# *Lab 7-2:* **Ripple Tank Observations**

**Purpose:** To make observations of wave phenomenon in a ripple tank.

**Procedure:** The ripple tank is already set up; just turn on the light. There should be nothing in the water at the start of the lab. You will be asked to make a series of observations. **Do your best to describe what you see and use diagrams.** It will generally be much easier to make observations by looking at the white paper underneath the ripple tank than by looking at the water directly. (Note: Whenever the water above the paper forms a crest**,** it will act like a magnifying glass and create a bright spot on the paper underneath. Conversely, wherever the water forms a trough**,** it will act like a diverging lens and create a dark spot on the paper underneath.)

*I. Wave Pulses*

1. Create a wave pulse by briefly touching the surface of the water with your finger. Describe what you see. (Note the speed and shape of the pulse as it travels.)

2. Place a wooden dowel in the water. Create a wave pulse by lightly tapping the dowel. Describe what you see. (Note the speed and shape of the pulse as it travels.)

*II. Reflections*

3. Using the wooden blocks, make a barrier in the ripple tank so that you can see its shadow on the paper below. Send a straight wave pulse into the barrier head-on. Describe what you see. (Note the speed, shape and direction of the pulse as it travels and reflects.)

4. Repeat step 3 several times. In each case, change the angle at which the pulse strikes the barrier. How does the ***angle of incidence*** compare to the ***angle of reflection****?* Describe what you see. (Also note the speed and shape of the pulse as it travels and reflects.)

5. Create a circular wave pulse with your finger and observe the reflections**.** Describe what you see. (Note the speed, shape and direction of the pulse as it travels and reflects. From where does the reflected wave seem to be originating?)

6. Remove the wooden blocks from the water. Create a straight wave pulse and observe its reflection off the edge of the ripple tank. Describe what you see. (Note the speed and shape of the pulse after it reflects off the side of the tank.)

7. Find the point where the reflected waves from step 6 meet. (This is the ***focus*****.**) Create a circular wave at this point. Describe what you see. (Note the speed and shape of the pulse after it reflects.)

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*III. Continuous Waves*

For these observations, turn on the wave generator by plugging it in. You get pretty decent results by keeping the frequency between 10 and 20, and keeping the amplitude pretty small. Start off with the plane wave generator, which has the plastic bar attached to it. You may have to adjust the height of the wave generator so that the it does not touch the glass bottom of the ripple tank.

8. Adjust the frequency of the motor. What effect does increasing the ***frequency*** of the waves have on the ***wavelength*** of the wave? How about the ***speed*** of the wave?

9. Place some wooden blocks a few centimeters from the wave generator. Adjust the frequency so that you create ***standing waves*** in between the generator and the block. (Standing waves do not seem to be moving. Standing waves are created when a continuous stream of waves is traveling in one direction, while at the same time, there is another stream of waves traveling in the opposite direction. Two waves that are in the same place at the same time are said to ***interfere*** with each other. If they are out of phase, they will ***destructively interfere***. If they are in phase, they will ***constructively interfere***.) How does the wavelength of the standing wave compare with the wavelength of the wave traveling past the barrier?

10. Using the same set up as in step 9, note what happens to the wave fronts as they go past the blocks. Look behind the blocks. Describe what you see. (It is called ***diffraction.***)

11. Place wooden blocks across the tank until they reach from side to side with a small opening (about 1 to 2 cm) in the middle. Using the wave generator, send straight waves into the barrier. How does the straight wave pattern change as it passes through the opening? What phenomenon is occurring?

12. Modify your barrier so that there are two openings separated from each other by about 4 cm near the center and repeat what you did in step 11. Describe and draw what you see. What two phenomenon are occurring?

13. Remove the blocks and put the two point sources on the wave generator (about 4 cm apart, if you have a choice.) Turn on the wave generator. Circular waves from these two point sources will move out in all directions. You will see on the white paper only the circles moving in one direction because of the way it is illuminated. Watch them constructively interfere and destructively interfere. Describe and draw what you see. Mark the sites where ***nodes*** and ***antinodes*** exist.