Recording the oscillation of a spring pendulum

Sensor-CASSY and ultrasonic motion sensor S

Objects of the experiment

1. Record the oscillation of a spring pendulum as a graph of distance against time.
2. Determine the amplitude and period of oscillation for a spring pendulum.

Setup

Apparatus

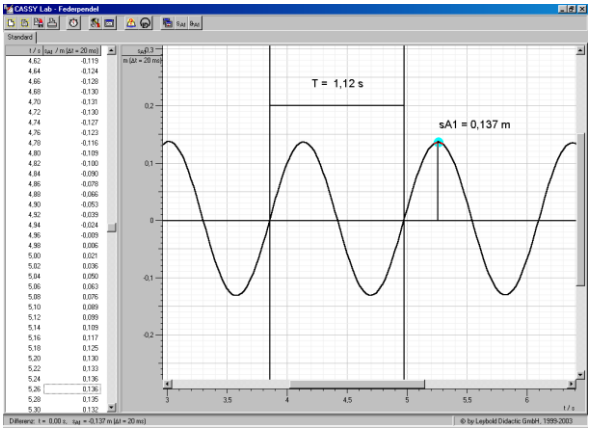
1 Helical spring, 32 N/m	352 12
1 Slotted mass hanger, 50 g, large	315 450
1 Slotted weight, 500 g	315 460
1 Sensor-CASSY 2	524 013
1 CASSY-Lab 2	524 220
1 Ultrasonic motion sensor S	524 070
1 Bench clamp	301 06
1 Stand rod, 100 cm, 12 mm diam.	300 44
1 Stand rod, 25 cm, 12 mm diam.	300 41
2 Leybold multiclamps	301 01

Additionally required:
1 PC with Windows XP or higher

Procedure

- Move the spring out of its rest position and let it go.
- Start measuring by pressing the F9 key.
- Observe the curve on the screen.
- Determine the amplitude *sA*1 and period of oscillation *T* of the spring pendulum from the curve.

Measuring example



Preparation of Sensor-CASSY:

- Connect the Sensor-CASSY module to a USB port of a computer.
- Run the CASSY-Lab software
- Activate INPUT A of the CASSY module by clicking it with the left mouse button in the “Settings” window.
- Configure the following settings in the “Sensor input settings” window.
  Measuring range: -1 m.....1 m
  Zero point: Centre
  Zero point →0←: Click with the left mouse button to establish the zero point as that of the pendulum in rest position.
- Configure the following settings in the “Measurement parameters” window.
  Time for measurement: 10 s
- Afterwards, close all windows to apply the settings.

Evaluation

Oscillation refers to motion of a body which repeats periodically over time and passes back and forth across the equilibrium position of the body.

The relationship between distance and time is described by a sine function.

The time for one complete motion back and forth across the equilibrium position is called the period.

The distance between the equilibrium position and the points where the motion reverses is called the amplitude.

The period of oscillation *T* of a body indicates how long an oscillating body takes to complete one oscillation.

In the sample experiment, the amplitude of the spring pendulum *sA*1 = 0.137 m and the period of oscillation *T* = 1.12 s.

Remark:

In order to demonstrate that the relationship between distance and time is described by a sine function, a “free fit” function can be carried out in CASSY-Lab.

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