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.

Lissajous figures

Video title: Lissajous figures

Signature: C 14841

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

Abstract: Lissajous figures are created and made visible with bending vibrations with different frequencies in two perpendicular directions, using a metal bar of rectangular cross section which is clamped at one end and carries a mirror at the other, off which a light beam is reflected.

Source: Pohls Einführung in die Physik - Mechanik, Akustik und Wärmelehre. Lüders, Klaus; Pohl, Robert Otto (Hrsg.) 19. Aufl., 2005, Springer Berlin Heidelberg New York; p. 40

Key words: Mechanics, bending vibrations, Lissajous figures

Goal of the experiment: Lissajous figures are created and made visible with a metal bar performing bending vibrations with different frequencies in two perpendicular directions.

Experimental setup: A metal bar of rectangular cross section (2 mm wide, 3 mm high) is clamped at one end. A small mirror is attached to its free end, and bending the bar will lead to a change of its orientation. In this way, bending vibrations can be made visible on a projection screen using a light beam (laser) that is being reflected off the mirror.

Experiment: First, the horizontal and the vertical normal modes are excited individually, and their damping shown. By kicking the bar in both directions simultaneously, Lissajous figures occur. The observed figures are typical for a frequency ratio of the horizontal to the vertical vibrational modes of 2:3. Their shape depends not only on the frequency ratio, but also on the phase between the two normal modes.

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Production and Distribution: IWF Wissen und Medien gGmbH, http://www.iwf.de, © IWF Goettingen 2006

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KNOWLEDGE AND MEDIA