Types of Diffraction

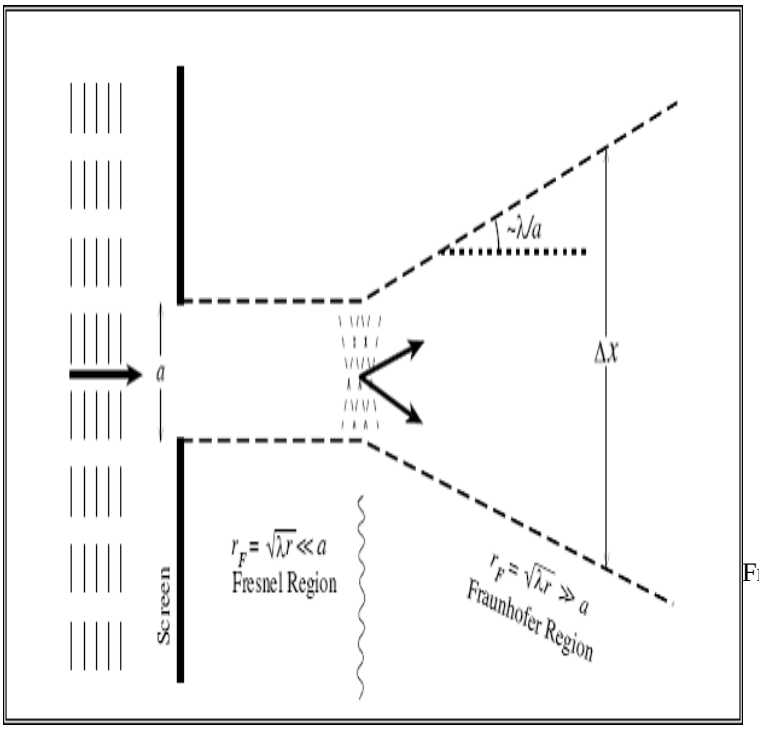
Created: Thursday, 25 August 2011 10:07 | Published: Thursday, 25 August 2011 10:07 | Written by Super User | Print

Diffraction Classifications

The phenomenon of light spreading out as it travels past sharp edges or through tiny holes can be explained by its wavelike properties. When a wave strikes a barrier with a hole, only part of the wave can move through the hole. If the hole is smaller than the wavelength of a wave, the wave that comes through the hole will no longer look like a straight wave front and will bend around the edges of the hole. This bending around the edges of the hole is called diffraction. If the hole is small enough, it will act as a point source of circular waves.

Diffraction of light can be divided into two classes:

1. Fraunhoffer diffraction:



Fraunhofer diffraction occurs with plane wave fronts when an object is effectively at infinity. The pattern of diffraction occurs in a particular direction and is a fringed image of the source. Interference takes place from different parts of an aperture when either the source or screen or both are at a finite distance from the obstacle. Incident wave fronts on the diffracting obstacle are plane wave fronts. The diffracting obstacle gives rise to wave fronts that are also plane. A convex lens converges plane diffracting wave fronts to produce a diffraction pattern.

2. Fresnel diffraction:

Fresnel diffraction is produced when light from a point source meets an obstacle, and the waves are spherical. The pattern that is observed is a fringed image of the object. The interference takes place from different parts of an aperture when either the source or screen or both are at a finite distance from the obstacle. Incident wave fronts are spherical and wave fronts leaving the obstacle are also spherical. A convex lens is not needed to converge the spherical wave front.

Fresnel diffraction with a double slit will produce two single slit patterns that are superimposed on one another. This is exactly what happens in Young's slit experiment.

Applications of Diffraction

- Wavelength of X-rays can be established by an X- ray diffractometer.
- The wavelength of monochromatic or compound radiation can be established using diffraction rasping.
- Diffraction can establish the structural morphology of a crystal.
- Ultrasound scans that are used to discover tumors and ulcers in the human body can be explained by this phenomenon.
- Diffraction procedures can help to project the velocity of sound in liquids.

***

Want to know more about types of fiffraction?Click here to schedule a live session with an eAge eTutor!

About eAge Tutoring:

eAgeTutor.com is the premium online tutoring provider. Using materials developed by highly qualified educators and leading content developers, a team of top-notch software experts, and a group of passionate educators, eAgeTutor works to ensure the success and satisfaction of all of its students.

Contact us today to learn more about our guaranteed results and discuss how we can help make the dreams of the student in your life come true!

Reference links:

- http://www.en.wikipedia.org/wiki/Wavefront
- http://www.play-hookey.com/optics/lens_convex.html
- http://www.en.wikipedia.org/wiki/X-ray -
- http://www.britannica.com/EBchecked/.../monochromatic-radiation

Category:ROOT