

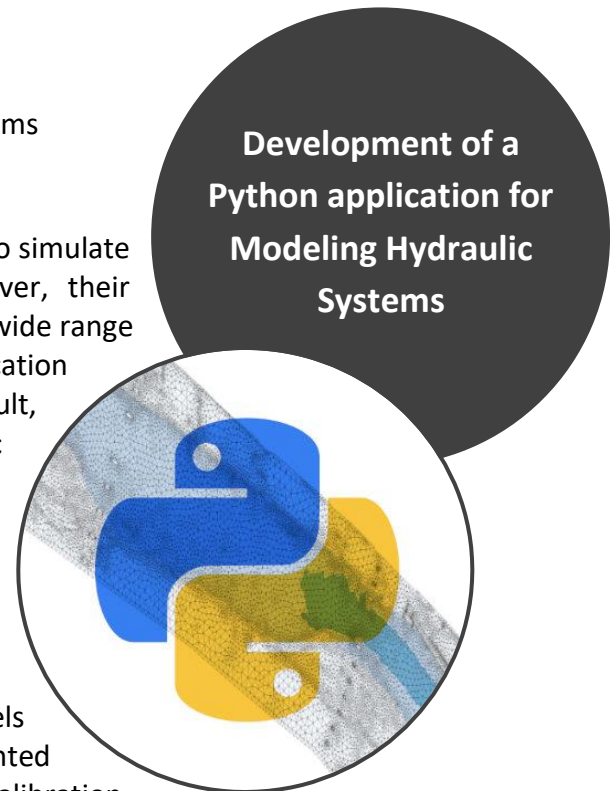


B.Sc/M.Sc. Topic

Development of a Python application for Modeling Hydraulic Systems

Background

Numerical models and AI-driven optimization schemes enable us to simulate hydrodynamic processes with ever-increasing accuracy. However, their application is challenging due to computational complexity and a wide range of parameters influencing the physical correctness of simplification hypotheses. In consequence, using such modeling tools is difficult, even for experts. To facilitate the use of already existing scientific codes for controlling numerical models and a supervised learning scheme for the optimization of numerical models, this thesis is aimed at developing a browser-based application. The Django Python framework will be used to create a graphical user interface, integrated and readily accessible within a web browser. The application interface design will be accomplished by the student, and linked with existing environments for running numerical models like Telemac or OpenFOAM. Similarly, an interface will be implemented to call an existing in-house Python package for numerical model calibration with supervised learning, namely, Bayesian optimization. This project can be accomplished as a Bachelor's (coding with minimum use case) or a Master's Thesis (coding with real-world use case).



Thesis Overview

1. Familiarize with the numerical model environments, parameters, and supervised learning for calibration.
2. Review existing code and draft concepts for developing an application user interface.
3. Design the application, including user interface and user experience design.
4. Develop a documentation for the application with a read-the-docs scheme.
5. Test and validate the web app with a case study (MA only).

Required Skills

Python programming fundamentals, or similar languages (proof of course works) and interest in application development and workflow automation with Python.



Apply now!

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The thesis can be written in German or English.

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