Answer on Question #65004, Physics / Optics

Depict spatial evolution of Fresnel diffraction pattern.

Solution:

Fresnel diffraction or near-field diffraction is a process of diffraction that occurs when a wave passes through an aperture and diffracts in the near field. It occurs due to the short distance in which the diffracted waves propagate, which results in a Fresnel number greater than 1 ($F > 1$). When the distance is increased, outgoing diffracted waves become planar and Fraunhofer diffraction occurs.

It is rightly for Fresnel diffraction:

Wave fronts: cylindrical wave fronts

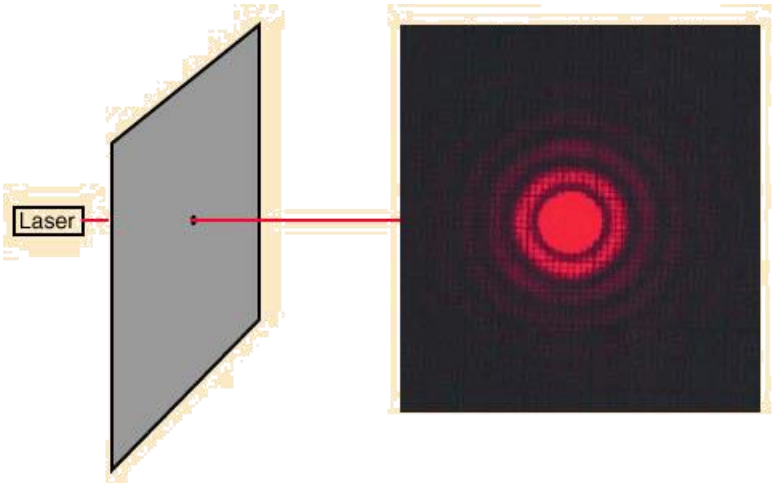
Observation distance: source of screen at finite distance from the obstacle.

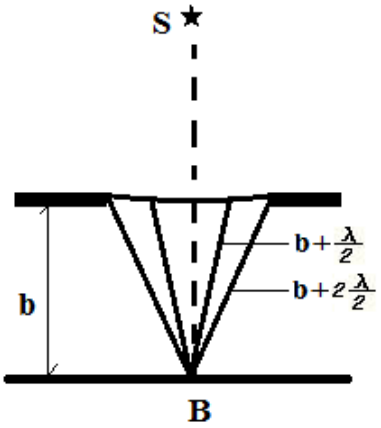
Movement of diffraction pattern: move in a way that directly corresponds with any shift in the object.

Surface of calculation: Fresnel diffraction patterns on flat surfaces

Diffraction patterns: change as we propagate them further 'downstream' of the source of scattering.

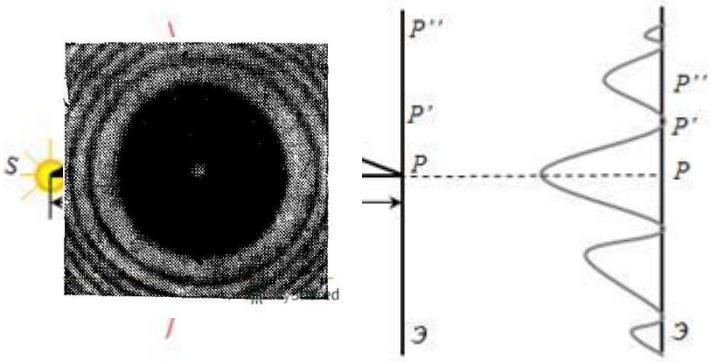
Circular Aperture Diffraction

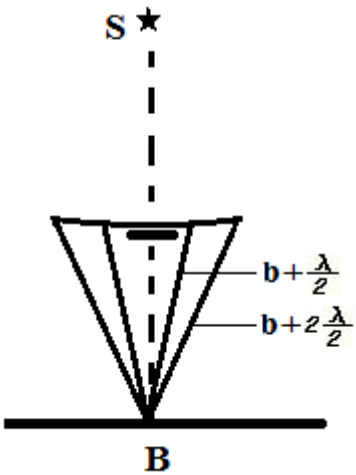




View of diffraction pattern depends on the number of Fresnel zones, which are invested in the hole.

Diffraction of disk





View of diffraction pattern depends on the number of Fresnel zones, which are invested in the disk.