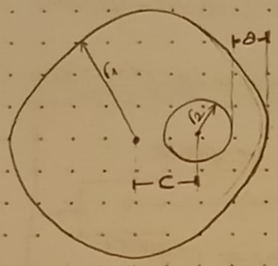


$r_1 = 8.00\,cm \quad r_2 = 1.75\,cm$
$a = 1.00\,cm \quad U = 25\,kV$

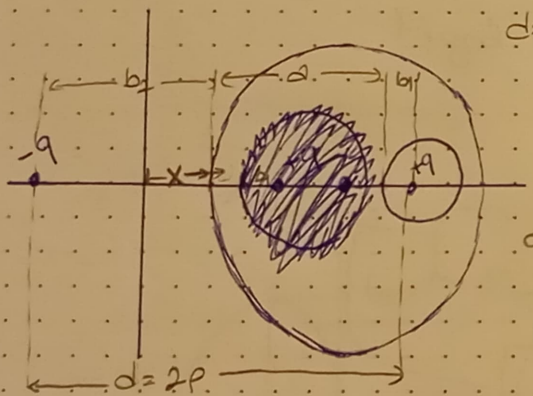
$m = (c^2 - r_1^2 - r_2^2)^2 - 4 r_1^2 \cdot r_2^2$

$c = r_1 - a - r_2 = 5.25\,cm$

$m = 776.25\,cm \quad \sqrt{m} = 27.86$

$$b_1 = \frac{2 r_1 \cdot c - (r_1^2 - r_2^2) + c^2 + \sqrt{m}}{2c} \qquad b_1 = 7.47\,cm$$

$$b_2 = \frac{2 r_2 c - (r_2^2 - r_1^2) + c^2 - \sqrt{m}}{2c} \qquad b_2 = 79.014\,cm$$



$d = a + b_1 + b_2$
$= 87.484$

$p = 43.742\,cm$

$$q = \frac{2\pi\varepsilon}{\ln\left[\frac{a+b_1}{b_2} \cdot \frac{a+b_2}{b_1}\right]} \cdot U$$

$$q = \frac{2\pi \cdot 8.854 \times 10^{-12} \cdot 25 \cdot 10^3}{\ln\left(\frac{1+7.47}{79.014} \cdot \frac{1+79.014}{7.47}\right)} = 10058{,}45 \times 10^{-9}\ C/m$$

0.1382

$$C = \frac{q}{U} = 402{,}338 \times 10^{-12}\ F/m$$

$$\eta = \frac{a}{a} \qquad a = \frac{U}{E_{max}}$$

$$E_{max} = \frac{U}{\ln\left[\frac{a+b_1}{b_2} \cdot \frac{a+b_2}{b_1}\right]} \cdot \frac{2p}{p^2 - x^2}$$

$x = p - b_1$

$$E_{min} = \frac{U}{\ln\left[\frac{a+b_1}{b_2} \cdot \frac{a+b_2}{b_1}\right]} \cdot \frac{2}{p} \qquad x = 0$$

$$E_{max} = 180.89 \times 10^3 \cdot \frac{2 \cdot 43.742}{\left(2 \cdot \underbrace{43.742}_{p} - \underbrace{7.47}_{b_1}\right) \cdot 7.47}$$

$E_{max} = 26.476 \times 10^3\ V/m$

$E_{min} = 8.2707\ V/cm$

$a = 0{,}944\,cm \qquad \eta = 0{,}944$

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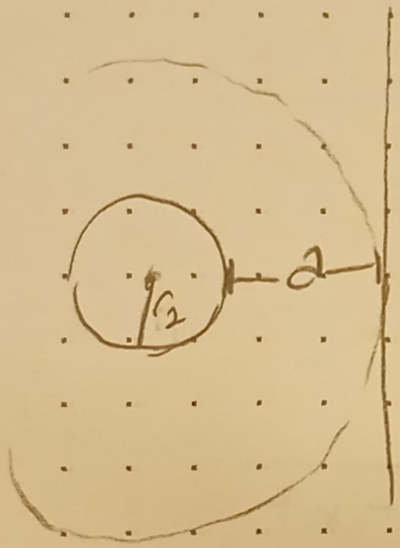
Approximation



$$E_{max} = k \cdot \frac{2.5k}{r_2 \cdot \ln \frac{r_2 + d}{r_2}} \qquad k \cong 1$$

$$\frac{2.5k}{1.75 \cdot \ln \frac{2.75}{1.75}} = 31,6 \times 10^3 \text{ V/cm}$$

