

SA/MA

Considering Joint Failure in Topology Optimization for Highly Loaded Joints

Keywords: Topology Optimization, Connection Design, Computational Mechanics



Background:

Generative design is becoming increasingly important in engineering, with topology optimization standing out for its ability to create lightweight structures while accounting for specific constraints. Despite its successes in optimizing material distribution, integrating practical assembly features – such as bolt connections – remains a significant challenge. Some components require a connection to be designed in such a way that the joint is not overloaded under high loads. To achieve this, the joint must be connected softer to the load. With the help of topology optimization, this softer structural connection can be implemented automatically.

This thesis focusses on advancing the existing methods at LPL to consider the failure of highly loaded joints within the optimization process.

Task Description:

- Further development of methods and algorithms for optimization in MATLAB or Python.
- Integrating the methodology in commercial optimization software, as OptiStruct.
- Proof-of-concept via detailed FEM analysis or testing.

Required skills:

We are looking for a highly motivated person who is keen to work on industry-relevant problems!

- Computational Mechanics, Mechanical Engineering or similar
- Interest in topology optimization
- Basic knowledge of MATLAB or Python

We offer:

- Insights into research on relevant future technologies
- Contact with the industry partners
- Hiwi- and Theses Festival in Summer and network of contacts

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