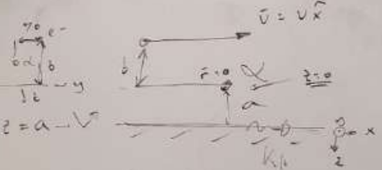


$\boxed{\varepsilon \to \infty}$

$\omega$

$$\phi_0^{ext}(\bar{r},\omega) = -e \int dt\, e^{i\omega t} \frac{1}{|\bar{r} - (\bar{b} + \bar{v}t)|}$$

$$\frac{1}{r} = \int \frac{d\bar{k}_{\parallel}}{2\pi k_{\parallel}} e^{i\bar{k}_{\parallel}\cdot\bar{R} - k_{\parallel}|z|}$$

$$= -e \int dt \int \frac{d\vec{k}_{\parallel}}{2\pi k_{\parallel}} e^{i\omega t} e^{i(k_x(x - vt) + k_y(y - y_0)) - k_{\parallel}|z+b|}$$

$\delta(k_x v - \omega)$

$$= -\frac{e}{v} \int \frac{dk_y}{k_{\parallel}} e^{i(k_x x + k_y(y - y_0)) - k_{\parallel}|z+b|}$$

$k_x = \frac{\omega}{v}$

$\bar{b} = (0, y_0, -b)$

$\bar{R} = (x, y)$

$\bar{k}_{\parallel} = (k_x, k_y)$

$z > -b$

$$\phi^{ext}(\bar{r},\omega) = -\frac{e}{v} \int \frac{dk_y}{k_{\parallel}} e^{i\bar{k}_{\parallel}\cdot\bar{R} - ik_y y_0} \left[ e^{-k_{\parallel}(z+b)} - r_p\, e^{-k_{\parallel}(b+2a-z)} \right]$$

$$\alpha_{eff} = \frac{1}{1/\alpha - G}$$

$$\boxed{\bar{p} = \frac{e\,\alpha_{eff}}{v} \int \frac{dk_y}{k_{\parallel}} e^{-ik_y y_0} \left[ e^{-k_{\parallel}b} (i\bar{k}_{\parallel} - \hat{z}k_{\parallel}) - r_p\, e^{-k_{\parallel}(b+2a)} (i\bar{k}_{\parallel} + k_{\parallel}\hat{z}) \right]}$$

$$\phi_p(\bar{r},\omega) = -\int \frac{d\vec{k}_{\parallel}}{2\pi k_{\parallel}} e^{i\bar{k}_{\parallel}\cdot\bar{R}} \left[ e^{-k_{\parallel}|z|}\, \bar{p}\cdot(i\bar{k}_{\parallel} - \mathrm{sign}(z)\, k_{\parallel}\hat{z}) - r_p\, e^{-k_{\parallel}(2a-z)}\, \bar{p}\cdot(i\bar{k}_{\parallel} - k_{\parallel}\hat{z}) \right]$$


$$\phi_p^{ext} = -\bar{p}\cdot\bar{\nabla}\frac{1}{r}$$

$\bar{p}$ at $\bar{r}=0$

$v_c = c/300$

$a \approx 10$ nm

$E_F \approx 0.5$ eV

$\omega = 0.1 - 0.3$ eV

$v/c = \frac{1}{200}$

$$r_p \approx \frac{k_p}{k_{\parallel} - k_p}$$

$e^{in\varphi_R}$

$$\int_0^{\infty} dk_{\parallel} \frac{J_n(k_{\parallel}R)\, f(k_{\parallel})}{k_{\parallel} - k_p}$$

$$\approx \frac{1}{2} \int_{-\infty}^{\infty} dk_{\parallel} \frac{H_n^{(1)}(k_{\parallel}R) + H_n^{(2)}(k_{\parallel}R)\, f(k_{\parallel})}{k_{\parallel} - k_p} = i\pi H_n^{(1)}(k_p R)\, f(k_p)$$

$\varepsilon \to \infty$

$$r_p = \frac{\varepsilon - 1}{\varepsilon + 1}$$

$B e^{-k_{\parallel}z}$

$\varepsilon$

$z=0$

1

$e^{-k_{\parallel}z} + A e^{k_{\parallel}z}$

$1 + A = B$

$1 - A = \varepsilon B$

$$B = \frac{2}{1+\varepsilon}$$

$$A = \frac{1-\varepsilon}{1+\varepsilon} = -r_p$$