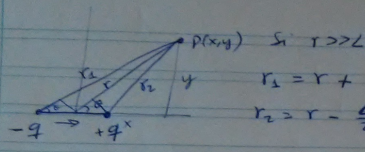


Si $r \gg L$ → puede aproximarse

$$r_1 = r + \frac{L}{2}\cos\alpha \qquad r_2 = r - \frac{L}{2}\cos\alpha \qquad \Big\} \; r_1 - r_2 = L\cos\alpha$$

Caso 2:

$$V(P) = \frac{-kq}{r_1} + \frac{kq}{r_2} = kq\left(\frac{1}{r_2} - \frac{1}{r_1}\right) =$$

$$= kq\left(\frac{r_1 - r_2}{r_2 r_1}\right) \simeq \frac{kqL\cos\alpha}{r^2} =$$

$\cos\alpha = \frac{x}{r}$ , $r^2 = x^2 + y^2$

$$= \frac{kqLx}{r^3} = \frac{kqLx}{(x^2+y^2)^{3/2}}$$

$$\vec{E} = -\vec{\nabla}V = -\frac{\partial V}{\partial x}\vec{i} - \frac{\partial V}{\partial y}\vec{j}$$

$$\frac{\partial V}{\partial x} = kqL\,\frac{(x^2+y^2)^{3/2} - x\frac{3}{2}(x^2+y^2)^{1/2}2x}{(x^2+y^2)^3} = kqL\,\frac{(x^2+y^2) - 3x^2}{(x^2+y^2)^{5/2}} =$$

$$= kqL\,\frac{y^2 - 2x^2}{(x^2+y^2)^{5/2}}$$

$$\frac{\partial V}{\partial y} = kqLx\left(-\frac{3}{2}\right)(x^2+y^2)^{-5/2}2y = -\frac{3kqLxy}{(x^2+y^2)^{5/2}}$$

$$\Rightarrow \vec{E} = \frac{kqL}{(x^2+y^2)^{5/2}}\left((2x^2 - y^2)\vec{i} + 3xy\,\vec{j}\right)$$