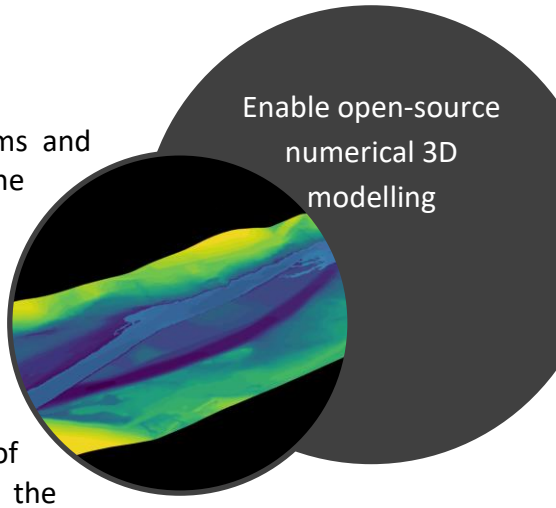
Universität Stuttgart

IWS Department of Hydraulic Engineering and Water Resources Management
Prof. Dr.-Ing. Silke Wieprecht

B.Sc. / M.Sc. Topic

"Enable open-source numerical three-dimensional (3D) modelling"



Background

Numerical simulations of rivers abstract complex natural ecosystems and hydraulic structures in computational grids. The virtual abstraction of the real world enables analyses of any type of intervention, such as structural modifications or river restoration measures, without having to pay for consequences. For instance, the layout of a weir may not be sufficient for safely bypassing dangerous flood discharges, or restoration actions may increase flood risks. A numerical model helps to identify such shortcomings without fatalities and at low costs. The great benefit of numerical models has led to a rapid development of modelling software in recent years. Alas, high license fees make the application of many commercial software hardly feasible in the poorest and climatically most threatened regions of the world. Yet the open-source community provides powerful software solutions to model more frequent and more intense extreme flood and drought events in the future with low budget, high efficiency, and precision. This B.Sc./M.Sc. thesis offers the opportunity to become an expert in the software OpenFOAM to master future challenges elegantly with latest cutting-edge technology. You, the student who will work on this project, will familiarize with the software, write an educational tutorial, and identify advantageous fields of application. Thus, your goal is to become more than an expert: become an expertise provider who can transfer knowledge to research institutions and to other professional working environments. If you want to write a Master's Thesis, you will also develop a case study with a dataset from real river.

Thesis Overview

1. Familiarize with open source platforms (guided introduction to Linux), OpenFOAM, and challenges in modelling hydraulic environments,
2. Run official OpenFOAM tutorials and create a tailor-made tutorial for modelling a rectangular flume with OpenFOAM,
3. Identify strengths and shortcomings of OpenFOAM for water resources engineering, and define fields of application.
4. M.Sc. Thesis: Create a case study with a dataset from a real river (or reservoir) and interpret the model results. Implement the interpretation into recommendations for application fields.

Desirable Skills

- Interest in hydrodynamics, numerical modelling and computer-aided solutions
- Basic knowledge of Python is an asset, but not mandatory

Apply now!

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Please email a list of lectures attended with some lines on your motivation.

The thesis can be written in German or English.

Examinar: Prof.-Dr. Ing. Silke Wieprecht (LWW) | Supervisor: Sebastian Schwindt (LWW)