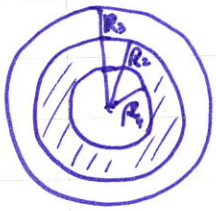
May 21, 2018

A. Fresnel Diffraction (ch. 13)

Circular

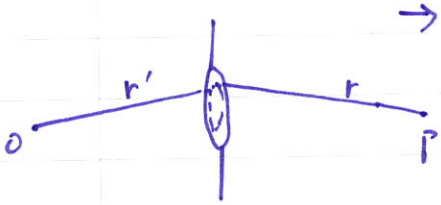


$A_1 = \pi R_1^2$; $A_2 = \pi(R_2^2 - R_1^2)$; $A_3 = \pi(R_3^2 - R_2^2)$

$R_2 = \sqrt{2} R_1$; $R_3 = \sqrt{3} R_1$; (13-20)

$\therefore A_2 = \pi(2-1)R_1^2$; $A_3 = \pi(3-2)R_1^2$

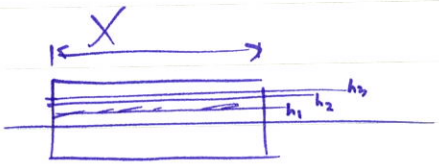
→ Same area effect to all zones!



$E_p = \iint \frac{dE_p}{rr'} dA$

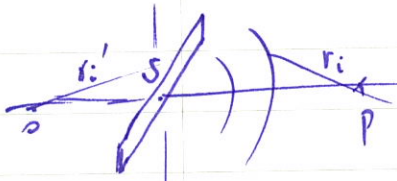
- At each zone, however, the field amplitude is not equal due to the ~~dem~~ different direction of Huygens wavelets, resulting in gradual amplitude decrease as r increases!

rectangular slit



$E_p \propto \frac{1}{r_1} E_s$

$A_1 = X h_1$; $A_2 = X(h_2 - h_1)$; ...



Assume that

$r_i = r_0 + n(\frac{\lambda}{2}) = \sqrt{n r_0 \lambda}$

$h_2 = \sqrt{2} h_1$; $h_3 = \sqrt{3} h_1$

- Sylindrical wave:

$E_p = \int \frac{dE_p}{r_1 r_1'} dA$

→ $A_1 = X h_1$; $A_2 = X(\sqrt{2}-1)h_1$; $A_3 = X(\sqrt{3}-\sqrt{2})h_1$

~~$A_1 < A_2$~~ ~~$A_3 > A_2 > A_1$~~ $A_3 < A_2 < A_1$

→ Different area effect!

~~To have the same area effect $h_i \neq r_i$~~

This, I_0 more rapidly decreases as h_i increases!

→ Cornue Spiral! (13-8)

morning glory