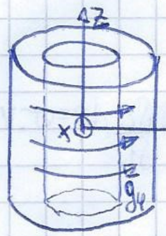
$$\boxed{\bar{B}_1=\mu_0 \cdot \bar{H}_1=\frac{\mu_0 \cdot I r}{2\pi a^2}\hat{\varphi}} \quad \boxed{\bar{B}_2=\mu \cdot \bar{H}_2=\frac{\mu \cdot I}{2\pi r}\hat{\varphi}} \quad \boxed{\bar{B}_3=\mu_0 \cdot \bar{H}_3=\mu_0\frac{(I+2\pi b\, g_z)}{2\pi r}\hat{\varphi}}$$

$$\boxed{\bar{M}_1=\bar{M}_3=0} \quad \boxed{\bar{M}_2=\frac{\bar{B}_2}{\mu_0}-\bar{H}_2=\left(\frac{\mu}{\mu_0}-1\right)\frac{I}{2\pi r}\hat{\varphi}} \quad \boxed{\bar{g}_{M_a}=\bar{M}_2\Big|_{r=a}\times(-\hat{r})=\left(\frac{\mu}{\mu_0}-1\right)\frac{I}{2\pi a}\hat{z}} \quad \boxed{\bar{g}_{M_b}=-\left(\frac{\mu}{\mu_0}-1\right)\frac{I}{2\pi b}\hat{z}}$$

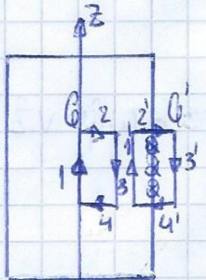
$\hat{\varphi}$:



Haciendo una reflexión en el plano x-y sale que: $\bar{H}=H(r)\cdot\hat{z}$

En el eje de un solenoide de longitud l y radio b se tiene: $\bar{H}=\frac{g_\varphi}{2}\left[\frac{l/2-z}{\sqrt{(l/2-z)^2+b^2}}+\frac{l/2+z}{\sqrt{(l/2+z)^2+b^2}}\right]\hat{z}$

$l\to\infty \Rightarrow \bar{H}_{eje}=g_\varphi\cdot\hat{z}$



$$\oint_C \bar{H}\cdot d\bar{l}=I_{enc}=0 \qquad \int_{C_1}\bar{H}\cdot d\bar{l}_1+\underbrace{\int_{C_2}\bar{H}\cdot d\bar{l}_2}_{0}+\int_{C_3}\bar{H}\cdot d\bar{l}_3+\underbrace{\int_{C_4}\bar{H}\cdot d\bar{l}_4}_{0}=H_{eje}\Delta z-H_{int}\Delta z=0$$

$$\Rightarrow \boxed{\bar{H}_{int}=g_\varphi\hat{z}} \qquad \oint_{C'}\bar{H}\cdot d\bar{l}=I_{enc}=\cancel{g_\varphi\cdot\Delta z}=\cancel{H_{int}\Delta z}-H_{ext}\cdot\Delta z \Rightarrow \boxed{H_{ext}=0}$$

$$\boxed{\bar{H}_1=\bar{H}_2=g_\varphi\cdot\hat{z}} \quad \boxed{\bar{H}_3=0} \quad \boxed{\bar{B}_1=\mu_0\bar{H}_1=\mu_0\cdot g_\varphi\cdot\hat{z}} \quad \boxed{\bar{B}_2=\mu\cdot\bar{H}_2=\mu\cdot g_\varphi\hat{z}} \quad \boxed{\bar{B}_3=0}$$

$$\boxed{\bar{M}_1=\bar{M}_3=0} \quad \boxed{\bar{M}_2=\frac{\bar{B}_2}{\mu_0}-\bar{H}_2=\left(\frac{\mu}{\mu_0}-1\right)g_\varphi\cdot\hat{z}} \quad \boxed{\bar{g}_{M_a}=-\left(\frac{\mu}{\mu_0}-1\right)g_\varphi\cdot\hat{\varphi}} \quad \boxed{\bar{g}_{M_b}=\left(\frac{\mu}{\mu_0}-1\right)g_\varphi\cdot\hat{\varphi}}$$

Juntando todo: $\boxed{\bar{B}_1=\mu_0\cdot\left(\frac{I r}{2\pi a^2}\hat{\varphi}+g_\varphi\cdot\hat{z}\right)}$ $\boxed{\bar{B}_2=\mu\left(\frac{I}{2\pi r}\hat{\varphi}+g_\varphi\cdot\hat{z}\right)}$ $\boxed{\bar{B}_3=\mu_0\cdot\frac{(I+2\pi b g_z)}{2\pi r}\hat{\varphi}}$

$$\boxed{\bar{H}_1=\frac{I r}{2\pi a^2}\hat{\varphi}+g_\varphi\hat{z}} \quad \boxed{\bar{H}_2=\frac{I}{2\pi r}\hat{\varphi}+g_\varphi\hat{z}} \quad \boxed{\bar{H}_3=\frac{I+2\pi b g_z}{2\pi r}\cdot\hat{\varphi}} \quad \boxed{\bar{M}_1=\bar{M}_3=0} \quad \boxed{\bar{M}_2=\left(\frac{\mu}{\mu_0}-1\right)\left(\frac{I}{2\pi r}\hat{\varphi}+g_\varphi\hat{z}\right)}$$

$$\boxed{\bar{g}_{M_a}=\left(\frac{\mu}{\mu_0}-1\right)\left(\frac{I}{2\pi a}\hat{z}-g_\varphi\hat{\varphi}\right)} \quad \boxed{\bar{g}_{M_b}=\left(\frac{\mu}{\mu_0}-1\right)\left(\frac{-I\hat{z}}{2\pi b}+g_\varphi\cdot\hat{\varphi}\right)}$$

c) Los campos y las velocidades son tangenciales a la superficie cargada en todo punto de la misma. Luego, la fuerza en cada punto debe tener la forma $\bar{F}=F\cdot\hat{r}$ ($\propto \bar{v}\times\bar{B}$). Entonces, por simetría de rotación: $\boxed{F_{neta}=0}$

d) $I+2\pi b g_z=0 \Rightarrow g_z=-\frac{I}{2\pi b}=\sigma\cdot v$ $\quad\boxed{v=-\frac{I}{2\pi b\sigma}}$ No hay restricciones sobre $\bar{\omega}$.