Ch 22

10. $\lambda = \frac{9.25\times10^{-12}}{1.6\times10^{-2}} = 5.78\times10^{-4}\ C/m$

$dE_x = \frac{k\lambda}{r^2}\cdot dE\cdot\cos\theta$

$dE_x = \frac{\lambda\cdot R}{r^3}\cdot R\cdot dx$

$\frac{\lambda R}{4\pi\varepsilon_0}\left[\frac{dx}{(x^2+(0.06)^2)^{\frac{3}{2}}}\right]$

$E = \int dE_x = \frac{\lambda R}{4\pi\varepsilon_0}\left[\frac{x}{0.06\sqrt{x^2+0.06^2}}\right]_{-0.08}^{0.08} = 13.86\ N/C$

沿着 X 轴方向

13. (a) $\lambda = \frac{-4.23\times10^{-15}C}{8.15\times10^{-2}m} = -5.19\times10^{-14}\ C/m$

(b)

$\frac{\lambda}{4\pi\varepsilon_0}\left(\frac{-1}{x}\right)_a^{L+a}$

$E = \frac{KQ}{(L+a)a}$ 代入，$E = 4.48\times10^{-3}\ N/C$

(c) $\theta = -180°$

(d) 同样 $E' = 1.52\times10^{-8}\ N/C$

(e) $E = k\cdot\frac{q}{r^2}$ $E' = 1.52\times10^{-8}\ N/C$

41. $u = -pE\cos\theta$

$W_a = u_f - u_i = pE(\cos 23 - \cos 180) = 2.668\times10^{-23}\ N\cdot m$

50. $f = \frac{x}{v_0\cdot\cos\theta_0}$ $m = 9.109\times10^{-31}kg$

$v' = v_0\cdot\sin\theta_0 - \frac{E\cdot q}{m}\cdot t$

代入 $\vec{v} = (3.06\times10^6 m/s)\hat{i} + (1.71\times10^6 m/s)\hat{j}$

54.

$$\bar{E} = \frac{\sigma}{2\varepsilon_0}\left(1 - \frac{z}{\sqrt{z^2+R^2}}\right)$$

$$E_m = \frac{\sigma}{2\varepsilon_0}$$

$$0.5 = \left(1 - \frac{8\times10^{-2}\,m}{\sqrt{(8\times10^{-2}\,m)^2+R^2}}\right) \quad \text{解得} \quad \therefore R = 1.385\times10^{-1}\,m.$$

$$= 0.1385\,m.$$

59. 设 $\lambda = \frac{2q}{\pi r}$ $\quad d\bar{E} = k\cdot\frac{\lambda}{r^2}\cdot ds = k\frac{\lambda}{r^2}\cdot r\,d\theta$

$$dE_x = k\cdot\frac{\lambda}{r}\cdot\cos\theta\,d\theta$$

$$d\bar{E}_x = \frac{q}{2\pi^2\varepsilon_0 r^2}\cos\theta\,d\theta$$

$$dE_y = \frac{q}{2\pi^2\varepsilon_0 r^2}\sin\theta\,d\theta$$

$$E_{x\,net} = \frac{1}{2\pi^2\varepsilon_0}\left[\frac{-q_1}{r_1^2}+\frac{q_2}{r_2^2}-\frac{q_3}{r_3^2}\right](-1).$$

$$= 9.16\times10^6\,N/C$$

同理 $E_{y,net} = -9.16\times10^6\,N/C$

$$\therefore \bar{E}_{net} = 1.3\times10^7\,N/C$$

$$\theta = -45^\circ \quad (\text{relative to positive-}X)$$