

Mixed Primal Dual Honeycomb Schemes

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The honeycomb scheme by Nira Dyn, David Levin and Dingyuan Liu [1] is an interpolatory convexity preserving refinement scheme for convex polyhedra generating C^1 surfaces in the limit. In general, these “honeycomb surfaces” have planar or line segments.

In this talk, we show how one can modify the honeycomb scheme to get rid of the line segments: First we generalize the honeycomb scheme and dualize it. Thus we obtain a corner indentation scheme generating limiting surfaces without line segments but which are not smooth in general albeit with a number of prescribed tangent planes.

Therefore we then propose to apply both schemes alternately. As we show, such mixed primal dual honeycomb schemes, or MPD-schemes, generate convex smooth limiting surfaces without line segments. The honeycomb, the corner indentation and the MPD schemes are related in different ways to local corner cutting schemes and their analysis helps to shed more light on local corner cutting and interpolatory refinement for convex polyhedra.

Joint work with: Hartmut Prautzsch

References

- [1] Dyn, Levin, Liu. Interpolatory convexity-preserving subdivision schemes for curves and surfaces. *Computer-Aided Design*, Volume 24, Issue 4, April 1992, pages 211-216.