

HM 150.21

Visualisation of streamlines in an open channel



The illustration shows the experimental unit on the work surface of the HM 150 base module and the GUNT Science Media Center, tablet not included

Description

- flow around various drag bodies
- incident flow of different weirs
- ink as contrast medium for visualising the streamlines
- flow visualisation using CFD technology
- multimedia teaching material online in the GUNT Science Media Center: E-Learning course, prepared CFD simulations, worksheets, videos

HM 150.21 can be used to visualise flow around drag bodies and flow phenomena in open channels.

Either a drag body or weir is fixed in the experimental flume. The streamlines are made visible by injecting a contrast medium. The experimental flume is made of transparent material so that the streamlines and the formation of vortices can easily be observed. The water level in the experimental flume can be adjusted via a sluice gate at the inlet and via a weir at the outlet.

There are two weirs and four different drag bodies available for the experiments. A stabiliser ensures an even and non-vortical flow of water.

The experimental unit is positioned easily and securely on the work surface of the HM 150 base module. The water is supplied by HM 150. Alternatively, the experimental unit can be operated by the laboratory supply.

In order to perform a virtual analysis of flow behaviour, CFD simulations are often used in practice. Such simulations allow, for example, flow visualisations in areas that cannot be visualised experimentally. In the GUNT Science Media Center, flow visualisations based on CFD calculations are available online. There are also multimedia teaching materials including E-Learning courses on basic knowledge and calculations. Videos show a complete experiment with preparation, execution and evaluation. Worksheets with solutions supplement the teaching material.

Learning objectives/experiments

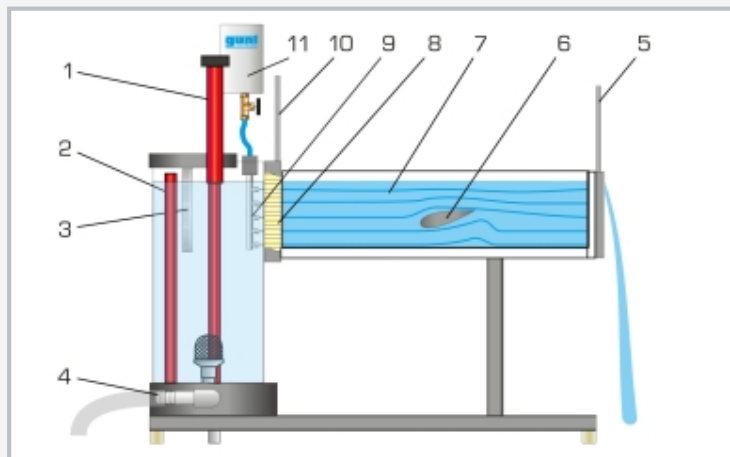
- how differently shaped weirs affect the flow
- visualisation of streamlines for flow incident to a weir
- visualisation of streamlines when flowing around various drag bodies
- supercritical and subcritical flow

GUNT Science Media Center, develop digital skills

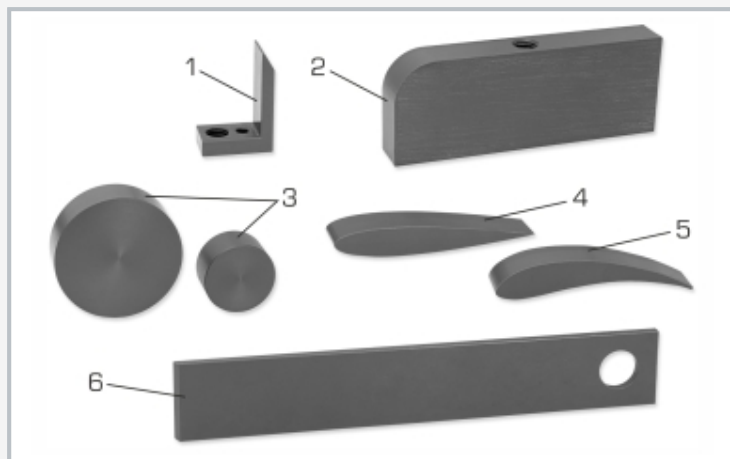
- E-Learning course with fundamental knowledge and calculations
- prepared CFD simulations for flow visualisation
- videos with detailed demonstration of the experiments: preparation, execution, evaluation
- assured learning success through digital worksheets
- retrieve information from digital networks

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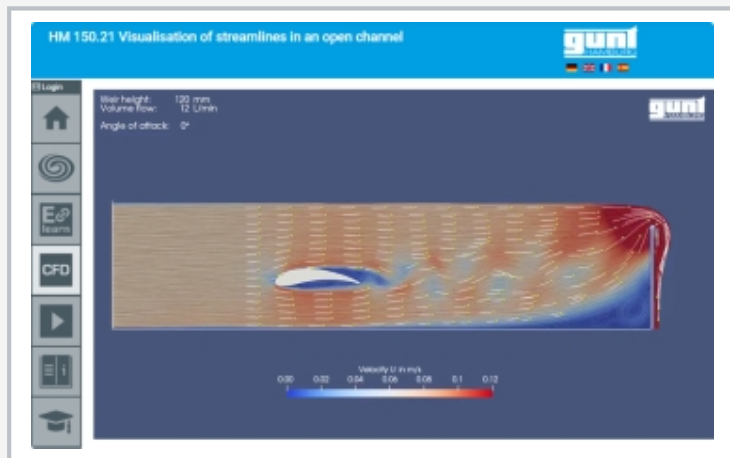


1 adjustable overflow, 2 tank, 3 scale, 4 water supply from HM 150, 5 weir at the water outlet, 6 drag body, 7 experimental flume, 8 flow straightener, 9 distributor for contrast medium, 10 sluice gate at the water inlet to the experimental flume, 11 tank for contrast medium



Drag bodies and weirs supplied

1 sharp-crested weir, 2 broad-crested weir, 3 cylinders, 4 streamlined body, 5 guide vane profile, 6 sluice gate



Screenshot of the GUNT Science Media Center

Specification

- [1] visualisation of streamlines during incident flow and flow around various weirs and drag bodies
- [2] transparent experimental flume
- [3] incident flow demonstrated on two weirs
- [4] demonstration of flow around four different drag bodies
- [5] contrast medium: ink
- [6] distributor for contrast medium with seven nozzles
- [7] water level in the experimental flume adjustable via sluice gate at the water inlet and weir at the water outlet
- [8] flow straightener for even, non-vortical water inlet
- [9] water supply using HM 150 base module or via laboratory supply
- [10] flow visualisation using prepared CFD simulations
- [11] digital multimedia teaching material online in the GUNT Science Media Center: E-Learning course, prepared CFD simulations, worksheets, videos

Technical data

Experimental flume

■ LxWxH: 625x20x150mm

Contrast medium: ink

Injection of the contrast medium: 7 nozzles

Tank for water: 12,5L

Tank for ink: 500mL

Drag bodies

■ small cylinder: Ø 35mm

■ large cylinder: Ø 60mm

■ streamlined body

■ guide vane profile

Weirs

■ broad-crested weir

■ sharp-crested weir

LxWxH: 895x640x890mm

Weight: approx. 24kg

Required for operation

HM 150 (closed water circuit) or water connection, drain;

PC or online access recommended

Scope of delivery

- 1 experimental flume
- 1 set of drag bodies and weirs
- 1 ink (1L)
- 1 set of tools
- 1 set of instructional material
- 1 online access to GUNT Science Media Center

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Optional accessories

HM 150 Base module for experiments in fluid mechanics