```
clear;

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

dx=0.1e-7; %0.1 nm, in cm

C=hbar^2/(2*m*dx^2);

V=[ zeros(1,5) ones(1,5) zeros(1,10) ones(1,5) zeros(1,5) ];
VR=V(end);
VL=V(1);

N=length(V);

H=C*(diag(2*ones(N,1))-diag(ones(N-1,1),1)-diag(ones(N-1,1),-1))+diag(V);

Es=0.001:0.01:5;
ii=1;
for E=Es
  kR=sqrt(2*m*(E-VR))/hbar;
  kL=sqrt(2*m*(E-VL))/hbar;
  SigmaR= -C*exp(i*kR*dx);
  SigmaL= -C*exp(i*kL*dx);

  Hp=H;
  Hp(1,1)=Hp(1,1)+SigmaL;
  Hp(N,N)=Hp(N,N)+SigmaR;

  q=zeros(N,1);
  q(1,1)=C*(exp(i*kL*dx)-exp(-i*kL*dx));
  psi=(E*eye(N)-Hp)\q;

  T(ii)=imag(SigmaR)/imag(SigmaL)*norm(psi(N))^2;
  ii=ii+1;
end

plot(Es, T,';finite differences;')
ylabel('Transmission')
xlabel('Energy [eV]')
```

wavenumbers

self-energies

Source

Calculate wavefunction

plot