FABRICATION-AWARE ALGORITHMS FOR DISCRETE SURFACES

JOHANNES WALLNER

This research proposal is connected with an area established about 15 years ago, namely mathematical methods and algorithms for free forms in architecture. It is mostly connected to discrete differential geometry and to geometry processing. The discrete nature of this line of research has its root in the decomposition of shapes into smaller manufacturable pieces of various kinds. It is driven by applications, but in a way different from most of Applied Mathematics. This is because one does not aim at solving problems in the natural sciences, but to facilitate a design process which is subject to nontrivial geometric constraints. The need to accommodate artistic decisions changes the nature of the mathematical approach: instead of unique solutions one aims at a description of feasibililty spaces resp. design manifolds.

We specifically plan to work on topics relating to textiles on the architectural scale, in particular those created by knitting-like techniques. These are interesting because of their large-scale applications and the possibility of achieving transformable designs. We will be able to draw on a body of previous work, ranging from geometric shape descriptors to methods for discrete surfaces. We also plan to collaborate with colleagues from Computer Science and Architecture.

Persons involved. Johannes Wallner, Institute of Geometry, TU Graz.
http://www.geometrie.tugraz.at/wallner, j.wallner@tugraz.at