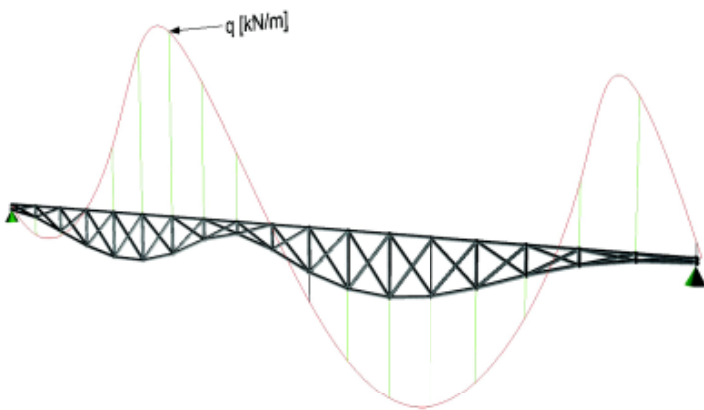
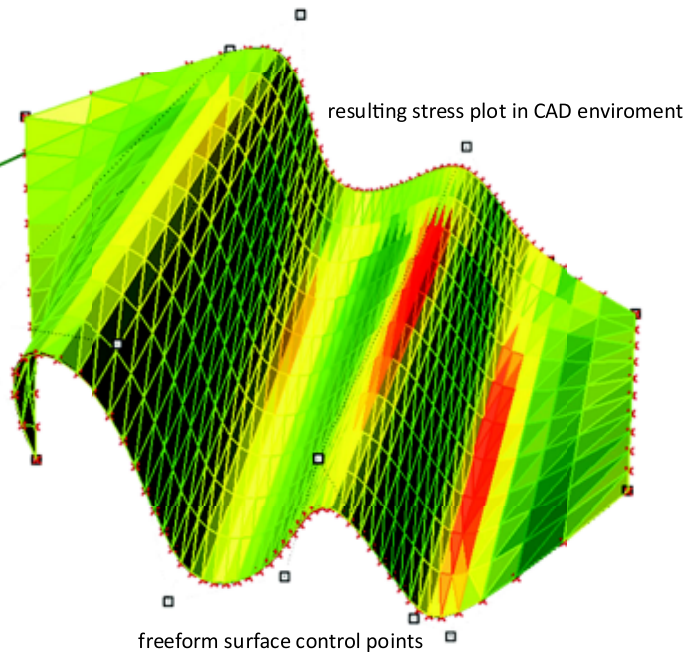


# interactive structural analysis + optimisation

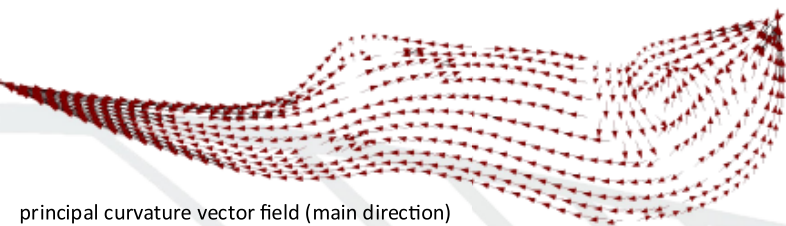
parametric design and computation as structural design tools

freeform surface interactive analysis  
a tool to enable commercially available parametric design software to interact with structural analysis software and give direct analysis feedback on any geometry specified. Apart from the geometric parameters, that are used to define a shape, structural parameters need to be included in the model and be controlled throughout the interactive process. these paramters can be the constrain conditions , materials , thicknesses and loading

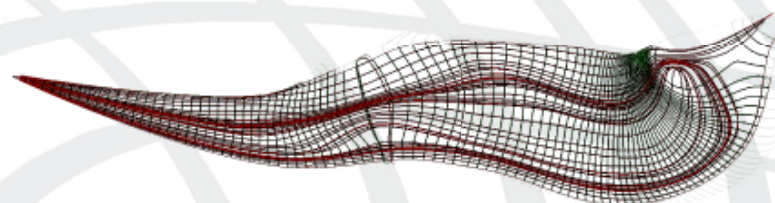
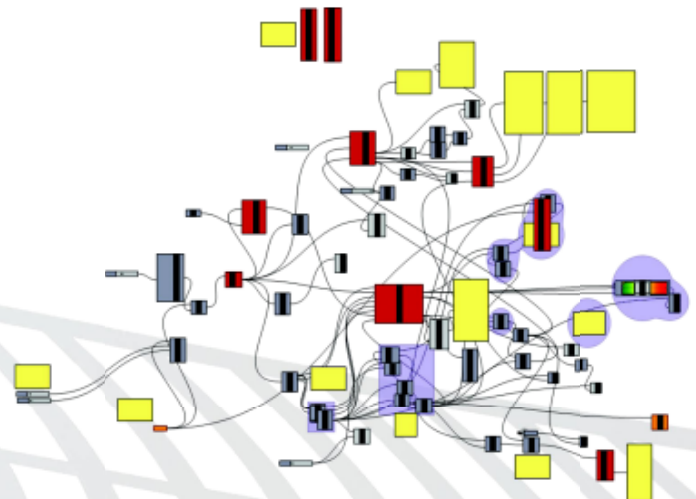
Vertex	out
MeshIn	A
Faces	B
VertexA	Node
VertexB	DrawTruss
VertexC	Displacement
SupportVertex	S1 Principal
FaceNormals	S2 Principal



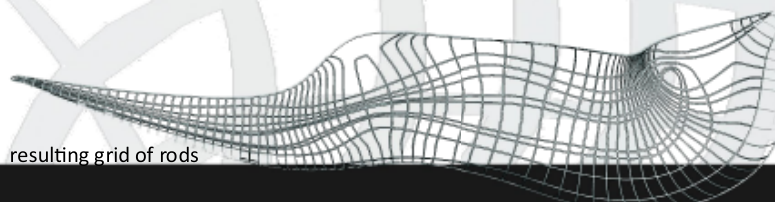
interactive optimisation of a simply supported truss  
the user can control the design parameters by simple screen controls letting the geometry of the truss update into an optimized shape



principal curvature vector field (main direction)



plotting the principal curvature trajectories on the surface



resulting grid of rods

transforming a freeform surface to an efficient grid-shell  
this tool creates a grid structure by following the principal stress trajectories of the continuum shell. the surface is defined parametrically in CAD enviroment and is analyzed as a continuum concrete shell. the resulting principal stresses (maximum and minimum stresses along the surface) are plotted to form trajectories which consist the grid rods. the results are returned in real time allowing the user to interact with the surface and structural parameters in order to enhance the grid geometry.