$\ln \frac{2.75}{1.75} \rightarrow 0,4519$

$1.75 \cdot 0,4519 \rightarrow 0,79097$

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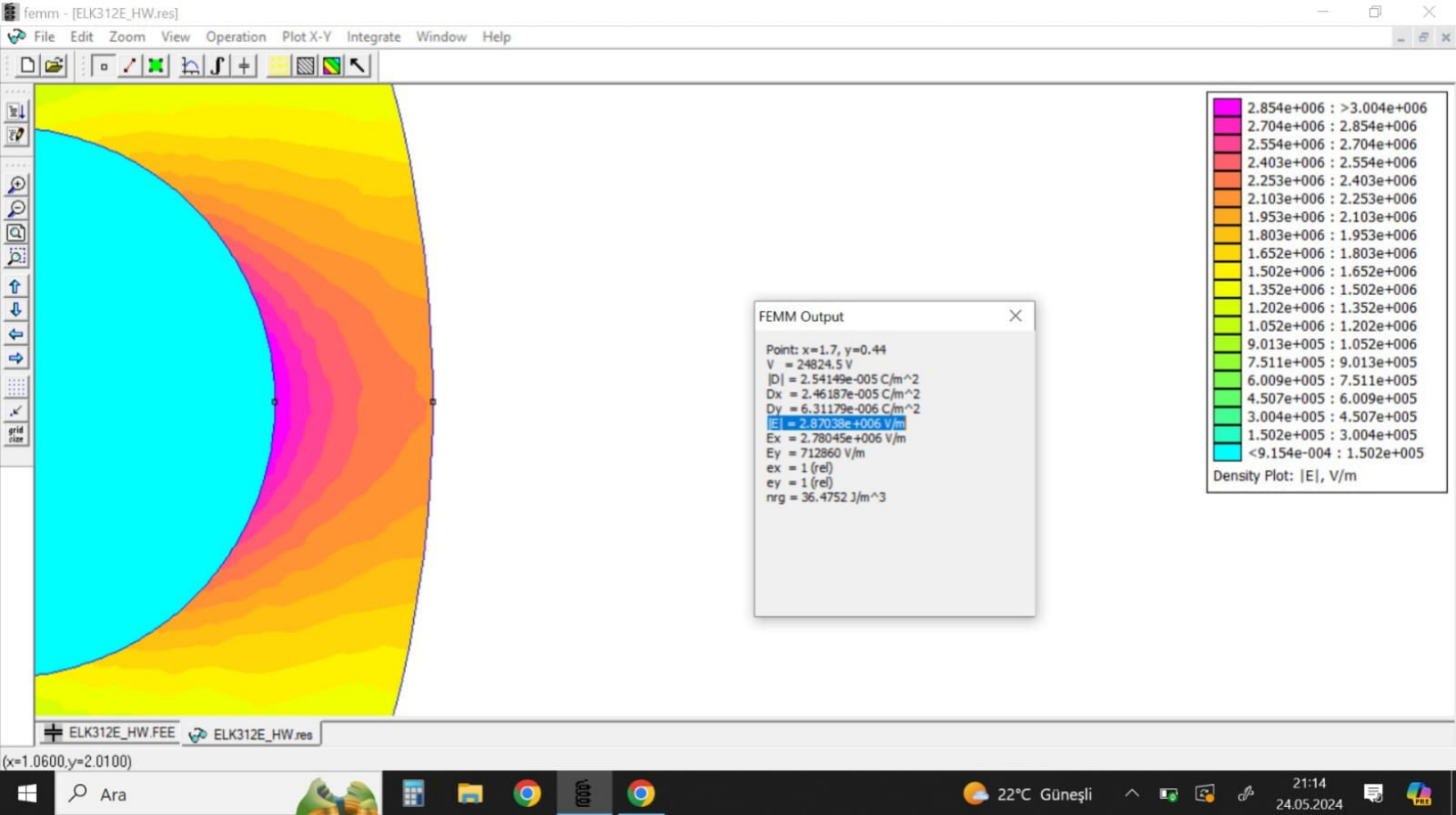
femm - [ELK312E_HW.res]
File Edit Zoom View Operation Plot X-Y Integrate Window Help
2.854e+006 : >3.004e+006
2.704e+006 : 2.854e+006
2.554e+006 : 2.704e+006
2.403e+006 : 2.554e+006
2.253e+006 : 2.403e+006
2.103e+006 : 2.253e+006
1.953e+006 : 2.103e+006
1.803e+006 : 1.953e+006
1.652e+006 : 1.803e+006
1.502e+006 : 1.652e+006
1.352e+006 : 1.502e+006
1.202e+006 : 1.352e+006
1.052e+006 : 1.202e+006
9.013e+005 : 1.052e+006
7.511e+005 : 9.013e+005
6.009e+005 : 7.511e+005
4.507e+005 : 6.009e+005
3.004e+005 : 4.507e+005
1.502e+005 : 3.004e+005
<9.154e-004 : 1.502e+005
Density Plot: |E|, V/m
FEMM Output
Point: x=1.7, y=0.44
V = 24824.5 V
|D| = 2.54149e-005 C/m^2
Dx = 2.46187e-005 C/m^2
Dy = 6.31179e-006 C/m^2
|E| = 2.87038e+006 V/m
Ex = 2.78045e+006 V/m
Ey = 712860 V/m
ex = 1 (rel)
ey = 1 (rel)
nrg = 36.4752 J/m^3
ELK312E_HW.FEE
ELK312E_HW.res
(x=1.0600,y=2.0100)
Ara
22°C Güneşli
21:14
24.05.2024