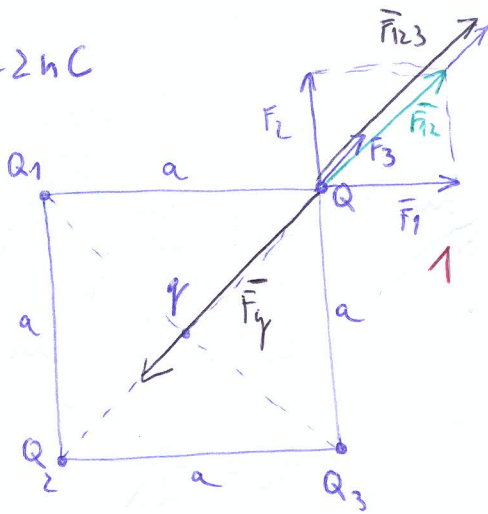


①

$$Q = 2 \text{ nC}$$



$$F_{123} = F_q$$

$$\frac{1}{4\pi\epsilon_0} \frac{Q^2}{a^2} \left(\frac{1}{2} + \sqrt{2} \right) = \frac{1}{4\pi\epsilon_0} \frac{Q|q|}{\left(\frac{a^2+a^2}{2} \right)^2} \quad 1$$

$$\frac{Q}{a^2} \left(\frac{1}{2} + \sqrt{2} \right) = \frac{|q|}{a^2+a^2}$$

$$\frac{Q}{a^2} \left(\frac{1}{2} + \sqrt{2} \right) = \frac{|q|}{2a^2}$$

$$Q \left(\frac{1}{2} + \sqrt{2} \right) = 2|q|$$

$$|q| = \left(\frac{1}{4} + \frac{\sqrt{2}}{2} \right) Q$$

$$|q| = 0,957Q$$

$$q = -0,957Q$$

$$q = -0,957 \cdot 2 \text{ nC} = -1,914 \text{ nC}$$

1

$$F = \frac{1}{4\pi\epsilon_0} \frac{q_1 q_2}{r^2} ; Q_1 = Q_2 = Q_3$$

$$F_1 = \frac{1}{4\pi\epsilon_0} \frac{QQ}{a^2}$$

$$F_2 = \frac{1}{4\pi\epsilon_0} \frac{QQ}{a^2}$$

$$F_{12} = \sqrt{F_1^2 + F_2^2} = \sqrt{\left(\frac{1}{4\pi\epsilon_0} \frac{Q^2}{a^2} \right)^2 + \left(\frac{1}{4\pi\epsilon_0} \frac{Q^2}{a^2} \right)^2} =$$

$$= \sqrt{2} \frac{1}{4\pi\epsilon_0} \frac{Q^2}{a^2} \quad 1$$

$$F_3 = \frac{1}{4\pi\epsilon_0} \frac{QQ}{(a^2+a^2)} = \frac{1}{4\pi\epsilon_0} \frac{Q^2}{2a^2}$$

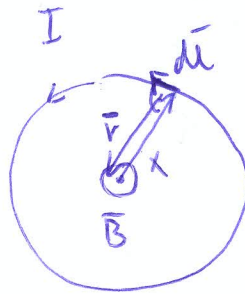
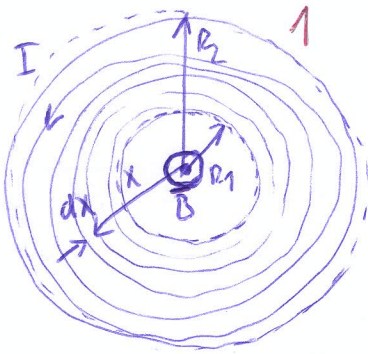
$$F_{123} = F_{12} + F_3 = \frac{1}{4\pi\epsilon_0} \frac{Q^2}{2a^2} + \sqrt{2} \frac{1}{4\pi\epsilon_0} \frac{Q^2}{a^2} =$$

$$= \frac{1}{4\pi\epsilon_0} \frac{Q^2}{a^2} \left(\frac{1}{2} + \sqrt{2} \right) \quad 1$$

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②

N_1, R_1, R_2, I



$$\vec{B} = \frac{\mu_0 I}{4\pi} \int \frac{d\vec{l} \times \vec{r}}{r^3}$$

$$B_0 = \frac{\mu_0 I}{4\pi} \int \frac{dl \sin 90^\circ}{x^2}$$

$$B_0 = \frac{\mu_0 I}{4\pi x^2} \int_0^{2\pi x} dl = \frac{\mu_0 I}{2x}$$

$$dB = B_0 dN$$

$$dB = \frac{\mu_0 I}{2x} dN$$

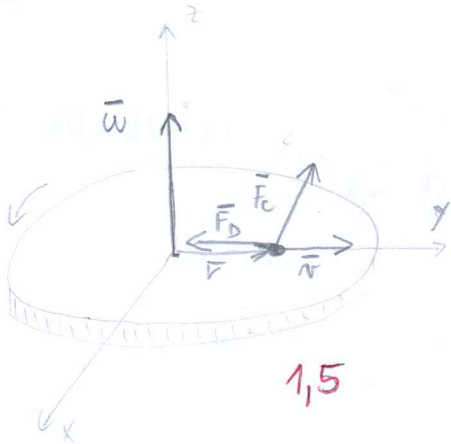
$$= \frac{\mu_0 I}{2x} g dx$$

$$= \frac{\mu_0 I}{2x} \frac{N}{R_2 - R_1} dx$$

$$B = \int_{R_1}^{R_2} dB = \int_{R_1}^{R_2} \frac{\mu_0 I}{2x} \frac{N}{R_2 - R_1} dx = \frac{\mu_0 I N}{2(R_2 - R_1)} \int_{R_1}^{R_2} \frac{1}{x} dx = \frac{\mu_0 I N}{2(R_2 - R_1)} \ln \frac{R_2}{R_1}$$

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3



OTEC

Coriolisova: $\vec{F}_c = (2 \vec{\omega} \times \vec{v}) m$

Dostředivá: $\vec{F}_b = (-\omega^2 \vec{r}) m$

VY: 0,5

Coriolisova: $\vec{F}_c = (-2 \vec{\omega} \times \vec{v}) m$ 0,5

odstředivá: $\vec{F}_b = (\omega^2 \vec{r}) m$ 0,5 2,5

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