

Lect. 21, Apr. 20, 2010

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Part 5: Electromagnetic Character of Light

polarization (CH 22)

Double Refraction (CH 22)

Maxwell's Equation (CH 23)

plane waves in a Dielectric (CH 23)

Poynting flux (CH 23)

Reflection and Refraction of EM waves (CH 24)

Polarization (CH 22)

The general wave function, also called displacement function, for 1-D (along z axis), plane wave is

$$\psi = a \cos(kz - \omega t + \phi_0)$$

k : wave number

ω : angular frequency

ϕ_0 : initial phase

$(kz - \omega t + \phi_0)$: phase term

$v = \frac{\omega}{k}$: phase velocity

a : amplitude.

* For a plane wave: $a(x, y, z) = \text{const}$

* For multiple waves: interference and diffraction

$a(x, y, z)$ is a function of location,
 \Rightarrow fringe pattern

* Polarization: $|a(x, y, z)| = \text{const}$, constant amplitude

still a plane wave.

However, the direction of displacement matters

$$a \rightarrow \vec{a} = \hat{i} a_x + \hat{j} a_y$$

