

Planar Domain Parameterization by Arc Fibration

Bert Jüttler*

* Institute of Applied Geometry
Johannes Kepler University
Altenberger Str. 69, 4040 Linz, Austria
e-mail: bert.juettler@jku.at, web page: <http://www.ag.jku.at>

ABSTRACT

Circular arcs are well known as highly useful geometric primitives for geometry processing and computational geometry, since they combine geometric flexibility and high approximation power with the simplicity of performing geometric computations. More precisely, circular arc spline curves are known to possess cubic approximation power, while the computation of intersections requires solely square roots, and bisector curves are quadratic implicit curves (conic sections). Among numerous other applications, these facts are exploited by an highly efficient algorithm for the computation of medial axes and trimmed offsets of planar free-form shapes [1].

Motivated by the need for domain parameterization in isogeometric analysis, we generalize the notion of star-shaped domains, based on the visibility with respect to circular arcs. This leads to the class of GAF domains, which consists of all planar shapes that are “Good for Arc Fibration”. We show how to decide whether a domain is GAF or not, and how to compute a parameterization by circular arc segments in the affirmative case.

This is joint work with M. Haberleitner, M.-S. Kim and S. Maroscheck.

REFERENCES

- [1] O. Aichholzer et al., “Medial Axis Computation for Planar Free-form shapes”, *Computer-Aided Design*, Vol. **41**, pp. 339-349 (2009).