物理光学常用参数单位

Variable	Definition	Units
temporal period	$\tau = \frac{\lambda}{v}$	S
temporal frequency	$\nu = \frac{1}{\tau}$	s^{-1}
wave number	$\kappa = \frac{1}{\lambda}$	m^{-1}
Phase	$\psi = kx - \omega t$	radians (rad)
angular frequency	$\omega = \left\lvert \left(\frac{\partial \psi}{\partial t} \right)_x \right\rvert = \frac{2\pi}{\tau}$	rad s^{-1}
propagation number	$k = \left\lvert \left(\frac{\partial \psi}{\partial x} \right)_t \right\rvert = \frac{2\pi}{\lambda}$	rad m^{-1}
initial phase (epoch angle), φ	$y(x,t) = A\cos(kx - \omega t + \varphi)$	rad
phase velocity	$v = \left(\frac{\partial x}{\partial t} \right)_\psi = \frac{\omega}{k}$	m s^{-1}
group velocity	$v_g = \frac{\partial \omega}{\partial k}$	m s^{-1}

Variable	Definition	Units
E (real-valued field) u or U(complex-valued field)	electric field amplitude	V m^{-1}
I	irradiance	W m^{-2}
H	magnetic intensity	A m^{-1}
m	mass	kg
n	real part of the refractive index	--
α	linear absorption coefficient	m^{-1}
ε_r	relative dielectric constant	--
t	time	S
x, y, z	spatial position	m
α, β, γ	direction cosines	--
ξ, η	spatial frequencies	m^{-1}
P	macroscopic electronic polarization	C m^{-2}
γ	molecular concentration	m^{-3}
ζ	molecular polarizability	C m^2 V^{-1}
χ	dielectric susceptability	--
V	visibility	--
$N = n + \kappa j$	complex index of refraction	--
j or i	$\sqrt{-1}$	--
∇^2	$\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} + \frac{\partial^2}{\partial z^2}$	m^{-2}

单位变换

1 W	1 J s^{-1}
1 km	10^3 m
1 m	39.37 in
1 m	10^3 mm
1 m	10^6 μm
1 m	10^9 nm
1 in	25.4 mm
1 eV	1.602×10^{-19} J
1 J	10^7 ergs
1 lb	4.448 N
1 V	1 J C^{-1}
1 N	1 kg m s^{-1}
1 cal	4.184 J
1 rad	57.30°
1 ft s^{-1}	0.3048 m s^{-1}
1 rpm	0.1047 rad s^{-1}
1 mile	1.609 km