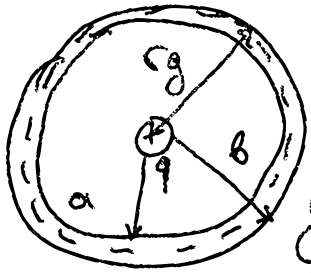
23.49 H.R. ed. 83 $q = 45FC$

$a = 2cm$

$b = 2,4cm$ Aj



$\rho = \frac{A}{r}$ $\quad a < r_g < b$

$\oint \vec{E} \cdot d\vec{S} = \frac{q_{ol}}{\varepsilon_0}$

$q_{ol} = q + q_1$ $\quad V = \frac{4}{3}\pi r^3$

$q_1 = \int \rho \cdot dV$ $\quad \frac{dV}{dr} = 4\pi r^2 \Rightarrow dV = 4\pi r^2 \cdot dr$

$q_1 = \int \frac{A}{r} 4\pi r^2 \cdot dr \Rightarrow q_1 = \int A 4\pi r \, dr \Rightarrow$

$\Rightarrow q_1 = A4\pi \cdot \int_a^{r_g} r \, dr \Rightarrow q_1 = 4\pi A \left[\frac{r^2}{2}\right]_a^{r_g} \Rightarrow$

$\Rightarrow q_1 = 2\pi A \left[r_g^2 - a^2\right]$

$\oint \vec{E} \cdot d\vec{S} = \frac{1}{\varepsilon_0} \cdot [q + q_1] \Rightarrow |E| \cdot 4\pi r_g^2 = \frac{1}{\varepsilon_0} [q +$

$+ 2\pi A \left(r_g^2 - a^2\right)] \Rightarrow$

$E = \frac{1}{4\pi\varepsilon_0 \cdot r_g^2} \left[q + 2\pi A r_g^2 - 2\pi A a^2\right] \Rightarrow$

$E = \frac{1}{4\pi\varepsilon_0} \cdot \left[\frac{q}{r_g^2} + 2\pi A - \frac{2\pi A a^2}{r_g^2}\right]$

$\frac{q}{r_g^2} = \frac{2\pi A a^2}{r_g^2} \Rightarrow A = \frac{q}{2\pi a^2} \Rightarrow A = 1,79 \times 10^{-11} \frac{C}{m^2}$