



University of Stuttgart Germany

Department for Stochastic Simulation and Safety Research for Hydrosystems (LS³) Research Facility for Subsurface Remediation (VEGAS)

M.Sc. Thesis Topic: "Modelling of water temperature in drinking water supply pipes" (SimTech, UMW)



Drinking water supply is one of the crucial requirements of human society. The drinking water quality in supply pipe networks depends directly on the soil temperature around the pipes, which has increasing influence on the drinking water temperature with increasing residence time. However, since higher drinking water temperatures are more susceptible to bacterial growth, the question of accurate prediction of the temperature in drinking water pipe networks becomes urgent in face of climate

Modelling Water Temperatures in Drinking Water Supply Pipes

change. The typical operational model describing the temperature along water pipes uses a simple exponential function. To address the influence of the meteorological conditions using heat transport from ground surface through the subsurface to the drinking water pipes pilot site was built in VEGAS. numerical model using the numerical simulation framework DuMuX was developed to describe the heat and moisture transport at the pilot site.

The **objective** of the proposed thesis is to compare both models (exponential function and process-based model). The aim of this analysis is to explore how the knowledge from the complex process-based model can be incorporated into operational temperature forecasts, e.g., used to design new drinking water networks.

For this purpose, the existing DuMuX model of the pilot site will be utilized. Depending on the candidate's preferences and qualifications, the focus of the thesis can be adjusted between real-world operational modelling and numerical implementation of physical models.

Tasks

- Literature review of modeling the water temperature in pipe networks
- Compare aspects of the exponential model and numerical implementation in DUMUX
- Calibration of the DUMUX model
- Visualization of results and discussion

General Information

- Advisors: PD Dr.-Ing. Claus Haslauer (VEGAS), Dr. Ilja Kröker (LS3)
- Theoretical / practical study

Desirable Skills

- C++, Python, computer programming
- Hydrogeology, Hydrology, Groundwater Modelling

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Apply now!

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