

There are three main types of geometrical modelling used, namely: line or wireframe modelling, surface modelling, solid modelling. Statistical Science 11 2 : 89-121. Berlin, Heidelberg: Springer Berlin Heidelberg.

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