

MAGNETISMO



- polos iguais se repelem, opostos atraem
- inseparabilidade dos polos
- magnetizar: alinha imãs elementares

MATERIAIS FERROMAGNÉTICOS: magnetizam-se no mesmo sentido do campo

ex: ferro, níquel, cobalto, aços

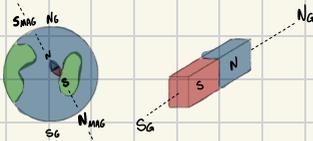
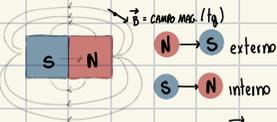
MATERIAIS PARAMAGNÉTICOS: iguais aos ferros porém

fracos ex: Alumínio, cálcio, oxigênio, platina

DIAMAGNÉTICOS: sentido contrário do campo

ex: água, cobre, prata, ouro

↳ "repulsão"



eletromagnetismo

direção? NÃO DIRETA

corrente induz campo magnético: \vec{B} (T)



- solenóide
- enrolado

$$\vec{B} = \mu_0 \frac{i}{2\pi d} \quad \mu_0 = 4\pi \cdot 10^{-7} \frac{T \cdot m}{A}$$

VFSC:



ON a figura 1 está representando

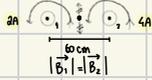
correlamente as linhas de \vec{B}

Q2. \vec{E} deve ter a mesma direção da

corrente

$$\alpha \frac{B}{r} = \frac{4\pi \cdot 10^{-7} \cdot 1}{2\pi \cdot 1} = 2 \cdot 10^{-7} T$$

ex 2:



$$\mu_0 \frac{i}{2\pi d} = \mu_0 \frac{i}{2\pi d} \\ \frac{i}{60 \cdot 10^{-2}} = \frac{i}{60 \cdot 10^{-2}} \therefore \alpha = 20$$

espira circular

anti-horário



horário



$$\vec{B}_{espira} = \mu_0 \frac{i}{2d}$$

US:



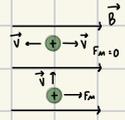
$$R_2 = 5R_1 \therefore \vec{B}_1 = \vec{B}_2 \Rightarrow i_2 = 5i_1 \\ K \cdot i_1 = K \cdot i_2 \Rightarrow \frac{i_1}{d_1} = \frac{i_2}{d_2} \therefore \frac{i_2}{i_1} = 5$$

dentro do solenóide $\vec{B} = \text{UNIFORME}$

Solenóide

$$4\pi \cdot 10^{-7} A^2 \cdot 10^{-3} \\ B_{sa} = \mu_0 \cdot i \cdot \frac{N}{L} \quad \mu_0 = 4\pi \cdot 10^{-7}$$

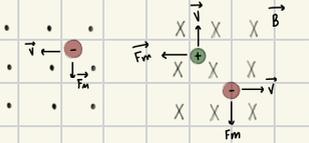
FAÇA MAGNÉTICA



$v = 0$ (repouso) não há manifestação magnética

$$F_m \neq 0 \Rightarrow v \neq 0 \\ \vec{F}_m = |q| \cdot \vec{B} \cdot v \cdot \sin \theta \\ F_m \perp \vec{B} \text{ e } \vec{v}$$

$\vec{v} \parallel \vec{B}$	$\vec{v} \perp \vec{B}$
$F_m = 0$	$F_m = F_{ant}$
M.R.U	M.C.U



para onde aponta F_m ?

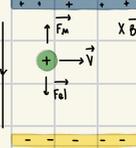
MÃO DIREITA: dedão = \vec{v} ; dedos = \vec{B} ; palma = $+q$; costas = $-q$

MÃO ESQUERDA: dedão = \vec{F}_m + UNHA = ENFE; Indicador = \vec{B} ; meio = \vec{v}

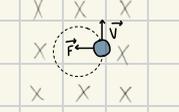
$$\vec{v} \perp \vec{B} \Rightarrow \text{M.C.U.} \Rightarrow \vec{F}_{mag} = F_c$$

EX 1:

$$F = 3 \cdot 10^{-6} \cdot 2 \cdot 10^3 \cdot \sin 30^\circ \\ F = 15 \cdot 10^{-3} = 15 \text{ mN}$$



$$F_m = F_e L \\ q \cdot B \cdot v \cdot \sin 90^\circ = q \cdot E \\ v = E/B$$



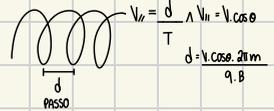
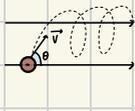
$$\vec{F}_c = \frac{m \cdot v^2}{r} = q \cdot B \cdot v \cdot \sin 90^\circ$$

EX:

$$R = \frac{1,5 \cdot 10^{-25}}{1,6 \cdot 10^{-19} \cdot 0,10^{-1}} \\ \frac{23 \cdot 0,1 \cdot 10^{-21}}{12,8 \cdot 10^{-10}} = 18 \text{ cm}$$

$\theta \neq 0^\circ \neq 90^\circ \neq 180^\circ$

movimento helicoidal Uniforme



$$v_z = \frac{d}{T} \quad v_{\perp} = v \cdot \cos \theta \\ d = v \cdot \cos \theta \cdot \frac{2\pi m}{q \cdot B}$$