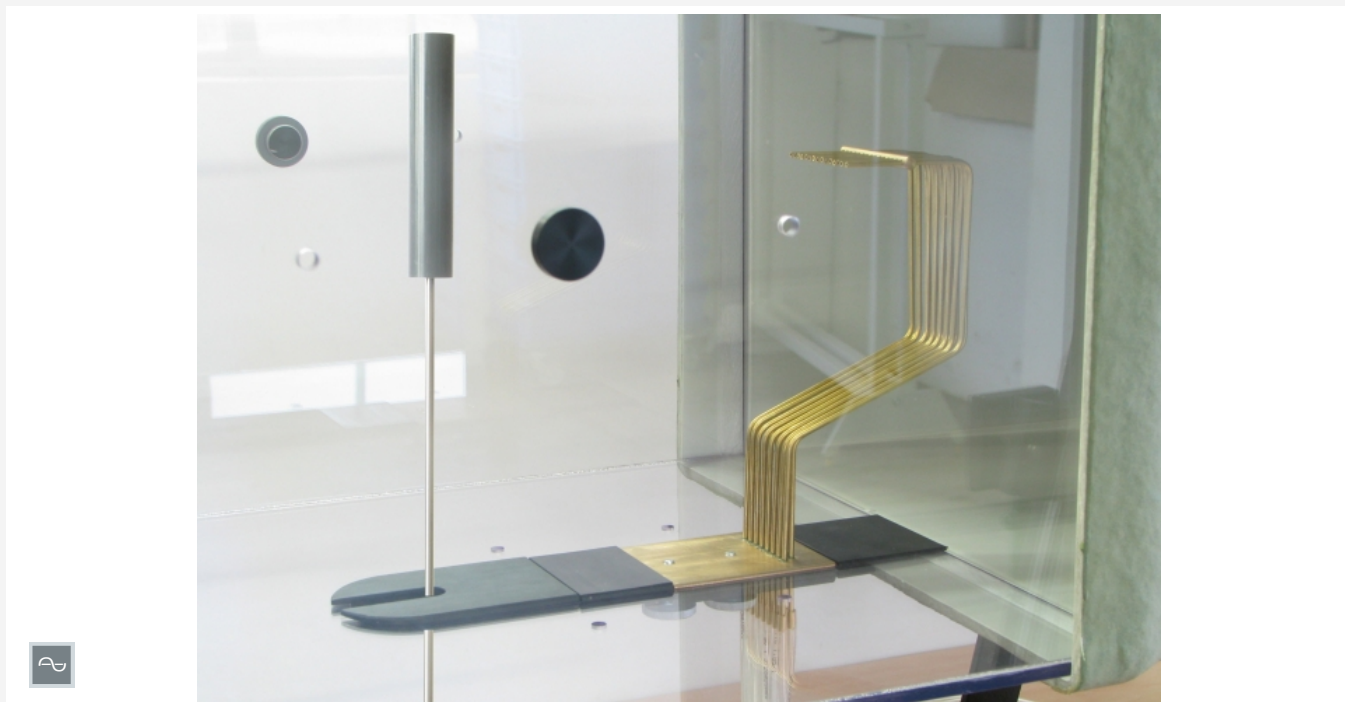


HM 170.28

Wake measurement



Description

- Investigation of the wake of a cylinder immersed in a flow
- Wake rake with 15 Pitot tubes
- Determine the drag coefficient for cylinders

Boundary layer flows form when drag bodies are immersed in a flow. In the wake of the body immersed in a flow, these boundary layer flows meet each other and form turbulence that leads to the velocity in this region being reduced. The reduction in velocity leads to a decrease in the dynamic pressure.

The HM 170.28 experimental unit – used in the wind tunnel HM 170 – allows the wake on a cylinder immersed in a flow to be measured. To record the total pressures, the experimental unit contains a wake rake consisting of 15 Pitot tubes. Each Pitot tube is fitted with a hose connection. The wake rake can be mounted at two different distances from the cylinder.

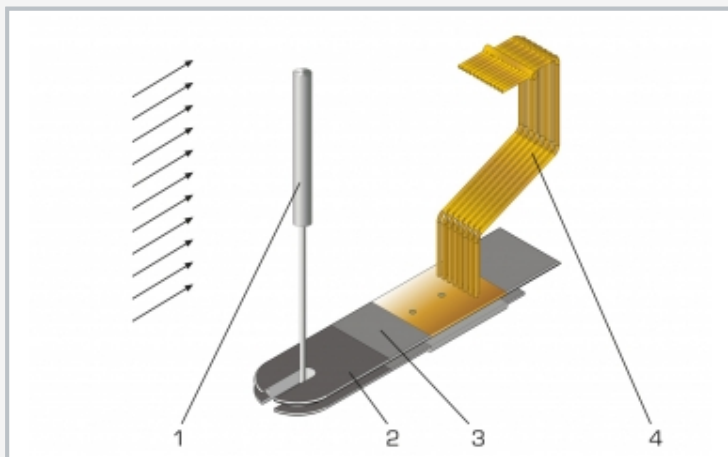
The total pressures are displayed on the tube manometers HM 170.50 or in the electronic pressure measurement HM 170.55. The pressure curve shown there clearly indicates the so-called wake depression. As a key parameter, the drag coefficient of the body in a flow can be determined from the pressures. In addition, the drag coefficient can be determined by measuring the drag force.

