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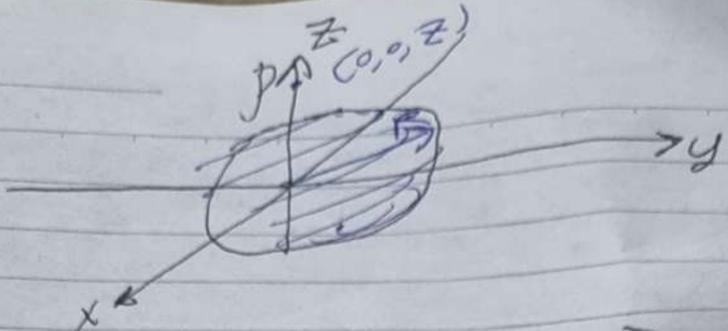

$G(r,\theta) = \langle r\cos\theta, r\sin\theta, 0\rangle$

where $\begin{cases} 0 \le r \le R \\ 0 \le \theta \le 2\pi \end{cases}$

Then, $\vec{n} = G_r \times G_\theta = \langle 0,0,1\rangle$

$\hat{n} = \frac{\vec{n}}{\|\vec{n}\|}$

$$\vec{E} = \iint_S \frac{k\sigma\, dA}{r^2}\hat{r} \quad \text{by def.}$$

$\vec{r} = \langle 0,0,z\rangle - \langle r\cos\theta, r\sin\theta, 0\rangle$

$\vec{r} = \langle -r\cos\theta, -r\sin\theta, z\rangle$

$$\begin{cases} \|\vec{r}\|^2 = r^2+z^2 \\ \hat{r} = \frac{\vec{r}}{\|\vec{r}\|} \end{cases}$$

So, $$\vec{E} = \iint_S \frac{k\sigma}{r^2+z^2}\,\frac{\langle -r\cos\theta, -r\sin\theta, z\rangle}{\sqrt{r^2+z^2}}\, d\underline{A}$$

$$\Rightarrow \|\vec{E}\| = k\sigma \int_0^{2\pi}\int_0^R \frac{\langle -r\cos\theta, -r\sin\theta, z\rangle \cdot \langle 0,0,1\rangle}{(r^2+z^2)^{3/2}}\,\partial r\,\partial\theta$$

$$\|\vec{E}\| = k\sigma(2\pi)\int_0^R \frac{z}{(r^2+z^2)^{3/2}}\,dr$$

$$\|\vec{E}\| = 2\pi\sigma k\left[\frac{R}{z\sqrt{R^2+z^2}}\right] = \frac{2\pi\sigma k R}{z\sqrt{R^2+z^2}}$$

?