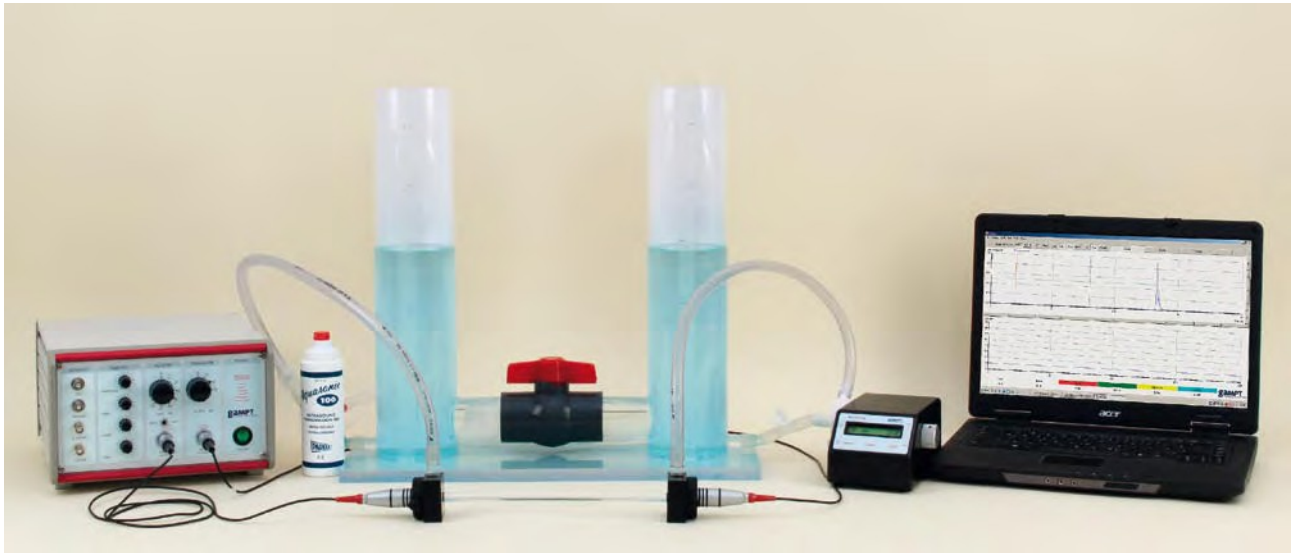


IND09 Transit time flow meter



The experiment demonstrates the carrying out of flow measurements using the ultrasonic transit time method. In this experiment, the connection between ultrasonic transit time difference in measurement with and against the flow direction and the flow velocity is determined and the volume flow is calibrated by volumetric measurement.



Related topics

Ultrasound velocity, transit time measurement, volume flow, flow velocity, transmission method, continuity equation

If an ultrasonic wave passes through a moving medium, the velocities of the sound wave and of the medium overlap vectorially. If the medium moves from the ultrasonic transmitter to the receiver, the velocities combine and the sound path transit time is shorter than in the medium at rest. If the medium flows from the receiver to the transmitter, the transit time is prolonged. From the transit time difference, the average flow velocity of the liquid can be calculated for a known sound velocity. The volume flow can be calculated with this.

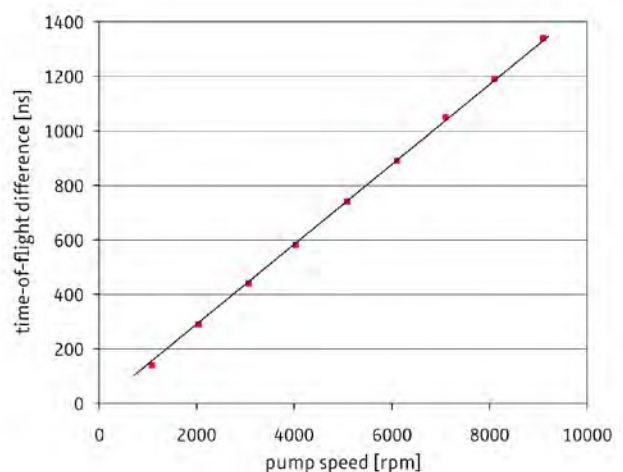
In the experiment, the dependence of transit time and thus of the volume flow on the pump speed is calculated for a given measurement length, thus giving the device constant of the transit time flow meter. The method is suitable for any gases and liquids without them having to contain scattering particles as are necessary for the Doppler measurement.

Equipment

Ultrasonic echoscope GS200	10400
2 ultrasonic probes 2 MHz	10152
Centrifugal pump MultiFlow	50130
Double reservoir	50170
Transit time pipe	10180
Ultrasonicgel	70200
- optional oscilloscope	-

Results

The diagram shows the measured transit time difference for measurements with and against the flow direction in dependence on the pump speed.



Related experiments

[PHY15](#) Fluid mechanics

[IND05](#) Doppler flow measurement