

Acoustics

Demonstration and recording of acoustic oscillations

Recording the oscillation of a tuning fork

Tuning fork model, Sensor-CASSY and laser motion sensor S

Objects of the experiment

1. Record the oscillation of a model tuning fork as a graph of distance against time.
2. Determine the period of oscillation T and the frequency f of the model tuning fork.

Setup



Safety notes

The laser motion sensor S is a class 2 laser. Safety regulations for laser equipment as specified in EN 60825-1 are to be observed.

- Do not look directly into the laser beam.
- Align the laser beam in such a way that it is not at eye level and avoid unintended reflections.
- Set up a boundary around where the experiment is taking place to prevent people entering it unintentionally and mark the boundary with a warning sign.
- In Germany, observe the accident prevention regulations for the use of laser equipment BGV B2 and any stipulations from the culture ministry. In other countries, comply with all the regulations applicable there.
- Inform everyone involved in the experiment of the dangers and

Preparation of tuning fork model:

Adhere retro-reflective foil to the end of one tine of the tuning fork model.

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: 0 m.....1 m

Zero point $\rightarrow 0 \leftarrow$: Click with the left mouse button to establish the zero point as that of the tuning fork model in rest position.

- Configure the following settings in the "Measurement parameters" window.

Interval: 2 ms

Time for measurement: 1 s

- Click with the right mouse button on the dark grey field of the axis s_{A1} and configure the following settings:

Minimum: -0.1 m

Maximum: 0.1 m

Apparatus

1 Tuning fork model	411 844
1 Laser motion sensor S	524 073
1 Sensor-CASSY 2	524 013
1 CASSY-Lab 2.....	524 220
1 Bench clamp	301 06
1 Stand base, V-shaped, large.....	300 01
1 Stand rod, 100 cm, 12 mm diam.	300 44
1 Leybold multiclamp	301 01

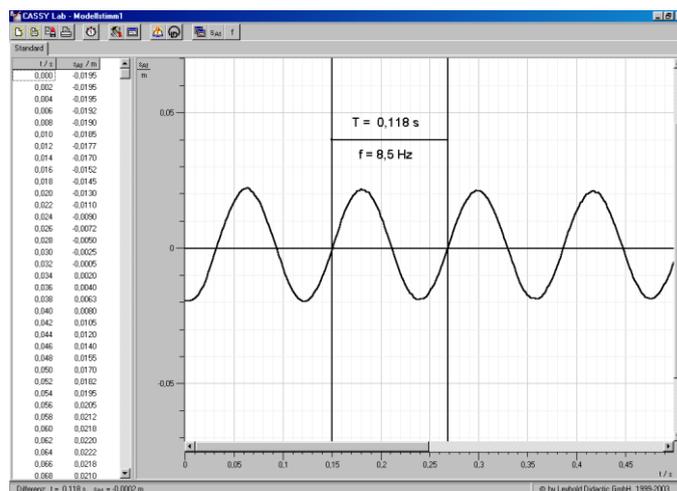
Additionally required:

1 PC with Windows XP or higher

Procedure

- Press the tines of the tuning fork model towards each other and then let go.
- Start measuring by pressing the F9 key.
- Observe the curve on the screen.
- Determine the period of oscillation T of the tuning fork model and calculate its frequency f .

Measuring example



Evaluation

For the oscillation of a tuning fork, the relationship between distance and time is described by a sine function.

The period of oscillation of the tuning fork model $T = 0.118$ s.

The frequency of the tuning fork model can be calculated from the period of oscillation T : $f = \frac{1}{T} = \frac{1}{0,118 \text{ s}} = 8.5 \text{ Hz}$.

Note:

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.