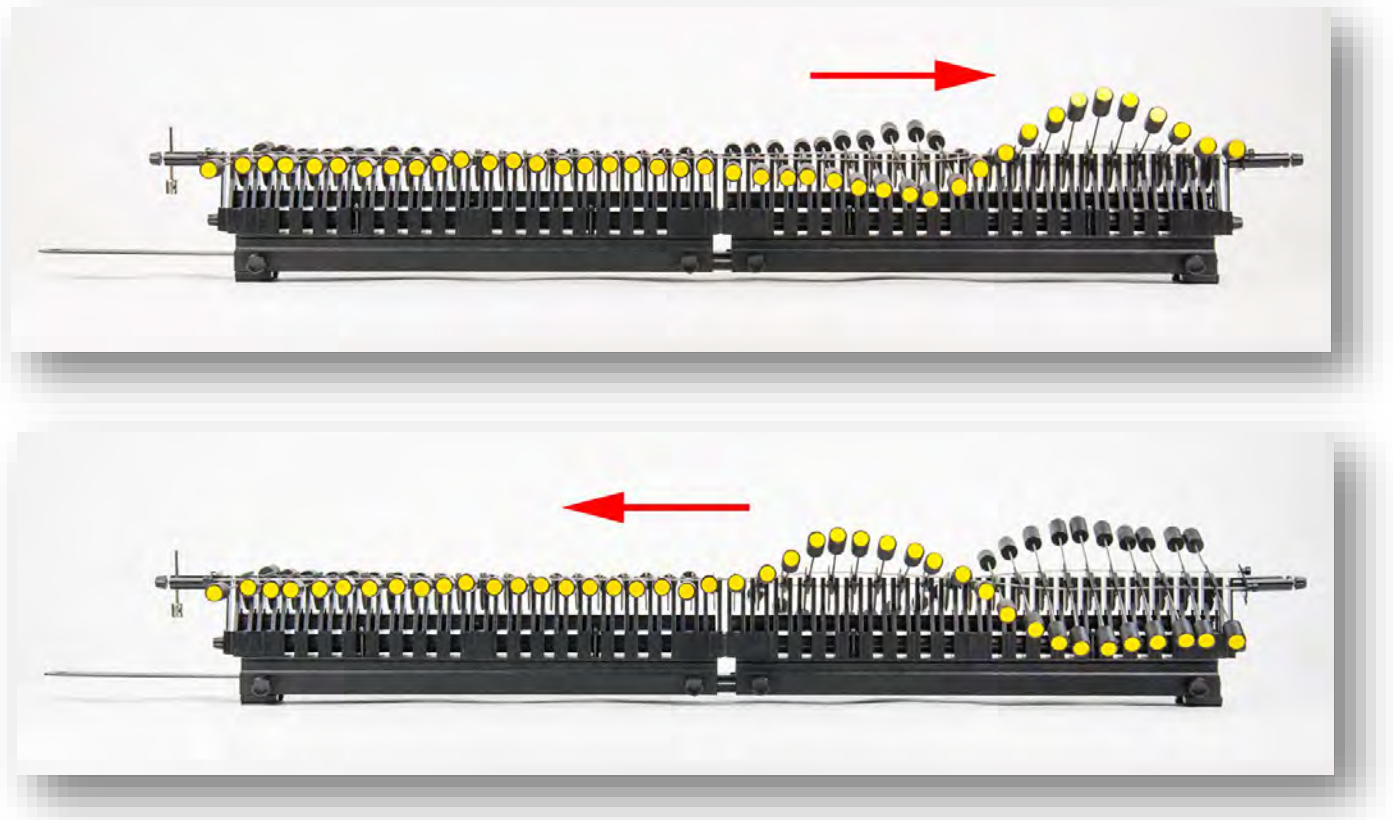


# REFLECTION AT THE FREE END

SWD 03.03



## **Material:**

Item Code	Qty	Description
<b>DW405-1A</b>	<b>1</b>	<b>Oscillation module 1 – set consisting of</b>
DW405-1A1	1	Oscillation module 1 with brake
P5312-1A	2	Little base with damping
DW405-3P	1	Pendulum bearing for wave demonstrator
P7230-4E	1	Bearing pin
DG205-1G	1	Hook metal, with handle
<b>DW405-1E</b>	<b>1</b>	<b>Wave demonstrator - Module II consisting of</b>
DW405-1E1	1	Oscillation module 2a with brake
P5310-1S	1	Rail bond SE, universal
DW405-3SL	2	Coupling spring 80 cm, for wave demonstrator
<b>DW405-2D</b>	<b>1</b>	<b>Wave demonstrator - Mechanical damping unit consisting of</b>
DW405-3P	1	Pendulum bearing for wave demonstrator

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## Purpose

The aim of this experiment is to investigate whether the transverse wave is reflected at a free (loose) end or not. If yes - in which form?

## Setup

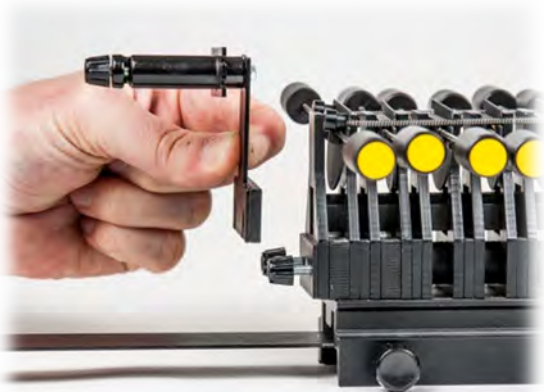
The two oscillation modules are coupled with the rail connector, thus we get a "wave machine" with a length of 80 cm



It should be noted that the two brake springs must also be coupled. The pin of one spring must snap into the hole in the second spring.



