

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.



Eddy current brake

Video title: Eddy current brake
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Abstract: Forces are demonstrated which arise when an electric conductor moves through an inhomogeneous magnetic field.
Source: Pohl's Einführung in die Physik - Elektrizitätslehre und Optik. Lüders, Klaus; Pohl, Robert Otto (Hrsg.) 22. Aufl., 2006, Springer Berlin Heidelberg New York; p. 98
Key words: Electric conductors, temperature dependent electric conductivity, inhomogeneous magnetic field, eddy currents, forces.

Goal of the experiment: To show the surprisingly large forces arising when induced currents flow in a magnetic field.
Experimental setup: Aluminum disks with different electrical conductivities are being moved through an inhomogeneous field between the conically shaped poles of an electromagnet.
Experiment: An aluminum disk is released in the inhomogeneous field, and sinks down only very slowly. In order to maximize the effect, the disk should be released closely to the center. Subsequently, the disk is cooled to the temperature of liquid nitrogen, 77 K, as a result of which the electrical conductivity increases by almost a factor of four. (Note that the cooling occurs slowly, because a gas film forming around the disk provides thermal insulation). When released in the magnetic field, the cold disk sinks even more slowly to the ground, since the larger induced currents experience larger forces. Finally, a large aluminum plate is yanked through the magnetic field, which results in amazingly large forces impeding the motion.

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