Sofia University “St. Kliment Ohridski”
Department of Mathematics and Informatics

Euler Beta-function B-spline: Definition and Basic Properties

Student: Nedyalka D. Delistoyanova

Tutor: assoc. prof. Petko Ruskov, Phd

Consultant: prof. Lubomir T. Dechevski. Phd

In this master thesis we will present a new type of B-spline – Euler Beta-function B-spline (BFBS). It will be introduced detailed definition and we will formulate the basic properties and advantages to the polynomial B-splines. We will also give exact evaluation of the Beta-function B-spline, its derivatives and antiderivatives using Bernstein basis and monomials bases. Finally we will analytically introduce interpolation of 2D and 3D curves with this B-spline. For this purpose we will take a look at the Bezier curves as an example for local curves for BFBS interpolation. We will also comment the Hermite interpolation property of the interpolation with Beta-function B-spline.

Keywords: computer-aided geometric design, spline, B-spline, beta function, gamma function, knot multiplicity, compact support, support, domain, curve, surface, smoothness, continuity, geometric continuity, interpolation, Hermit interpolation, Lagrange interpolation, approximation, Taylor series, band-limited matrix, Bernstein polynomial, monomial basis, Bezier curve

Sofia, July 2007