Refraction and Standing Waves

Lab #7

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Objective

Measure the wavelength of a microwave by creating a standing wave and demonstrate Snell's law using a prism mold.

1 Introduction

1.1 Standing waves

A standing wave is a wave whose energy density at every point remains constant, or a wave that does not propagate. The points at which the energy density is zero are called the nodes of the wave, and the points where the energy density is a maximum are called the antinodes.

A standing wave is generated by resonance when a traveling plane wave of wavelength λ reflects back on itself from a wall that is some integer multiple of $\lambda/2$ away from the source and interferes with itself. The horns of the microwave receiver reflect some radiation, so the transmitter and receiver can be placed facing each other at a distance $n\lambda/2$ apart (for any natural number n) to create a standing wave. When this happens, the intensity reading will be at a maximum.

1.2 Refraction

An electromagnetic wave is refracted, or bent, when it passes from one medium to another.

2 Procedures and Results

2.1 Standing wave

We set up the microwave system so that the transmitter and receiver diodes were approximately 70 cm and then slid them a few centimeters farther apart to get a maximum intensity reading. Then, we slid them farther apart, counting the times that the intensity reading hit a local minimum, stopping at a local maximum. We recorded the initial and final positions of the units and the number of minima passed.

Table 1: My caption

Initial position	Number of minima passed	Final position
74.9 cm	10	90 cm
73.3 cm	11	88.3 cm

2.2 Refraction

3 Discussion

3.1 Standing wave

3.2 Refraction

4 Conclusion

Today