

Glossary

axis of a polarizing filter the direction along which the filter passes the electric field of an EM wave

birefringent crystals that split an unpolarized beam of light into two beams

Brewster's angle $\theta_b = \tan^{-1} \left(\frac{n_2}{n_1} \right)$, where n_2 is the index of refraction of the medium from which the light is reflected and n_1 is the index of refraction of the medium in which the reflected light travels

Brewster's law $\tan \theta_b = \frac{n_2}{n_1}$, where n_1 is the index of refraction of the medium in which the incident and reflected light travel and n_2 is the index of refraction of the medium that forms the interface that reflects the light

coherent waves are in phase or have a definite phase relationship

confocal microscopes microscopes that use the extended focal region to obtain three-dimensional images rather than two-dimensional images

constructive interference for a diffraction grating occurs when the condition $d \sin \theta = m\lambda$ (for $m = 0, 1, -1, 2, -2, \dots$) is satisfied, where d is the distance between slits in the grating, λ is the wavelength of light, and m is the order of the maximum

constructive interference for a double slit the path length difference must be an integral multiple of the wavelength

contrast the difference in intensity between objects and the background on which they are observed

destructive interference for a double slit the path length difference must be a half-integral multiple of the wavelength

destructive interference for a single slit occurs when $D \sin \theta = m\lambda$, (for $m = 1, -1, 2, -2, 3, \dots$), where D is the slit width, λ is the light's wavelength, θ is the angle relative to the original direction of the light, and m is the order of the minimum

diffraction the bending of a wave around the edges of an opening or an obstacle

diffraction grating a large number of evenly spaced parallel slits

direction of polarization the direction parallel to the electric field for EM waves

horizontally polarized the oscillations are in a horizontal plane

Huygens's principle every point on a wavefront is a source of wavelets that spread out in the forward direction at the same speed as the wave itself. The new wavefront is a line tangent to all of the wavelets

incoherent waves have random phase relationships

interference microscopes microscopes that enhance contrast between objects and background by superimposing a reference beam of light upon the light emerging from the sample

optically active substances that rotate the plane of polarization of light passing through them

order the integer m used in the equations for constructive and destructive interference for a double slit

phase-contrast microscope microscope utilizing wave interference and differences in phases to enhance contrast

polarization the attribute that wave oscillations have a definite direction relative to the direction of propagation of the wave

polarization microscope microscope that enhances contrast by utilizing a wave characteristic of light, useful for objects that are optically active

polarized waves having the electric and magnetic field oscillations in a definite direction

Rayleigh criterion two images are just resolvable when the center of the diffraction pattern of one is directly over the first minimum of the diffraction pattern of the other

reflected light that is completely polarized light reflected at the angle of reflection θ_b , known as Brewster's angle

thin film interference interference between light reflected from different surfaces of a thin film

ultraviolet (UV) microscopes microscopes constructed with special lenses that transmit UV rays and utilize photographic or electronic techniques to record images

unpolarized waves that are randomly polarized

vertically polarized the oscillations are in a vertical plane

wavelength in a medium $\lambda_n = \lambda/n$, where λ is the wavelength in vacuum, and n is the index of refraction of the medium