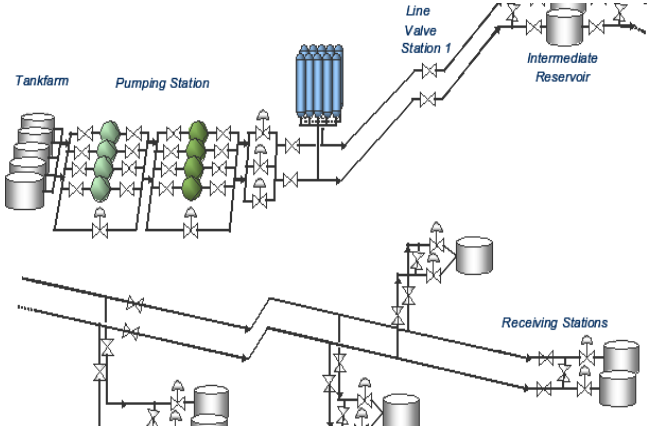
GRADUATE SCHOOL
computational engineering

TECHNISCHE UNIVERSITÄT DARMSTADT

**Subject:** Model Reduction in the Numerical Simulation and Optimization of Water-Networks

**Research Focus/ Cross-sectional Area:** Multirate and multiscale methods (R1)




**Description:**

This project is concerned with the modeling and numerical solution of optimization and control problems for flow processes in water networks. Flow problems on networks are described by a hierarchy of local dynamics (PDEs or ODEs) on the edges and transmission conditions at the nodes of the network. The successful solution of such complex problems requests the development of adaptive numerical methods.
Solution-dependent physical models, decomposition of the network in regions of high and low dynamics, and control of spatial and temporal multi-scale effects are important aspects. Several systematic strategies for reducing the model complexity of water networks such as proper orthogonal decomposition, centroidal Voronoi tesselation, and adjoint based approaches will be considered.

**Requirements:**

Applicants are expected to have a strong interest in numerical analysis and optimization with a close link to real life applications.

**Supervisors:** J. Lang, Numerics of PDEs
A. Oberlack, Fluid Dynamics
S. Ulbrich, Nonlinear Optimization and Optimal Control