Magnetismo

CM por Integración Directa

Ley de Biot-Savart	$\overline{B}(\overline{r}) = \frac{\mu_0 i}{4\pi}\oint_C d\overline{r'} \wedge \frac{\overline{r}-\overline{r'}}{\left\|\overline{r}-\overline{r'}\right\|^3}$
Permitividad Magnética del Vacío	$\mu_0 = 4\pi\, 10^{-7} \quad \left[\frac{T\,m}{A}\right]$

★ Alambre

CM - Alambre	$\overline{B}(r,z) = \frac{\mu_0 i}{4\pi r}\widehat{\varphi}\left(\frac{-(z-z_2)}{\left[r^2+(z-z_2)^2\right]^{\frac{1}{2}}} + \frac{(z-z_1)}{\left[r^2+(z-z_1)^2\right]^{\frac{1}{2}}}\right)$
CM - Alambre Infinito	$\overline{B}(r) = \frac{\mu_0 i}{2\pi r}\widehat{\varphi}$
CM - Alambre Semiinfinito	$\overline{B}(r,z) = \frac{\mu_0 i}{4\pi r}\widehat{\varphi}\left(1 + \frac{z}{\left[r^2+z^2\right]^{\frac{1}{2}}}\right)$

★ Espira

CM - Espira Circular	$\overline{B}(z) = \frac{\mu_0 i R^2}{2\left[z^2+R^2\right]^{\frac{3}{2}}}\widehat{k}$
CM - Espira Circular $z \gg R$	$\overline{B}(z) \sim \frac{1}{\left\|z\right\|^3}$
CM - Espira Circular $z = 0$	$\overline{B}(z) = \frac{\mu_0 i}{2R}\widehat{k}$

★ Semiespira

CM - Semiespira Circular	$\overline{B}(z) = \frac{\mu_0 i R}{4\pi\left[z^2+R^2\right]^{\frac{3}{2}}}\left(2z\,\widehat{j} + R\pi\,\widehat{k}\right)$
CM - Semiespira Circular $z = 0$	$\overline{B}(z) = \frac{\mu_0 i}{4R}\widehat{k}$

★ Solenoide

Solenoide Ideal	$p \ll R$
Densidad de Espiras	$n = \frac{N}{L}$
Nro de Espiras Diferencial	$dN = n\,dz'$
CM Diferencial - Solenoide	$d\overline{B}(z) = \frac{\mu_0 n i R^2}{2}\cdot\frac{dz'}{\left[(z-z')^2+R^2\right]^{\frac{3}{2}}}\widehat{k}$
CM - Solenoide	$\overline{B}(z) = \frac{\mu_0 n i}{2}\left(\frac{z+\frac{L}{2}}{\sqrt{\left(z+\frac{L}{2}\right)^2+R^2}} - \frac{z-\frac{L}{2}}{\sqrt{\left(z-\frac{L}{2}\right)^2+R^2}}\right)\widehat{k}$
CM - Solenoide	$\overline{B}(z) = \frac{\mu_0 n i}{2}\left(cos(\theta_1) + cos(\theta_2)\right)\widehat{k}$
CM - Solenoide Infinito $L \gg R$	$\overline{B}(z) = \mu_0 n i\,\widehat{k}$