Soluciones Guía de Ejercicios Nº 2 FI2A2

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Problema 1.

$$a)\ \overrightarrow{J}(\rho) = -\frac{1}{\rho}\frac{V_0}{\left(\frac{\theta_1}{g_1}+\frac{\theta_2}{g_2}\right)}\hat{\theta};\ \overrightarrow{E}_1(\rho) = -\frac{1}{g_1\rho}\frac{V_0}{\left(\frac{\theta_1}{g_1}+\frac{\theta_2}{g_2}\right)}\hat{\theta};$$

$$\overrightarrow{E}_2(\rho) = -\frac{1}{g_2\rho}\frac{V_0}{\left(\frac{\theta_1}{g_1}+\frac{\theta_2}{g_2}\right)}\hat{\theta};\ R = \frac{\left[\frac{\theta_1}{g_1}+\frac{\theta_2}{g_2}\right]}{(z_2-z_1)\,ln\left(\frac{\rho_2}{\rho_1}\right)}$$

$$b)\ \sigma(\rho) = \frac{V_0}{\rho\left(\frac{\theta_1}{g_1}+\frac{\theta_2}{g_2}\right)}\left(\frac{\varepsilon_2}{g_2}-\frac{\varepsilon_1}{g_1}\right)$$

$$c)\ \sigma(t,\rho) = \sigma(0,\rho)e^{-\lambda t}$$

$$Con\ \sigma(0,\rho) = \frac{V_0}{\rho\left(\frac{\theta_1}{g_1}+\frac{\theta_2}{g_2}\right)}\left(\frac{\varepsilon_2}{g_2}-\frac{\varepsilon_1}{g_1}\right)\ y\ \lambda = \left(\frac{g_1\theta_2+g_2\theta_1}{\varepsilon_1\theta_2+\varepsilon_2\theta_1}\right)$$

Problema 2.

Parte I.

$$a)\ R = \frac{h}{g\pi a^2}$$

$$b)\ t = a\left[\sqrt{1+\frac{g}{4g_c}}-1\right]$$

Parte II.

$$a)\ \begin{cases} \rho < a & \overrightarrow{B}(\rho) = \frac{\mu_0 I_0 \rho}{2\pi a^2}\hat{\theta} \\ a < \rho < b & \overrightarrow{B}(\rho) = \frac{1.6 I_0}{2000\pi\rho + I_0}\hat{\theta} \\ \rho > b & \overrightarrow{B}(\rho) = 0 \end{cases}$$

$$b)\ \begin{cases} \rho < a & \overrightarrow{M}(\rho) = 0 \\ a < \rho < b & \overrightarrow{M}(\rho) = \left[\frac{1.6 I_0}{\mu_0(2000\pi\rho + I_0)} - \frac{I_0}{2\pi\rho}\right]\hat{\theta} \\ \rho > b & \overrightarrow{M}(\rho) = 0 \end{cases}$$

Problema 3.

$$a)\ L = \frac{N^2 A}{\left[\frac{2h}{\mu_0}+\frac{(a+b)\pi(\mu_1+\mu_2)}{2\mu_1\mu_2}\right]}$$

Problema 4.

$$a)\ i.\ \overrightarrow{B}(d) = \frac{\mu_0 I a}{2\left(d^2+a^2\right)^{\frac{3}{2}}}\hat{k}$$

$$ii.\ M = \frac{\mu_0\pi a^2 b^2}{2\left(d^2+a^2\right)^{\frac{3}{2}}}$$

b) La fórmula es general en los casos en que se cumple el teorema de Stokes. Así, su validez se acota a las hipótesis del teorema, respecto de las propiedades de las curvas y superficies del sistema.

Problema 5.

$$a)\ \overrightarrow{B}(0) = -\frac{\mu_0 I}{2a}\left(\frac{1}{\pi} + \frac{1}{2}\right)\hat{k}$$

Evaluando,

$$\parallel \overrightarrow{B}(0) \parallel = 2.06 \cdot 10^{-5}[T]$$

$$b)\ \overrightarrow{B}(0) = \frac{\mu_0 I}{4}\left(\frac{1}{b} - \frac{1}{a}\right)$$

$$c)\ \overrightarrow{B}(z) = \frac{\mu_0 \sigma \omega}{2}\left[\frac{a^2 + 2z^2 - 2 \parallel z \parallel (a^2+z^2)^{\frac{1}{2}}}{(a^2+z^2)^{\frac{1}{2}}}\right]\hat{k}$$

Problema 6.

a) Pendiente.

b)

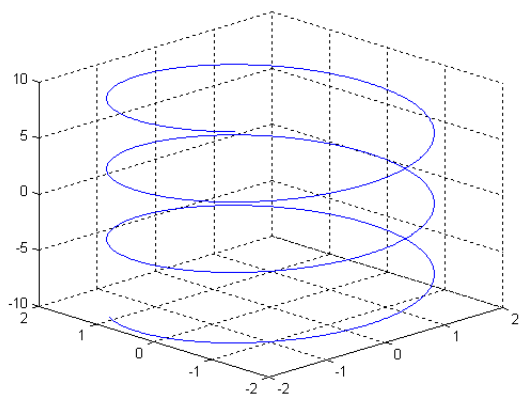

Figura N^o 1.

Problema 7.

$$a)\ \overrightarrow{B} \simeq \frac{\mu_0 I L}{4\pi}\frac{x\hat{j} - y\hat{i}}{(x^2+y^2+z^2)^{\frac{3}{2}}}$$