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function [Es,T]=transfermatrix(interfaces, Vs)

% EXAMPLE: double barrier resonant tunneling:
% interfaces=1e-7*[0 0.5 1.5 2];
% Vs=[0 1 0 1 0];

c=2.998e10;%cm/s
hbar=6.582e-16;%in eV*sec
m=5.11e5/c^2;%in eV/c^2

minE=0.001;
deltaE=0.01;
maxE=5;

Es=(minE:deltaE:maxE);

ii=1;
for E=Es
    kL=sqrt(2*m*(E-Vs(1)))/hbar; k2=kL;

    M=eye(2);
    for jj=1:length(interfaces)

        k1=k2;
        k2=sqrt(2*m*(E-Vs(jj+1)))/hbar;

        A11=(k1+k2)/(2*k1)*exp(i*(k2-k1)*interfaces(jj));
        A12=(k1-k2)/(2*k1)*exp(-i*(k1+k2)*interfaces(jj));
        A21=(k1-k2)/(2*k1)*exp(i*(k1+k2)*interfaces(jj));
        A22=(k1+k2)/(2*k1)*exp(i*(k1-k2)*interfaces(jj));

        M=M*[A11 A12;
            A21 A22];
    end

    T(ii)=k2/kL*(1/M(1,1))'*(1/M(1,1));
    ii=ii+1;
end

plot(Es,T)
xlabel('Energy [eV]')
ylabel('Transmission')

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>> transfermatrix(1e-7*[0 0.5 1.5 2],[0 1 0 1 0])
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