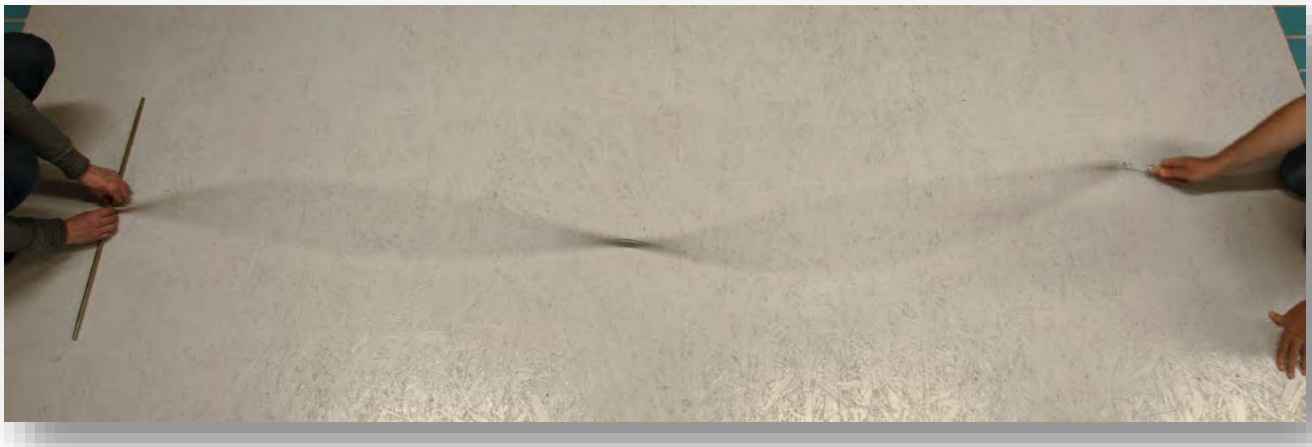
STANDING WAVES WITH REFLECTION AT THE FIXED END

SWD 02.06e



Material:

Item Code	Qty	Description
DW171-1S	1	Wave motion demonstrator, 180 cm
DG205-1G	1	Hook metal, with handle

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Goal:

A special kind of oscillation is a "standing wave". It is to be found out how such a wave can arise.

Setup:

The spring is placed on a surface that is as long and smooth as possible. A smooth floor or several tables lined up at the same height are suitable for this purpose.

One of the ends of the spring should be a "fixed end". To do this, the ring can be held by hand, but it is better to hold it by pushing a tripod rod through the ring and holding it with your hands.

The hook on the handle is hooked into the ring on the other end of the spring, extending it to about 300 - 350 cm.

Experiment:

Using the hook with handle, the spring is slowly moved back and forth with a deflection of about 30 cm. The back and forth movement is then made faster and faster (the frequency of the movement is increased). You can see a locomotion of waves.

As soon as a node develops around the middle of the spring, keep this frequency.
You should be able to see the node and two bellies.

After that, the frequency is further increased. The attempt is made to create two and then three nodes.

Result:

If waves excited at certain frequencies are reflected at a fixed end, the incoming wave and the reflected wave overlap and a standing wave is formed.

Note:

To generate a constant frequency by hand requires some skill and patience. However, due to the size of the spring, the transition from a moving to a nearly stationary wave can usually be seen well.
This is supposed to be a preliminary experiment for SWD 02.07. In this one, the standing wave is ideally represented by using a function generator.