TOPOLOGY OPTIMIZATION TOOL FOR PRELIMINARY DESIGNS

Context

Finding the most efficient design for complex structures is a challenging task of enormous industrial importance. Traditional approaches usually seek the best design by varying a few parameters of an initial design concept. Currently designers use tabulated formulas to dimension components. This is very restrictive: it only considers simple geometries and no combined load cases. Topology optimization overcomes both these limitations by adapting the material distribution over successive FEM simulations, to find the best designs: maximal stiffness, minimal weight, suppressed vibrations, etc.

Sioux has developed an in-house topology optimization tool. To unlock its potential for mechanical designers in the concept phase, an intuitive GUI is needed to quickly generate design concepts. The user should be able to draw design spaces, boundary conditions, constraints, and select typical objectives. Secondly, shorter computation times and live visualization of intermediate solutions make the tool suitable for interactive use.

Internship overview

- Master
- Internship
- Mathware / Software / Mechanics
- Location: Eindhoven

Technologies

- Topology optimization
- Graphical User Interface development
- Finite Element Modelling
- Structural mechanics
- User Experience

Assignment

Develop a tool with and for mechanical designers in the early phases of the design of a mechanical part to perform topology optimization on idealized design spaces. The tool should enable designers to quickly evaluate the effect of different load cases via an intuitive graphical user interface (GUI).

A topology optimization code developed in-house in Python will be used as a starting point for the implementation of the most common objectives and constraints. In a second step, the code should be modified to extend its functionalities.

Activities

- Develop a GUI for a topology optimization library
- Adapt the GUI design based on designer's feedback
- Validate the tool functionality via a valuable industrial case
- Expand the topology optimization code to include additional objectives and constraints

Why choose Sioux?

- Working on innovative technology
- Challenging, dynamic and varied work
- A comfortable and personal work environment
- Plenty of opportunities for personal development
- Great carreer opportunities
- Contributing to a safe, healthy and sustainable society

Get in touch!

Would you like to know more about this student assignment?

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