Learning objectives/experiments

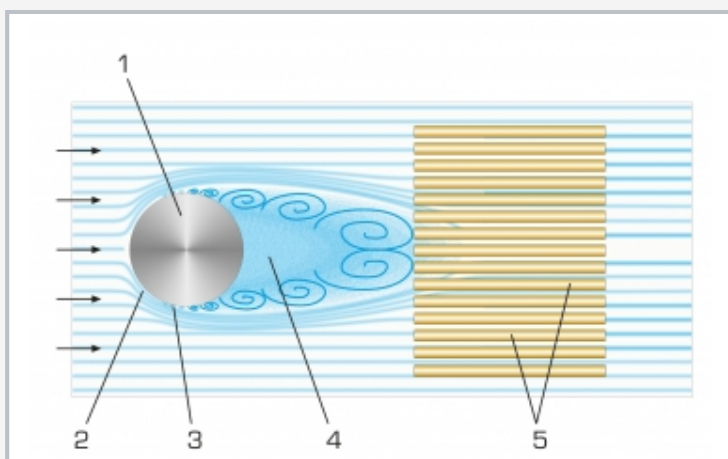
- detect pressure distribution using wake rake
- demonstrate wake depression
- determine drag coefficient by pressure distribution in the wake of the cylinder
- determine Reynolds number
- measurement of drag with the force sensor from HM 170
- determine the drag coefficient via the drag force
- comparison of the two methods for determining the drag coefficient

HM 170.28

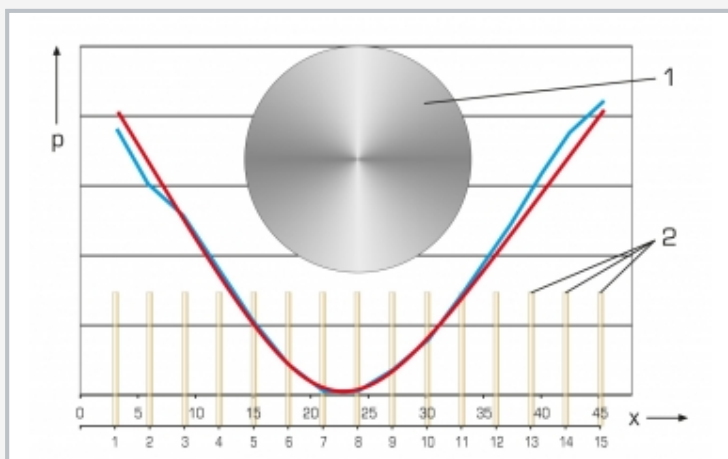
Wake measurement



1 cylinder, 2 bracket, 3 spacer plate, 4 wake rake



Experimental setup: 1 cylinder in a flow, 2 adjacent streamlines, 3 separation of the flow, 4 turbulence (dead wake region), 5 wake rake



The pressure distribution shows the wake depression behind the cylinder immersed in a flow: blue: measured pressure distribution, red: theoretical pressure distribution; 1 cylinder, 2 Pitot tubes of the wake rake; x width of the wake rake in mm, p pressure

Specification

- [1] investigation of the wake of a cylinder immersed in a flow
- [2] accessory for the wind tunnel HM 170
- [3] cylinder as drag body
- [4] wake rake with 15 Pitot tubes detects total pressures
- [5] measurement of drag via force sensor from HM 170
- [6] removable spacer plate allows two wake rake positions for measurement
- [7] display of the pressures on the 16 tube manometers HM 170.50 or in the electronic pressure measurement HM 170.55

Technical data

Cylinder

- inner Ø: 20mm
- height: 100mm
- height with supporting rod: 290mm

Wake rake

- 15 Pitot tubes
- inner Ø: 1,1mm
- outer Ø: 2mm
- distance between the Pitot tubes: 3mm

LxWxH: 237x52x175mm

Weight: approx. 3kg

Scope of delivery

- 1 experimental unit
- 1 wake rake
- 1 cylinder
- 1 measuring hose
- 1 set of instructional material

HM 170.28

Wake measurement

Required accessories

070.17000	HM 170	Open wind tunnel
070.17050	HM 170.50	16 tube manometers, 600mm
or		
070.17055	HM 170.55	Electronic pressure measurement for HM 170