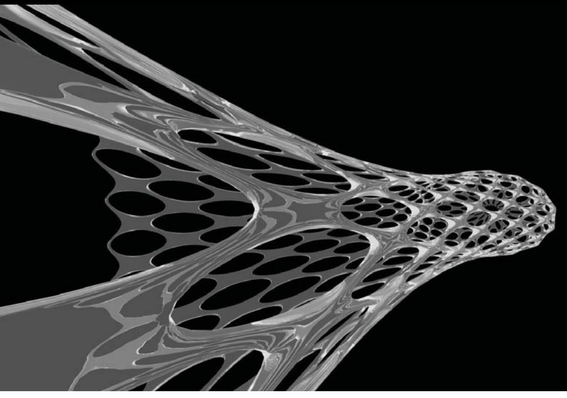
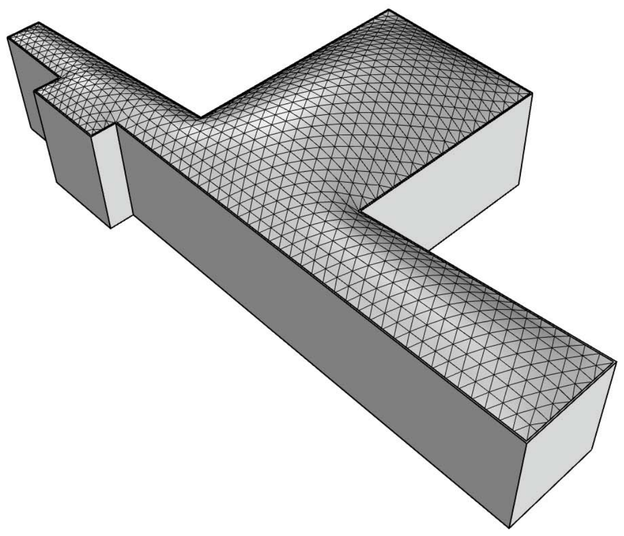


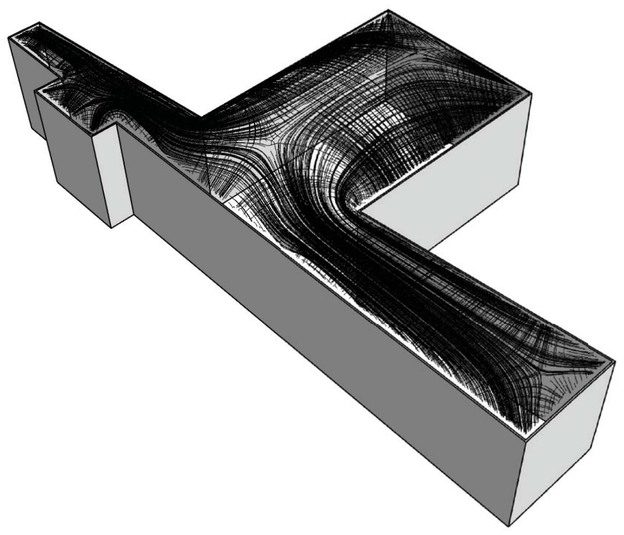
Digital Architectonics
University of Bath

Daniel Gebreiter
[d.gebreiter@bath.ac.uk]

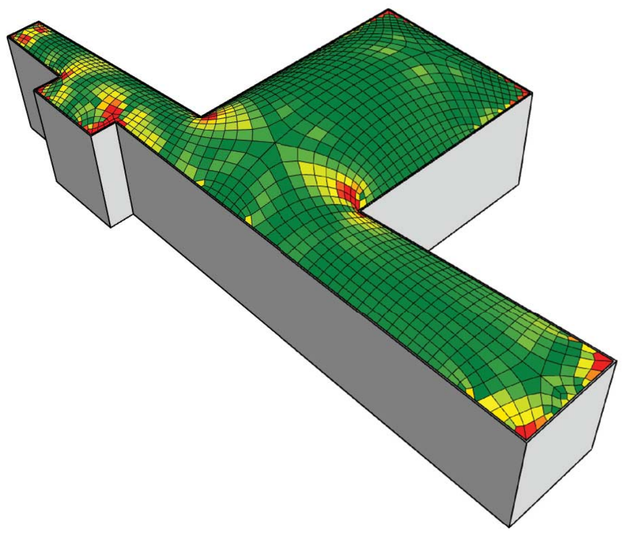
Mesh Processing in an Architectural Setting



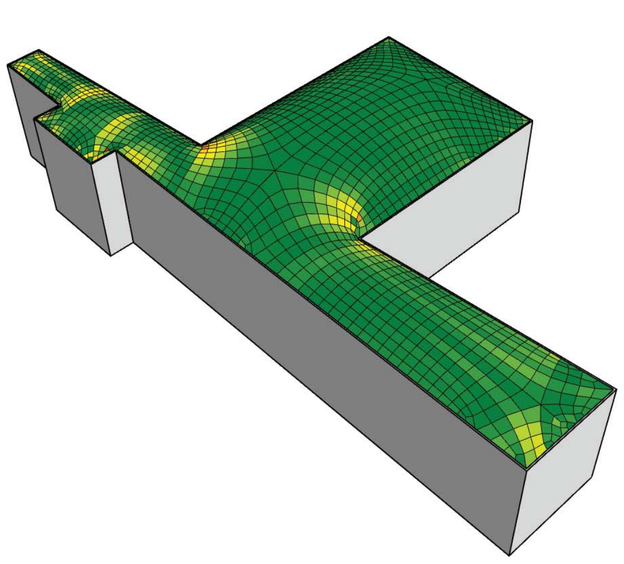
Initial formfinding using dynamic relaxation



