

The Physics Experiments of Robert Wichard Pohl (1884–1976)

For decades, Robert Wichard Pohl taught his famous lectures of introductory physics in the old lecture hall of the Physics Institute at Goettingen University. These lectures became the foundation for three volumes entitled „Introduction into Physics“. Now, using Professor Pohl’s original instruments in the same lecture hall in which he taught, this set of videos captures his extraordinary ingenuity and once more brings to life Pohl’s great experimental skills.



Model experiments for streamlines

Video title: Model experiments for streamlines

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Series title: The Physics Experiments of Robert Wichard Pohl (1884-1976)

Abstract: The goal is the demonstration of two-dimensional streamline patterns as they occur when non-viscous fluids flow around obstacles. The patterns shown are models, since they have been produced in a viscous fluid under conditions of laminar flow. Examples shown are the flow through a constriction, around a sphere or a cylinder, and finally a plate or an airplane wing under different angles with respect to the incoming fluid flow.

Source: Pohl's Einführung in die Physik - Mechanik, Akustik und Wärmelehre. Lüders, Klaus; Pohl, Robert Otto (Hrsg.) 19. Aufl., 2005, Springer Berlin Heidelberg New York; p. 152, 156, 158, 169

Key words: Mechanics, fluids, non-viscous flow, laminar flow, streamlines

Goal of the experiment:

Laminar flow fields of different geometries are used to model two-dimensional non-viscous flow patterns and their streamlines around various objects.

Experimental setup:

Water is flowing through a flat, narrow channel between two glass plates, with a flow rate controlled by means of a hose clamp. The water enters from two storage containers from above, through two rows of small holes. These rows are off-set against each other by one-half of their spacing. With ink added to one of the containers, streamlines are formed. They can be projected onto the wall of the lecture room. The patterns observed correspond to those that would be observed in perfectly non-viscous fluids.

Experiment:

Streamlines are demonstrated for the empty channel, and also for the channel containing several objects:

1. a constriction,
2. a sphere or cylinder,
3. a plate in three orientations, and
4. an airplane wing in three orientations (the next to last one coming closest to the orientation of an airplane in flight).

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