Path-time diagrams of rotational motions - time measurements with the counter P (P 1.4.1.1 a)

P 1.4.1

Rotational motions

P 1.4.1.1 Path-time diagrams of rotational motions - time measurements with the counter P

Cat. No.	Description	P 1.4.1.1 (a)	P 1.4.1.1 (b)
347 23	Rotation model	1	1
337 46	Forked light barrier, infra-red	1	2
575 451	Counter P	1	1
501 16	Multicore cable, 6-pole, 1.5 m	1	2
300 76	Laboratory stand II	1	1
301 07	Simple bench clamp	1	1
500 411	Connecting lead, red, 25 cm	1	1

The low-friction Plexiglas disk of the rotation model is set in uniform or uniformly accelerated motion for quantitative investigations of rotational motions. Forked light barriers are used to determine the angular velocity; their light beams are interrupted by a 10° flag mounted on the rotating disk. When two forked light barriers are used, measurement of time t can be started and stopped for any angle φ. This experiment determines the mean velocity

$$\omega = \frac{\varphi}{t}.$$

If only one forked light barrier is available, the obscuration time Δt is measured, which enables calculation of the instantaneous angular velocity

$$\omega = \frac{10°}{\Delta t}.$$

In this experiment, the angular velocity ω and the angular acceleration α are recorded analogously to acceleration in translational motions. Both uniform and uniformly accelerated rotational motions are investigated. The results are graphed in a velocity-time diagram $\omega(t)$. In the case of a uniformly accelerated motion of a rotating disk initially at rest, the angular acceleration can be determined from the linear function

$$\omega = \alpha \cdot t.$$