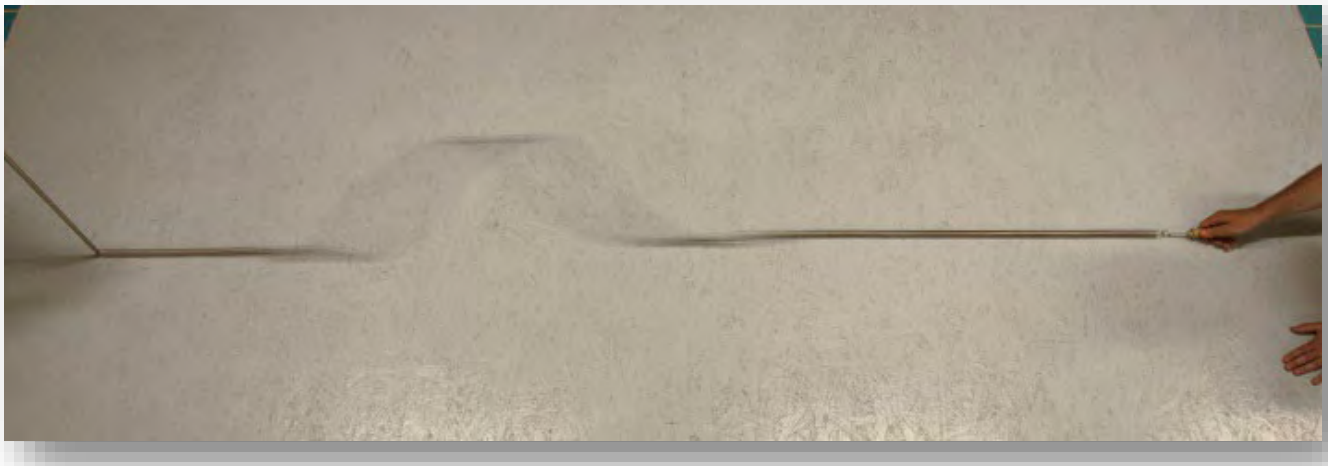
REFLECTION AT THE FIXED END

SWD 02.03e



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 transverse wave is to be examined to determine whether the wave is reflected at a fixed end or not. If so, in what form?

Setup:

The coil 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". For this purpose, the ring can be held by hand, but it is better to hold it by pressing a tripod rod through the ring to the floor.

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 1:

The hook with handle is used to set the spring in motion by deflecting it about 30 - 40 cm, forcefully and as quickly as possible.

The movement of the spring is observed.

Result:

The hand movement creates a wave crest. The wave propagates along the entire length of the spring.

During reflection, a force is exerted on the holder at the fixed end and the corresponding counterforce causes a "swing-through" to the opposite side.

The reflected, returning wave is no longer as high (half wave).

If the wave is strong enough, a further reflection of the returning wave (at the end with hook) can be detected.

Experiment 2:

A wave trough is now created, and the course of the wave motion is again observed.

Conclusion:

During reflection at a fixed end (no oscillation can occur there), a wave trough returns as a wave crest and a wave crest returns as a wave trough.
A phase jump of half an oscillation occurs.

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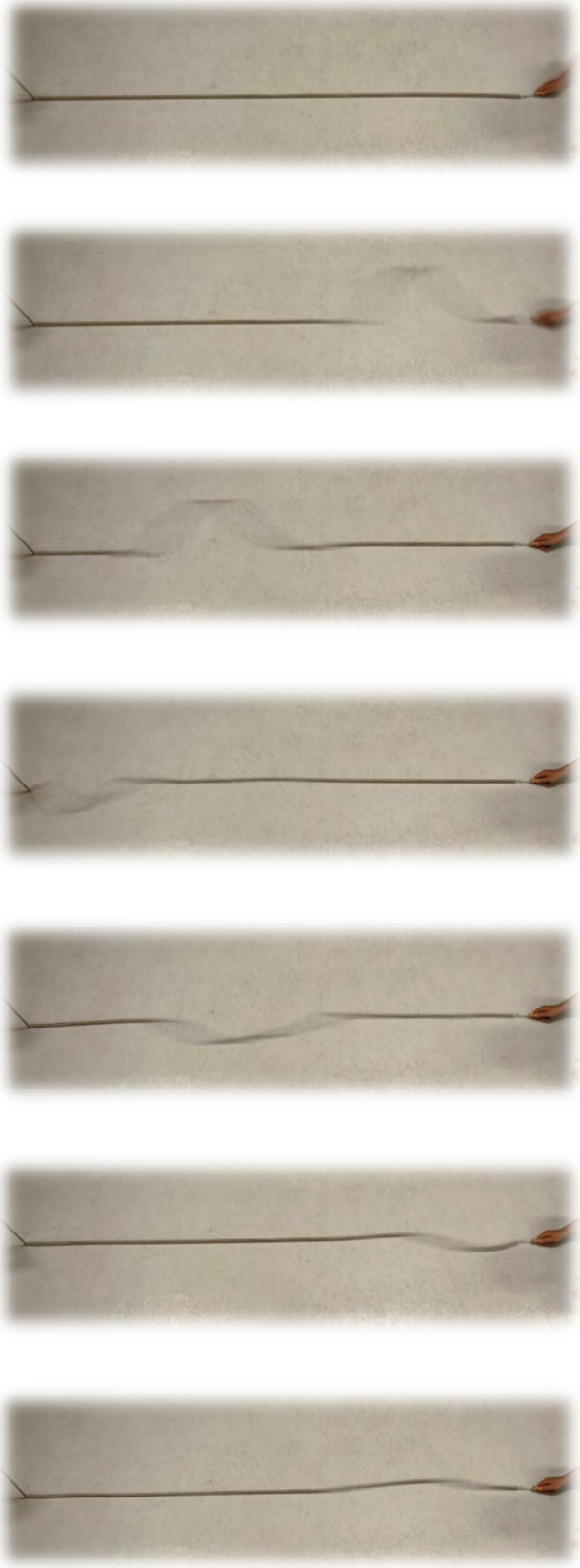
Wave crest and reflection



Wave trough and reflection