TUM

Modeling: ★★☆☆☆
Mathematics: ★★☆☆☆
Programming: ★★★★☆
Science: ★★★☆☆

Software Lab:

A browser-based 3D viewer for shape optimization

Setting

"BMW Shape Module" is a solver-independent shape optimization framework for engineering design, which uses black-box solvers and free-CAD parametrization with Vertex morphing technique [1]. The optimization framework contains a lot of different settings to solve various shape optimization problems.

In this project the browser-based GUI should be developed for pre-/postprocessing. The GUI should be able to read the geometries from different solvers and input settings. The GUI should have functionality to show basic settings, like step size or filtering radiuses, constraint geometries, design space of the model. Additionally, advance features are required, such as feasible and infeasible directions for geometrically constraint optimization, convergence graphs. All functionalities should be called from the GUI, which means user should not make any additional files.
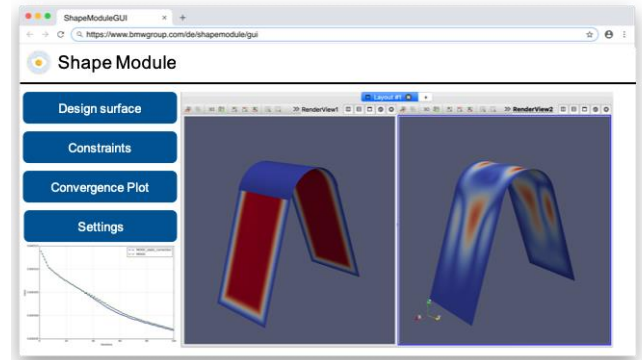
Task
Create a web-based graphical interface to:
− Extracting the geometry and other necessary information from the simulation input/output data.
− Prepare python-based scripts for Paraview to visualize:
    − Design surface;
    − Non-penetrative contact geometries;
    − Feasible and infeasible sub-space for geometrically-constrained optimization;
    − Optimization settings;
    − Convergence graphs;

Supervisors

Ihar Antonau, Chair of Structural Mechanics, ihar.antonau@tum.de
Reza Najian, Chair of Structural Mechanics, reza.najian-asl@tum.de

References

[1] Hojjat, M., Stavropoulou, E., & Bletzinger, K.-U. (2014). The Vertex Morphing method for node-based shape optimization. Computer Methods in Applied Mechanics and Engineering, 268, 494–513.