

task_ddjurcpk494go2q1_with_calculation

Student Group

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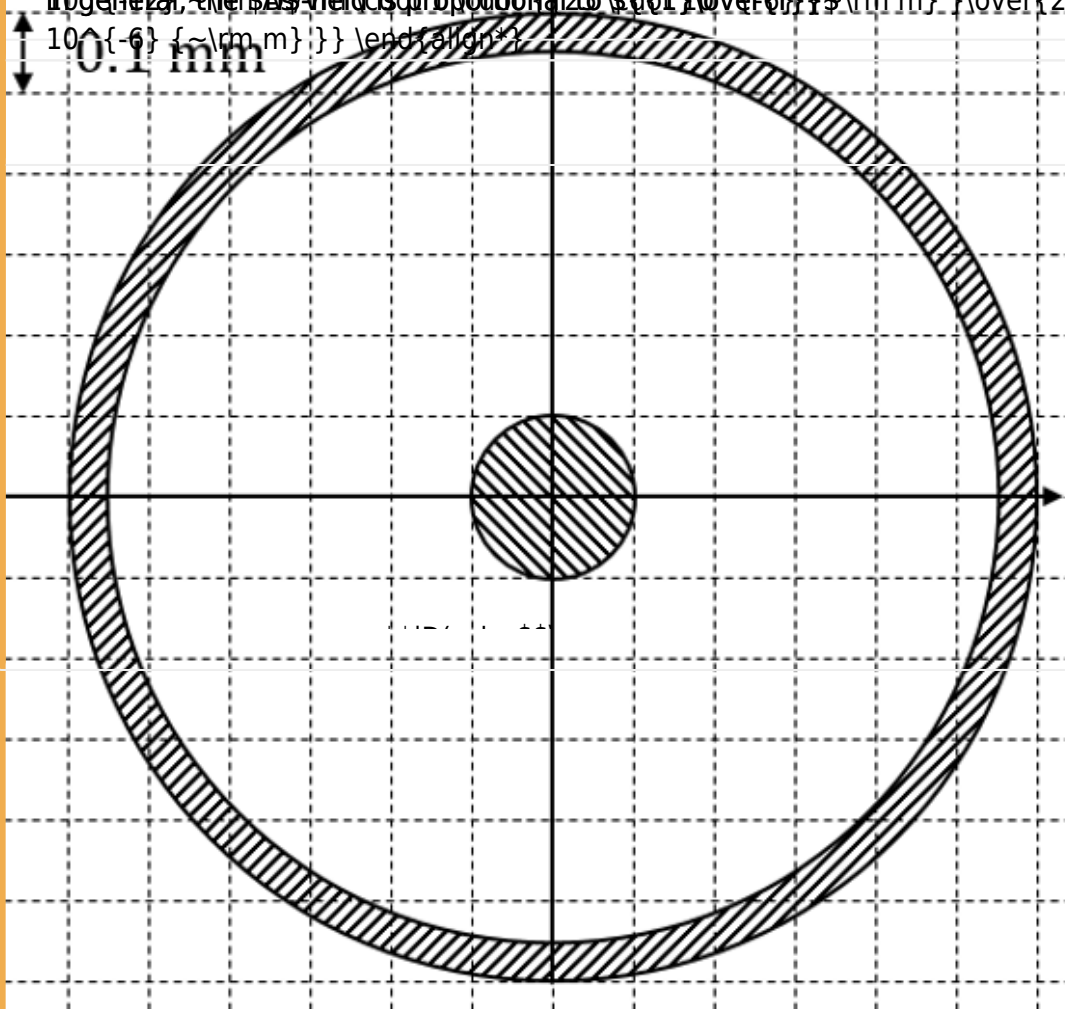
electric field, magnetic field, exam ee2 SS2024

Exercise E1 Capacitor**(written test, approx. 12 % of a 120-minute written test, SS2024)**

2. With the graph of the magnitude of $B(r)$ with parameters B_0 of the diagram 4.06 shows the cross-section of a coaxial cable with (0.6 mm | 0) as center of the cable. Describe dimensions and label the diagram.

- Path
- Inner conductor: $+3.3 \text{ mA}$, $+10 \text{ nC}$ (current into the plane of the diagram)
 - Outer conductor: -3.3 mA , 0 nC (current out of the plane of diagram)
 - $H_{\text{r0}} = 0.955 \dots \text{ A/m}$

$C = \epsilon_0 \epsilon_r \frac{A}{d} \parallel = 8.854 \cdot 10^{-12} \frac{\text{F}}{\text{m}} \cdot 10 \cdot 10^{-6} \frac{\text{m}}{\text{m}} = 8.854 \cdot 10^{-17} \text{ F}$



... What is the magnitude of the magnetic field strength B at $(-0.1 \text{ mm} | 0)$ and $(0.55 \text{ mm} | 0)$?

Path

The magnitude of the magnetic field strength H can be calculated by: $H = \frac{I}{2 \pi \cdot r}$
 So:

$$\begin{aligned} H_{\text{i}} &= \frac{I}{2 \pi \cdot r_{\text{i}}} \quad \&= \quad \frac{+3.3 \text{ A}}{2 \pi \cdot \{0.1 \cdot 10^{-3} \text{ m}\}} \quad \& H_{\text{o}} &= \frac{I}{2 \pi \cdot r_{\text{o}}} \quad \&= \quad \frac{+3.3 \text{ A}}{2 \pi \cdot \{0.55 \cdot 10^{-3} \text{ m}\}} \end{aligned}$$

Hint: For the direction, one has to consider the right-hand rule. By this, we get that the H -field on the right side points downwards.

Therefore, the sign of the H -field is negative.

But here, only the magnitude was questioned!

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