

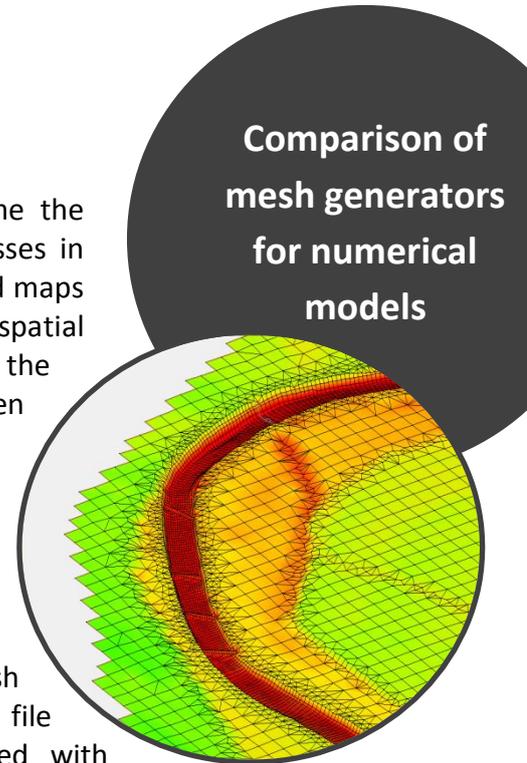


## B.Sc. Topic

Comparison of mesh generators for hydro-morphodynamic modelling

## Background

In recent years, two-dimensional (2D) numerical models have become the state-of-the-art tool for simulating hydro- and morphodynamic processes in rivers. Among other applications, they are used to generate flood hazard maps or to calculate sediment transport. In numerical modelling, the spatial discretization is implemented by means of a calculation mesh, dividing the terrain into a number of triangular or rectangular elements. When generating the mesh, certain quality criteria must be respected in order to establish computationally stable and efficient models. The resolution of the mesh and the type of elements used also have an important effect on the accuracy of the simulation results. Several mesh generators exist to enable and facilitate the automated creation of a high-quality mesh. The content of this study is the comparison of multiple available mesh generators. The student will analyze mesh generators regarding their implementation of quality criteria, their file system, and compatibility with modelling software. Meshes created with different generators are then applied in a small case study for hydrodynamic modelling, to verify the effect of various mesh types on the simulation results. The results of this study will constitute the baseline for guiding future decisions regarding the choice of an efficient mesh generator for hydro-morphodynamic modelling.



## Thesis Overview

1. Review literature on the basics of hydro- and morphodynamic numerical modelling with focus on mesh generation and the quality criteria.
2. Familiarize with mesh generation tools.
3. Compare mesh generators regarding regarding quality criteria, file system integrity, and compatibility with modelling software.
4. Apply mesh generators to a small case study and compare simulation results to identify the efficiency of the created meshes.



**Apply now!**

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The thesis can be written in German or English.

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