

# Introduction



- 1. Measure the speed of sound in air.
- 2. Determine the wavelength of a sound wave.
- 3. Calculate the frequency of a sound wave.
- 4. Compare the experimental results with theoretical values.
- 5. Discuss the sources of error and uncertainty.

# THEORY

The speed of sound in air is given by the equation:

$$v = \lambda f$$

where  $v$  is the speed of sound,  $\lambda$  is the wavelength, and  $f$  is the frequency.

In this experiment, we will measure the wavelength of a sound wave by using a resonance tube.

A resonance tube is a tube that is partially filled with water. The air column above the water surface will resonate with the sound wave from the speaker.

The resonance occurs when the length of the air column is equal to an odd multiple of one-quarter of the wavelength.

$$L = (2n - 1) \frac{\lambda}{4}$$

where  $L$  is the length of the air column,  $\lambda$  is the wavelength, and  $n$  is an integer.

By measuring the length of the air column for different values of  $n$ , we can determine the wavelength of the sound wave.

The frequency of the sound wave is determined by the speaker, which is connected to a signal generator.

The speed of sound in air is approximately 343 m/s at room temperature.

The wavelength of the sound wave can be calculated using the equation:

$$\lambda = \frac{v}{f}$$

where  $v$  is the speed of sound and  $f$  is the frequency.

The frequency of the sound wave is determined by the signal generator.

The speed of sound in air is approximately 343 m/s at room temperature.