Master's Thesis

Analysis of topology optimized bone-like structures

Supervisor: M.Sc. Simon Peters

Background: Bone-like trabecular structures, see Figure 1, can be found in various natural structures, which are characterized by their particularly good mechanical properties and low weight. Such principal stress-oriented structures can be generated by computer-aided methods such as topology optimization and used for engineering applications.

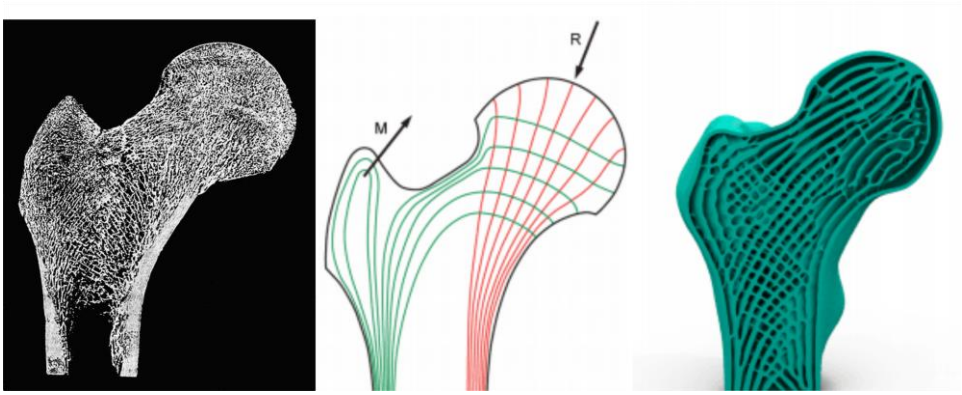

Figure 1: left: Cross section of a human femur bone. Center: Representation of the principal stress directions. Right: Cross-section of an optimized porous structure. [1]

Tasks: In this master thesis, first the implemented homogenization method [2] will be used. Based on this code, a programmed projection method will be used to generate principal stress oriented structures. Finally, this structures will be analyzed in structural mechanics program.

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Literature:

[1] – Wu et al. 2018. Infill Optimization for Additive Manufacturing -Approaching Bone-like Porous Structures