Principal curvature directions on triangulated surface



Creation of quad-dominant mesh

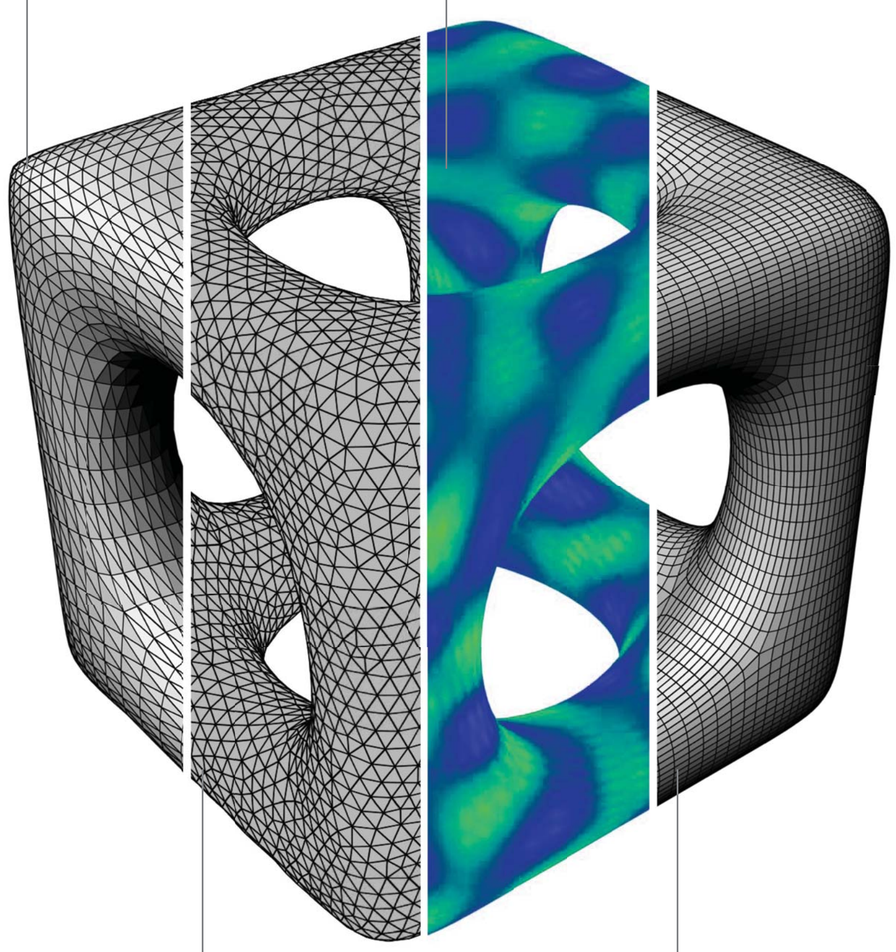


Optimisation towards planarity of quads

Discrete surface representations provide a unified framework for the creation and optimisation of architectural surfaces and patterns. Intrinsic information embedded locally in triangle meshes can be employed directly for the restructuring of the surface into regular, smooth patterns.

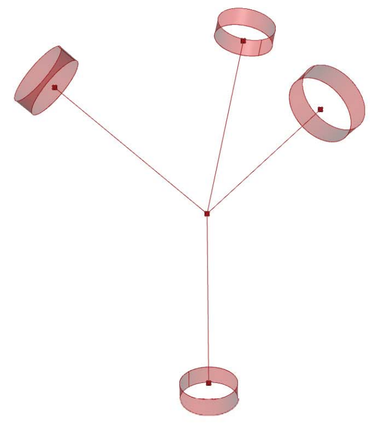
Anisotropic subdivision mesh

Laplacian Eigenfunction

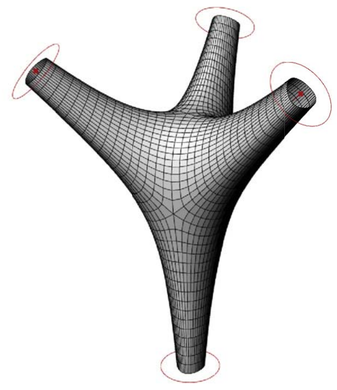


Isotropic remeshing

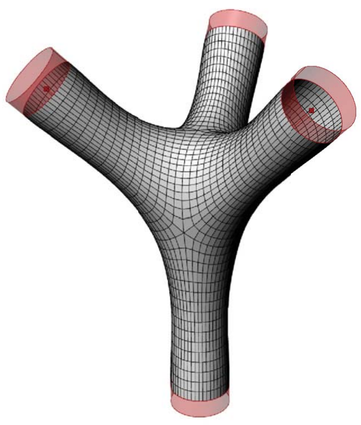
Quad remeshing



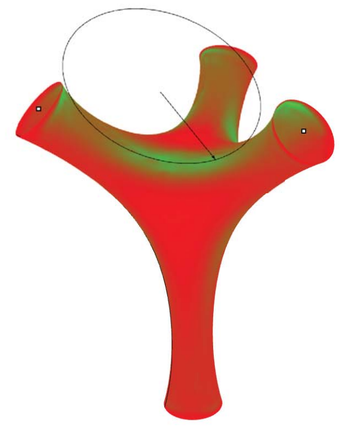
Topological node definition with tangent constraints



Initial approximation using subdivison surface



Adaption to boundary constraints



Implicit fairing minimises curvature variation

These patterns can exhibit certain architecturally desirable properties such as isotropy and vector field alignment, for example to the principal curvature directions of the surface.

Such properties can significantly reduce node complexity or cut-off in the manufacture of facades. Certain quad alignments can provide structural advantages, whilst others can permit the cladding of surfaces with planar elements such as glass panes.

Subdivision surfaces, the tracing of curvature lines as well as spectral mesh processing methods have been examined and implemented.