

Chap 38: Diffraction and Polarization

Example 1: Microwaves illuminate a single slit whose width is 1 cm. The screen is 1 m away and the central maximum is 40 cm wide. What is the wavelength?

Example 2: How close together are two building if radio waves passing between them have a diffraction minimum at 8° ? The frequency is 101.5 MHz.

Example 3: How many fringes are in central maximum if the slit width is 0.22 mm and the slit separation distance is 0.50 mm? The screen distance is 2 m and the wavelength is 632.8 nm.

Example 4: At what distance can car headlights just be resolved? The headlights are 1.5 m apart and the wavelength is 600 nm. Assume your pupil diameter is 2 mm.

Example 5: Using the Palomar telescope (diameter is 5.08 m) what is the smallest crater that can be resolved on the moon? The wavelength is 400 nm. (distance to the moon = 3.84×10^8 m)

Example 6: A spy satellite's camera lens has a diameter of 1.96 m and the satellite orbits 112 km above the Earth's surface. What is the smallest object that can be resolved by the camera if it is sensitive to 327 nm light?

Example 7: A helium neon laser's light (632.8 nm) passes through a diffraction grating. The first order occurs at an angle of 20° . What is the slit spacing?

Example 8: A diffraction grating has 1250 lines per cm. If the wavelength is 400 nm, at what angle is the second order found?

Example 9: What is the minimum number of lines needed to resolve 656.3 and 656.48 nm spectral lines in the second order?

Example 10: Two Polaroid sheets have their axis rotated 30° with respect to each other. What percentage of the light gets through?

Example 11: Three Polaroid sheets have their axis rotated 45° with respect to each other. What percentage of the light gets through?

Example 12: When light reflects off of a lake ($n = 1.33$) at what angle of incidence is the reflected light completely polarized?