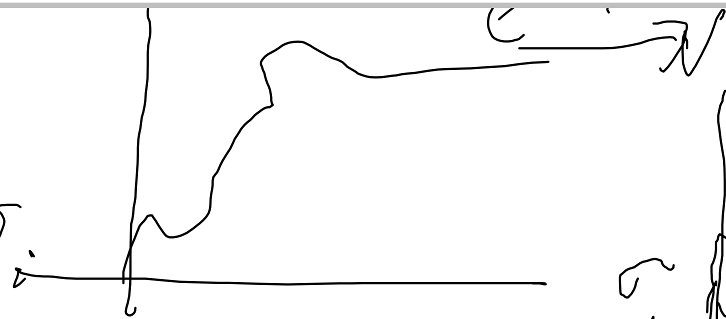
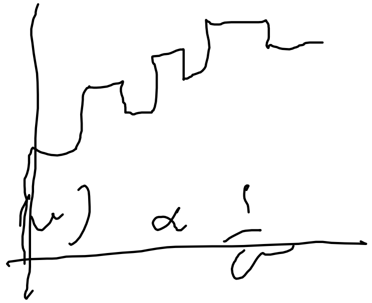
$\sigma_t = \sigma_a + \sigma_{\text{scat}}$

$\frac{1}{\tau_x} = [N\sigma_t]_x \, v$





$\sigma_t(v) \propto \frac{1}{v}$

$\int \frac{|\psi(x)|^2}{\tau v} \, dx = P_{\text{loss/source}}$

$|\psi|^2 \Rightarrow 1$ n/sec/cm

$v|\psi|^2 = ($

$\int [N\sigma]_x |\psi(x)|^2 \, dx$

$$\boxed{P_{obs} = \int_0^\infty [N\sigma(v)]_x \, |\psi(x)|^2 \, dx}$$

$T e^{-\kappa x}$

$$= [N\sigma(v)] \, |T|^2 \int_0^\infty e^{-2\kappa x} \, dx$$

$$\left(\frac{1}{2\kappa}\right) \left|\frac{2k}{k+i\kappa}\right|^2$$

$$\frac{4 \quad 2}{[1+\kappa^2/k^2]} \quad \kappa d$$

$$\psi_I = e^{ikx} + Re^{-ikx} \qquad \psi_{III} = Te^{-\kappa(x-d)}$$

$$\psi_{II} = Ae^{ik'x} + Be^{-ik'x}$$

$$1+R = A+B \qquad \psi_I = \psi_{II}$$

$$1-R = (A-B)\,k'/k$$

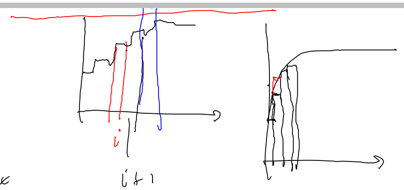
$$Ae^{ik'd} + Be^{-ik'd} = T$$

$$T = 2/D \qquad |\psi_{II}|^2 = (A^2 + B^2)$$

$$(AB^* e^{i2k'x} + BA^* e^{-i2k'x})$$

$$D = \cos k'd + \cdots$$

$e^{i h_0 x} \rightarrow$



$$A_i e^{i h_i x} + B_i e^{-i h_i x} = \psi_i(x)$$

$$i h_i \left(A e^{i h_i x} - B e^{-i h_i x}\right) = \psi_i'(x)$$

$x = 0 \quad x = d_i$

$$\psi_i(0) = A_i + B_i$$

$$\frac{\psi_i'(0)}{i h_i} = A_i - B_i \qquad \psi_i'(0) = i h_i (A_i - B_i)$$

$$2A_i = \psi_i(0) + \psi_i'(0)/i h_i$$

$$2B_i = \text{''} \; - \; \text{''}$$

$$\psi_i(x) = \psi_i(0) \cos h_i x + \frac{\psi_i'(0)}{h_i} \sin h_i x$$

$$\psi_i'(x) = -h_i \psi_i(0) \sin h_i x + \psi_i'(0) \cos h_i x$$

$$\begin{bmatrix} \psi_i(x) \\ \psi_i'(x) \end{bmatrix} = \boxed{\begin{bmatrix} \cos h_i x & \sin h_i x / h_i \\ -h_i \sin h_i x & \cos h_i x \end{bmatrix}} \begin{bmatrix} \psi_i(0) \\ \psi_i'(0) \end{bmatrix}$$

$$\begin{bmatrix} \psi_i(d) \\ \psi_i'(d) \end{bmatrix} = M_i(d) \begin{bmatrix} \psi_i(0) \\ \psi_i'(0) \end{bmatrix}$$

$$M = \dots M_3 M_2 M_1 \begin{bmatrix} 1+R \\ 1-R \end{bmatrix}$$

$$\psi_I = e^{ilx} + R e^{-ilx}$$

$$\psi_I(0) = 1 + R$$

$$\psi_I'(0) = (1-R)\, \underline{i h_0}$$

$T \cancel{e^{i h_f x}}$

$$\psi_{out} = T e^{i h_{out} x}$$

$$\psi_{out}' = i h_0 T$$

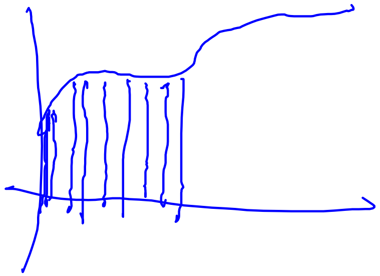
$$\begin{bmatrix} T \\ i h_0 T \end{bmatrix} = M \begin{bmatrix} 1+R \\ (1-R) i h_0 \end{bmatrix} = \begin{bmatrix} A & B \\ C & D \end{bmatrix} \begin{bmatrix} 1+R \\ (1-R) i h_0 \end{bmatrix}$$

$$\left(\frac{\hbar^2}{2m}\right)^{1/2} h_i = \sqrt{E - V_i(1 - i\delta)} \qquad (N\sigma) \int |\psi(x)|^2 \, dx$$

$$\boxed{\text{Lekner - Theory of Reflection 1987}}$$

$$\begin{bmatrix} \psi(x) \\ \psi'(x) \end{bmatrix}$$

$$\begin{bmatrix} \psi_{i+1}(x) \\ \psi'_{i+1} \end{bmatrix} = \underbrace{M_i}_{\text{layer}} \begin{pmatrix} \psi_i(0) \\ \psi'_i(0) \end{pmatrix}$$



$$\psi_i(x) = A_i e^{i k_i x} + B_i e^{-i k_i x}$$

$$\left(\frac{\psi'_i(x)}{i k_i} \right) = A_i e^{i k_i x} - B_i e^{-i k_i x}$$