İTÜ MATEMATİK BÖLÜMÜ

h–γ Blossoming, *h–γ* Bernstein Bases and *h–γ* Bézier Curves for Translation Invariant Spaces

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Blossoming provides one of the most powerful tools in Bézier and B-spline theory. Algorithms for recursive evaluation, subdivision, differentiation, degree elevation, and knot insertion for Bézier and B-spline curves and surfaces are all derived using blossoming. In this study, we introduce a novel h–γ blossom for translation invariant $\pi_n(\gamma_1, \gamma_2)$ spaces including polynomial, trigonometric, hyperbolic, and their discrete analogues. The h–γ blossom merges γ-blossoming for $\pi_n(\gamma_1, \gamma_2)$ spaces with h-blossoming for h-Bernstein bases and h-Bézier curves. Based on this h–γ blossom, we define h–γ Bernstein bases and h–γ Bézier curves and study their properties. We derive recursive evaluation algorithms, subdivision proce- dures, Marsden identities, and formulas for degree elevation and interpolation for these h–γ Bernstein and h–γ Bézier schemes. In particular, the parameter h serves not only as a new shape parameter for $\pi_n(\gamma_1, \gamma_2)$ spaces but also, more importantly, allows for interpolation formulas not present in conventional γ-Bernstein and γ-Bézier schemes.

This is joint work with Ronald N. Goldman and Plamen Simeonov.

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