
Table of contents

Electric Field:

$$Coulomb\ Force: F_E = \frac{1}{4\pi\epsilon_0} \frac{q_0 \cdot q \vec{r}}{r^2} \quad (1)$$

$$\mathcal{E} = \frac{F_E}{q_0} = \frac{1}{2} \frac{1}{2\pi} \frac{1}{\epsilon_0} \frac{q}{r^2} \frac{\vec{r}}{r} = -\nabla U = v\mathcal{B} \quad (2)$$

spherical waves of Electric Field from idealized point charge (linear coherent):

$$\mathcal{E} = \frac{A_0}{r} \cos(\omega t - kr) = A_L \int_{-D/2}^{D/2} \frac{1}{r} \cos(\omega t - kr) dD \quad (3)$$

Reflected Electric Field:

$$\mathcal{E}(\vartheta) = \sum_{n=1}^N a_n e^{i(\omega t - kr_n)} = a \cdot e^{i(\omega t - kR)} \frac{\sin(\frac{N}{2}\Delta\varphi)}{\sin(\frac{1}{2}\Delta\varphi)} = A(\vartheta) e^{i(\omega t - kR)} \quad (4)$$

Diffracted Electric Field:

$$\mathcal{E}(\theta) = a \cdot e^{i(\omega t - kR)} \frac{\sin(\frac{N}{2}\Delta\varphi)}{\sin(\frac{1}{2}\Delta\varphi)} = a \cdot \cos(\omega t - kR) \frac{\sin(\frac{N}{2}\Delta\varphi)}{\sin(\frac{1}{2}\Delta\varphi)} = a \cdot \cos(\omega t - kR) \frac{\sin(\frac{N}{2}2\alpha)}{\sin(\frac{1}{2}2\alpha)} \stackrel{\text{linear-coherent}}{=} A_L \frac{D}{R} s \quad (5)$$

where:

$$A_L = \frac{1}{D} \lim_{N \rightarrow \infty} \lim_{A_0 \rightarrow 0} (N \cdot A_0)$$

A_0 = intrinsic Eigen-Amplitude of charge (“Quellstärke”) emitting radiation due to its movement (vibration)

$D = N \cdot d$ = total size of object (binded charges)

d = distance between objects (charges)

r = distance from object (charge) location to impact place = ray length

$R = r_{N/2} = r_1 - \frac{N-1}{2}\Delta s$ = average ray length

N = amount of objects (charges) emitting rays