Povzetek

V diplomskem delu so predstavljene Bézierove krivulje ter njihove osnovne lastnosti. Med drugim tudi de Casteljauov algoritem za izračun točk na Bézierovi krivulji. Obravnavani so zlepki iz Bézierovih krivulj, za katere definiramo še zveznost C^k in geometrijsko zveznost. Ker so polinomske krivulje pri modeliranju včasih preveč omejene, si pogledamo še racionalne Bézierove krivulje. Še posebej se osredotočimo na kvadratne racionalne Bézierove krivulje, nam bolj poznane pod imenom stožnice. Pokazano je, da lahko s stožnicami interpoliramo dve točki in dve enotski tangenti v teh dveh točkah v geometrijskem smislu. Žal pa se tega problema ne da rešiti s krožnimi loki. V ta namen si pogledamo še krožne dvoloke, ki omogočajo enoparametrično družino prej omenjenih interpolantov. Izkaže se, da imamo pri konstrukciji prosto izbiro vmesne točke, ki pa mora ležati na posebni krožnici.

Abstract

This work presents Bézier curves and their basic properties, including de Casteljau's algorithm for calculating the points on the Bézier curve. It discusses the splines from Bézier curves, for which we further define C^k continuity and geometric continuity. Since the polynomial curves are sometimes to limited in modeling, we also take a look at rational Bézier curves. In particular, we focus on quadratic rational Bézier curves, better known as conic sections. It is shown that with conics we can interpolate two points and two unit tangents at these two points in a geometrical sense. Unfortunately, this problem can't be solved with circular arcs. For this purpose we further look at biarcs, which provide one-parametric family of previously mentioned interpolants. It turns out that we have a free choice in the construction of the intermediate point, however this point must lie on the specific circle.

Math. Subj. Class. (2010): 65D05, 65D10, 65D15, 65D17.

Ključne besede: krožni dvoloki, Bézierove krivulje, CNC stroji, geometrijska zveznost.

Keywords: biarcs, Bézier curves, CNC machining, geometric continuity.

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