

Practical 1 – Topic 4

Oscillations of a cantilever

This practical can also be a design lab if you give no further information other than listing some of the materials to be used.

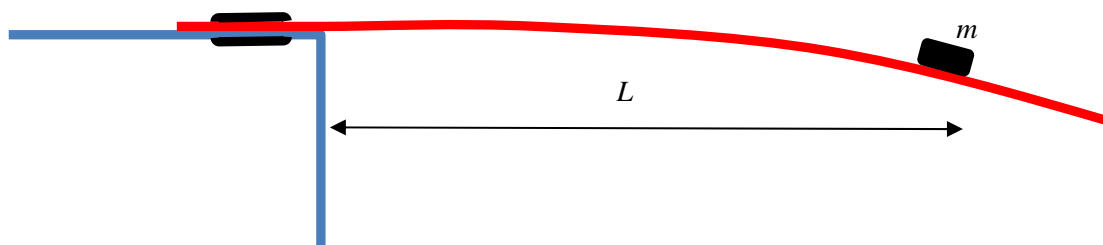
Criteria assessed

- DCP
- CE

Materials needed

- Meter rule (plastic or wooden)
- Clamps
- Ruler
- Weights
- Stopwatch or, much better if available, a light gate connected to an electronic timer.

What to do



- Clamp the meter rule on a horizontal table and attach a fixed mass m at a distance L from the point of support.
- Push the free end of the rod down a *small* distance and let go. The rod oscillates. (Why must you push down by only a small amount?)
- Measure the period of oscillations. This is easy if you are using a light gate. With a stopwatch you have to improvise, for example by measuring 20 oscillations and dividing the time taken by 20. (Would it make a difference if you counted only 10 oscillations?)
- Attach the same mass at a different distance from the point of support.
- Repeat the above. You must push the rod down by the same amount as before – why?
- How is the uncertainty in the period calculated?

Analysis

Theory suggests that the period T is related to the distance L by $T \propto L^p$.

- How should the variables be plotted to give a straight line and at the same time determine the constant p ?

You may want to modify this experiment somewhat by now attaching different masses m at the same distance L from the point of support.

- Theory again suggests that the period T is related to the mass m by $T \propto m^p$.

If you have performed both experiments you may want to find the formula relating to the period T to both L and m .

- Search the literature: how close are your results to the accepted dependence of T on L and m ?