The little bases are inserted and screwed tight at the outer ends of the wave machine.



The pendulum bearing is mounted at the end with the long brake spring.

The bearing pin is screwed tight in the vertical slot of the pendulum bearing.



At the end with the short brake spring, the second pendulum bearing (part of the damping unit) is mounted.

The two 80 cm long coupling springs are hooked into the upper slit of the pendulum.



The two pendulum bearings are also included

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SWD 03.03

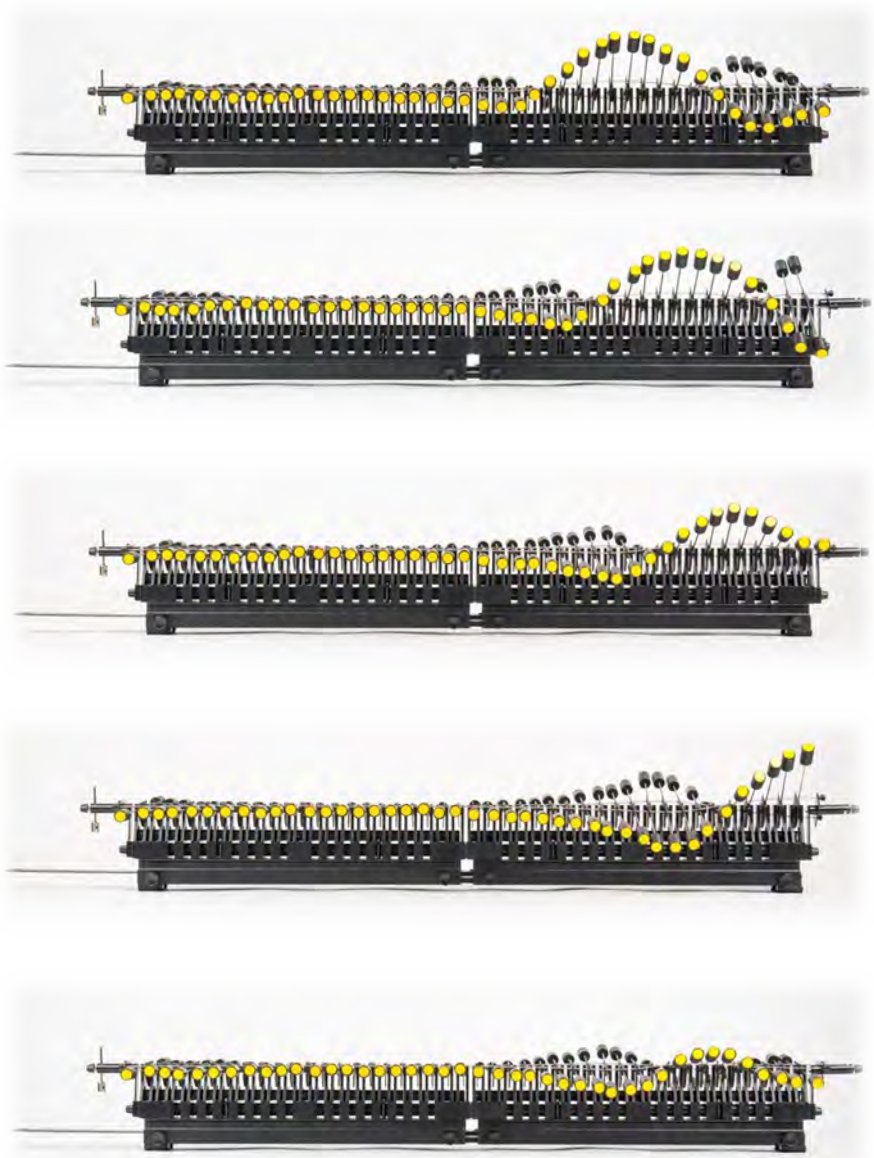
## Experiment 1

All pendulum rods are brought into a horizontal position.

The bearing pin is deflected by hand about  $20 - 30^\circ$  and then turned back to the starting position. This movement should be done quickly.

The first pendulum body of the oscillation module is thereby deflected in an up and down movement and then returned to the starting point again.

Observe the movements of the pendulums!



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SWD 03.03

## Result

The transmitted wave passes through the wave machine and is reflected at the free end.

During the reflection, the free end swings out, so there is no "swing through" to the opposite side (no phase jump).

An emitted wave crest is also reflected as a wave crest.

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



## Annotation

By swinging out at the free end, the reflected wave runs back in a different position ("higher or lower"). If the wave is strong enough, a further reflection of the returning wave can be determined at the excitation end. If the end is recorded after the excitation, a phase jump can be determined. If the end is released after the excitation, we also have a "free end" here and the wave is reflected with the same phase direction.

## Experiment 2

A "valley" of wave is now created and the course of the wave movement is observed again.

## Conclusion

In the case of the reflection at a fixed end (no swinging out there), a wave crest returns as a wave crest.

There is no phase jump.