Reflection of a straight pulse by a barrier

Demonstration

This ripple tank experiment provides a good introduction to wave reflections. Students will see a pattern in the reflections more clearly with a simple straight pulse than they might with continuous straight ripples.

Apparatus and materials

For each group of students

Ripple tank and accessories [1]

Barrier, straight

Wooden rod

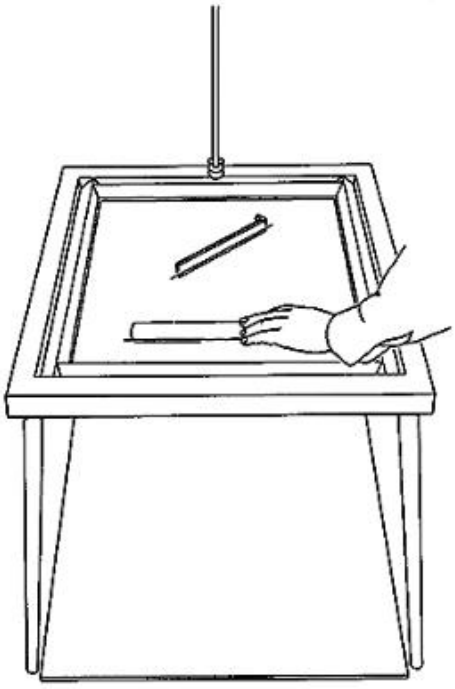
Health & Safety and Technical notes

Beware of water on the laboratory floor. Make sure you have a sponge and bucket handy to mop up spills immediately.

Place the power supply for the lamp on a bench, not on the floor by the tank.

Read our standard health & safety guidance

Procedure



Ask: 'Can you see any simple story about the direction of straight waves before and after meeting a flat wall? How are the angles related?'

Do not, at this stage, talk about laws of reflection, measurements of angles, or urge students to remember what they saw before.

Make a straight-line pulse and watch what happens when it hits a straight reflecting barrier. It is easier to see what happens when there is a single pulse rather than a series of waves.

Try directing a pulse head-on (normally) to the barrier and then at various other angles, larger or smaller than 45°. Avoid just 45° because this produces a grid pattern and it is hard to tell the difference between incident and reflected rays.

Teaching notes

1 Most students will bring out some story about angles. It does not matter at all whether the angles are angles between wavefront and barrier or wavefront and the normal. Dragging in references to the normal in these simple studies of reflection is no help at all. Even with a curved reflector, young people can imagine a tangent to the surface just as easily as they imagine a normal. All you want here is some idea of ' equal angles'.

2 At this point students could be introduced to ‘rays’ as guide lines indicating the direction in which the wave is travelling. Place a metre rule at right angles to the wave fronts to help students to ‘see’ where the rays are. This would link ripple tank experiments to ray optics .

3 This template [3] with two sets of parallel lines can be used with an OHT to simulate reflection and interference of plane waves, at a straight barrier.

This experiment was safety-checked in January 2007

Related guidance

Using ripple tanks [4]

Source URL: http://www.nuffieldfoundation.org/practical-physics/reflection-straight-pulse-barrier

Links:
[1] http://www.nuffieldfoundation.org/node/1898
[2] http://www.nuffieldfoundation.org/node/1634/
[3] http://www.nuffieldfoundation.org/sites/default/files/files/Reflection of a straight pulse by a barrier_2000.pdf
[4] http://www.nuffieldfoundation.org/node/1961