

Examination in Applied Electromagnetism 071025

All examination aids except those which provide contact with the outer world are allowed.

If numeric values are needed but not given, you may assume reasonable numbers!

1

If three capacitors of the same type are coupled in series the energy needed to charge them to voltage U is W . What is the energy needed to charge to voltage U them if they are coupled parallel?

Explain the possible difference with the help of the field energy.

2

Two equally charged long wires (not point charges) are placed parallel to the z -axis through the points $(0, 10, 0)$ mm and $(0, -10, 0)$ mm respectively. At what point along the x -axis is the field strongest?

3

A water molecule with dipole moment 6×10^{-30} Cm is placed in a homogenous electrical field of 2500 V/m. The dipole can orient itself freely. How is the total field affected by the dipole at distance 0.1 μ m from the dipole

a/ along the dipole

b/ perpendicular to the dipole

Both the magnitude of the change and if it increases or decreases the field should be stated.

4

In an IR-emitter a current of 1,2 A is passing a filament made from a material with resistivity 135 Ω mm²/m. The filament is 3mm long and has cylindrical symmetry and the radius is given by

$$r = \left(1 + \frac{|z|}{2mm} \right)^{1/2} \cdot 0,3mm \quad -1,5mm < z < 1,5mm$$

What is the voltage over the filament?

5-6

In the old type of TV electrons are accelerated over a voltage of 5 kV (order of magnitude) and are directed with magnets. Will orientation of the TV relative to the earth magnetic field affect the position of the image in an observable way?

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