

Title of the project: Overtopping wave flows on a dike crest - CFD modelling to design a simulator.	
Assignment no.: 02.24	Internal/external: External HKV
Head graduation committee: Dr. Jord Warmink	Daily supervisors: ir. Niels van der Vegt ir. Martijn Huis in 't Veld (HKV) Other supervisors Dr. ir. Bas Hofland (TU Delft)
Name(s) of participating companies or institutes: University of Twente, HKV lijn in water, Delft University of Technology	Start of the project: March/April 2024
Required courses: Data Analysis, Mathematical Physics, Hydraulic Engineering, Wave Dominated Coastal Dynamics	
Short description and objective of the project:	
<p>The wave overtopping simulator (see figure) is used to study the strength and erosion resistance of the grass cover on the landward slope of dikes in the field. Over 17 research programs have been conducted on the development of damage. However, the relation between the overtopping volume and the flow characteristics on the crest of a dike can be improved.</p>	
<p>As part of the Future Flood Risk Management Technologies project, we plan to conduct full-scale indoor laboratory experiments on the resistance of the clay sub-layer after failure of the grass top layer. Currently, we are in the process of preparing these experiments by developing an experimental setup to conduct indoor overtopping experiments at the Delft University of Technology. To successfully conduct the experiments, it is crucial that we are able to realistically simulate the flow caused by overtopping waves at the inner crest of a dike.</p>	
<p>Within this thesis you are tasked with studying how the flow from overtopping waves can be realistically simulated on the crest of the dike using a simulator. The primary focus in this thesis is to develop a laboratory overtopping simulator using a CFD model such as OpenFOAM. If time allows, a prototype might be build and tested. An important part of your study will be the studying the relation between flow-specific parameters (e.g. front velocity and flow thickness) in relation to the overtopping volume and designing the overtopping simulator such that it is able to accurately simulate those flows.</p>	
<p>The research project is available as of March 2024 and will be carried out at HKV (office: Lelystad, Amersfoort or Delft) and in cooperation with the Delft University of Technology. Because documentation and contact with stakeholders will be mostly in Dutch, proficiency in the Dutch language is recommended.</p>	