Universität Stuttgart

IWS Department of Hydraulic Engineering and Water Resources Management
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Agric-Hydrological Modeling

M.Sc. Topic
"2d Numerical Simulation of Agri-Hydrological Land-Management Models Using Drone Survey Data"

Background
Agricultural fields are increasingly exposed to hydro-climatic extreme events, which can exacerbate rapid surface runoff, soil erosion, and plant-available soil water. The consequences are loss of fertile topsoil, rill formation and increased sediment input into nearby water bodies.
To better understand hydraulic processes related to the successions of extreme drought and rainfall events, this thesis applies high-resolution 2d simulations in the framework of a European project in the Danube watershed. For this purpose, agricultural high-resolution drone surveys provide detailed terrain and digital elevation models (DEM) that capture small topographical features. This data along with vegetation and soil characteristics, constitutes the basis for 2d numerical models of agricultural fields to predict and test solutions aimed at reducing erosion in the future. The specific aim of this thesis is to apply and generalize existing concepts for TELEMAC-2D simulations of agricultural fields in the Danube basin using drone survey data.

Thesis Overview

1. Literature review & familiarize with TELEMAC and mesh generation
2. Apply and generalize existing 2d numerical model concepts to a broad range of fields
3. Optimize runtime and calibrate the model
4. Analyze and evaluate the simulation results

Required Skills

- Basic familiarity with numerical simulation proven through relevant course work (e.g., Numerical Surface Water Simulation)
- Knowledge of Python is an asset but not mandatory

Apply now!

Please send your CV and a few lines why you would like to take this topic. The thesis can be written in German or English.

Examiner: Dr. sc. Sebastian Schwindt (LWW) | Supervisor: Niklas Henning (LWW)