# Impulse waves - run-up with overland flow

The generation and propagation processes of impulse waves due to landslides discharging into a reservoir were investigated at VAW during the last decade. The wave characteristics resulting from the seven relevant landslide parameters were thereby attained using the impulse product parameter. The next logical step in this project relates to the wave run-up process at the opposite shoreline. Due to the short propagation distance within a reservoir, wave height damping is considered negligible. Large impulse waves either overtop a dam crest or result in a massive wave run-up at the opposed shoreline, both accompanied by a large damage potential. In the course of global warming, the probability of rock and glacier slide occurrence increases, resulting in hazards for both humans and infrastructure.

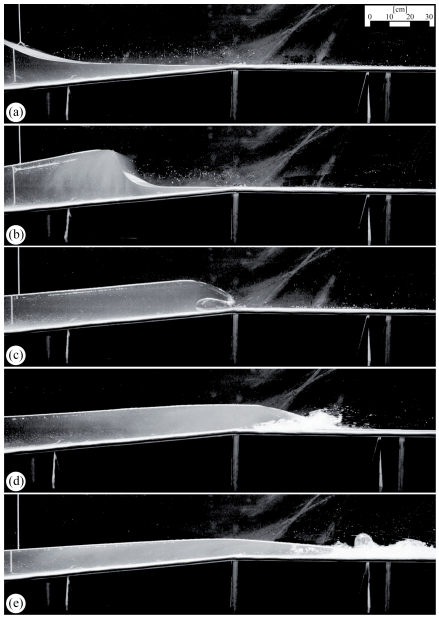


Fig. 1: Photo sequence of solitary wave run-up and overland flow on 1:10 sloping beach of shore height 0.30 m, shore length 1.5 m, and still water depth h = 0.30 m

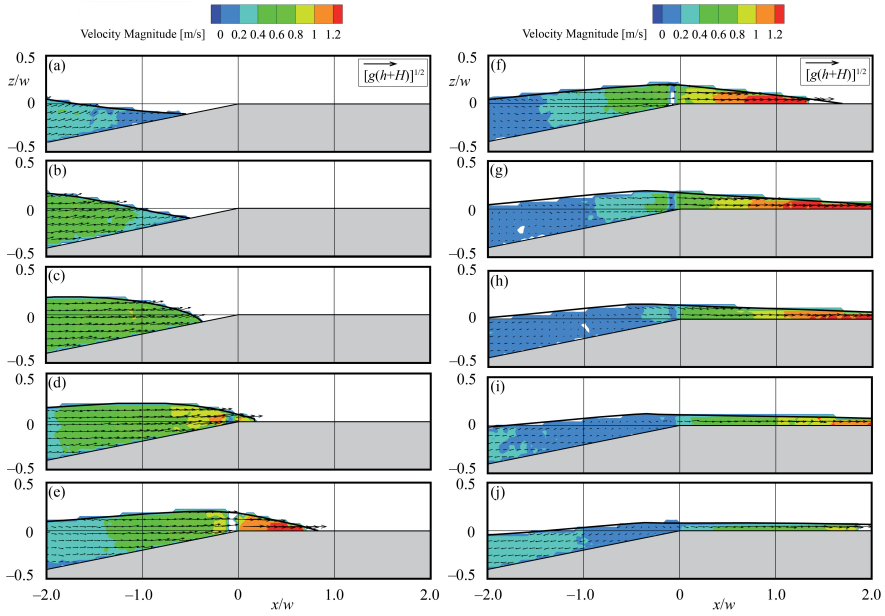


Fig. 2: Velocity vector fields of the transition from solitary wave aproach to overland flow for shore height w = 0.25m, still water depth h = 0.22 m and relative wave height H/h = 0.3

Physical model experimentation will be used to determine the run-up flow characteristics for various initial wave parameters for a number of shoreline geometries. A piston-type wave generator including a vertical plate displaced over a predefined distance with a certain speed moves the water body, thereby generating waves with high repetition accuracy. Wave run-up slopes from 1:5 up to 1:1.5 (vertical : horizontal) followed by a horizontal run-over plane 2.5 m long will be integrated into the 11.0 m long, 0.5 m wide and 1.0 m high VAW impulse wave channel. The shore elevation considered will be 0.25 m for various ratios of still water depth to shore height. The wave features will be recorded by means of Particle-Image-Velocimetry (PIV), an optical measuring system providing high-resolution temporal and spatial velocity vector fields. According to these velocity fields and the local water depths in the run-up and run-over zone, wave energy may be quantified and thus the damage potential analyzed.

**Main goals**

- Investigating the effects of shoreline geometry and incident wave characteristics on impulse wave run-up and overland flow
- Quantifying the velocity distribution in the run-up and overland zone
- Specifying the wave energy and damage potential related to shoreline and wave conditions


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