HM 140
Open-channel sediment transport

Description

- **flow in an inclinable flume with and without bed-load transport**
- **subcritical and supercritical flow**
- **siltation and scour formation at a bridge pier or a sluice gate**

HM 140 uses sand as an example to demonstrate important phenomena of bed-load transport in the area near the bottom. Open-channel flow without sediment transport is also possible. Discharge can be subcritical or supercritical.

The core element of the HM 140 experimental flume with closed water circuit is the inclining experimental section. The side walls of the experimental section are made of tempered glass, which allows excellent observation of the experiments. All components that come into contact with water are made of corrosion-resistant materials (stainless steel, glass reinforced plastic). The inlet element is designed so that the flow enters the experimental section with very little turbulence and no sediment can flow back. The tank after the water outlet contains a sediment trap for coarse sand.

The inclination of the experimental flume can be finely adjusted to produce slope and to create a uniform flow at a constant discharge depth.

In addition to bed-load transport in open channels, some models can also be used to observe fluvial obstacle marks, namely scour formation and siltation at structures. A rounded-nosed pier or a sluice gate can be inserted into the experimental section.

The discharge is measured via a measuring weir in the water outlet and a level gauge.

A contrast medium can be injected to visualise the flow conditions.

Learning objectives/experiments

- bed-load transport in open channels
  - subcritical and supercritical flow
  - formation of ripples, dunes and antidunes
- how flow velocity affects bed-load transport
- fluvial obstacle mark (siltation/scour formation)
  - bridge pier
  - sluice gate
- visualisation of the flow
- open-channel flow without sediment transport
  - subcritical and supercritical flow
  - control structure: sluice gate
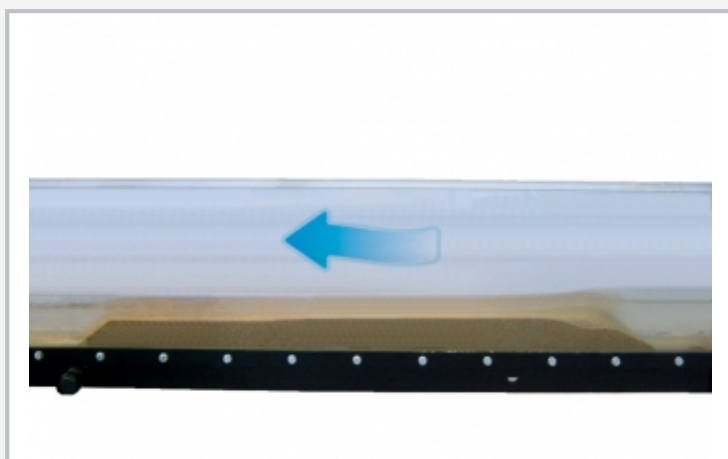 - discharge measurement on the sharp-crested weir

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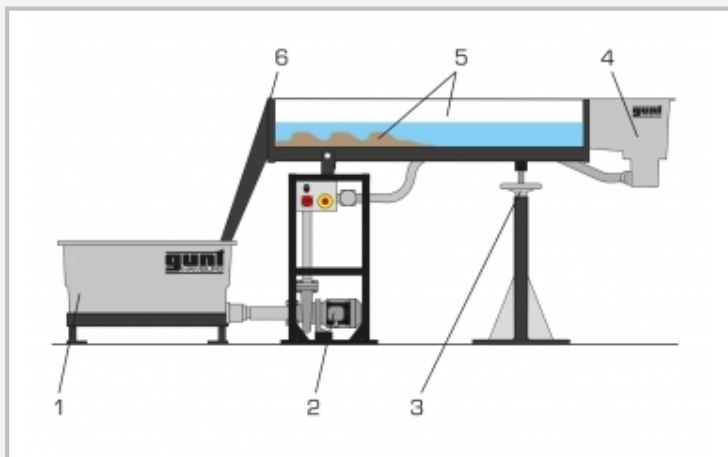
1 water tank, 2 pump, 3 inclination adjustment, 4 inlet element, 5 experimental section, 6 water outlet
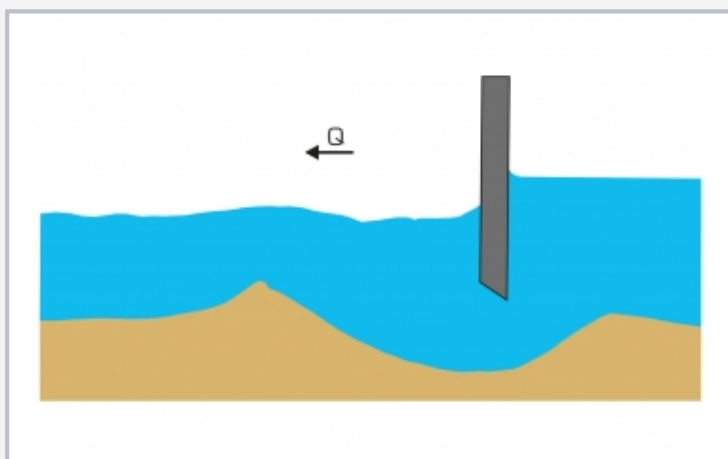
Sediment transport at the sluice gate: scour formation under the gate, siltation downstream

Open-channel sediment transport, observation of an emerging bed form at subcritical discharge

Specification

[1] investigation of open-channel flow with and without bed-load transport
[2] experimental flume, consisting of experimental section, inlet element, water outlet and closed water circuit
[3] smoothly adjustable inclination of the experimental section
[4] side walls of the experimental section are made of tempered glass for excellent observation of the experiments
[5] all surfaces in contact with water are made of corrosion-resistant materials
[6] flow-optimized inlet element for low-turbulence entry to the experimental section
[7] closed water circuit with water tank with sediment trap for coarse sand, pump and manual flow rate adjustment
[8] sluice gate and bridge pier for experiments with and without sediment transport
[9] visualisation of the flow using a contrast medium
[10] discharge measurement via measuring weir in the water drain
[11] level gauge for measuring the discharge depth

Technical data

Experimental section
■ length: 1600mm
■ flow cross-section WxH: 86x300mm
■ inclination adjustment: -1...+3%
Tank: 280L
Pump
■ power consumption: 1,02kW
■ max. flow rate: 22,5m^3/h
■ max. head: 13,7m
Sediment trap filter element
■ aperture size: 0,3mm (49mesh)

230V, 50Hz, 1 phase
230V, 60Hz, 1 phase; 120V, 60Hz, 1 phase
UL/CSA optional
LxWxH: 3450x650x1200mm
Weight: approx. 215kg

Required for operation

sediment: sand (1...2mm grain size)

Scope of delivery

1 experimental flume
1 sluice gate
1 rounded-nosed pier
1 measuring weir
1 system for flow visualisation
1 level gauge
1 tool for smoothing sand
1 set of instructional material

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