NUCL 510 HMWK 3

1. Mono-Energetic Neutron Beams Crossing
2. Density Distribution Functions of Mono-Energetic Neutrons
   1. Neutron Density
   2. Neutron Flux
   3. Neutron Current
3. Neutron Production uniformly in a spherical chamber
4. Plotting of Energy-Independent S-Wave scattering
   1. 0.025 eV

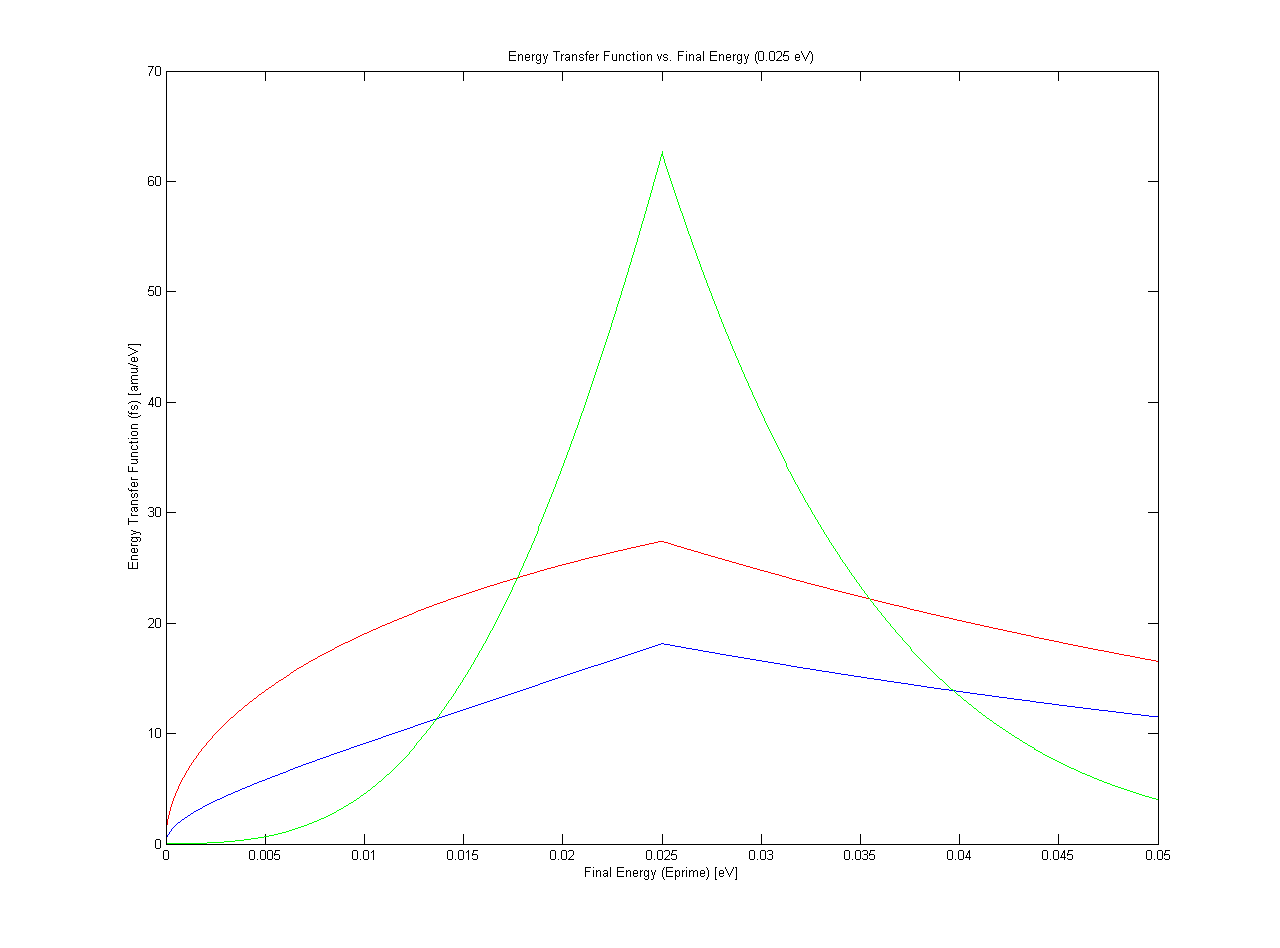


Figure Energy Transfer function vs Final Energy (0.025 eV)

* 1. 10 eV

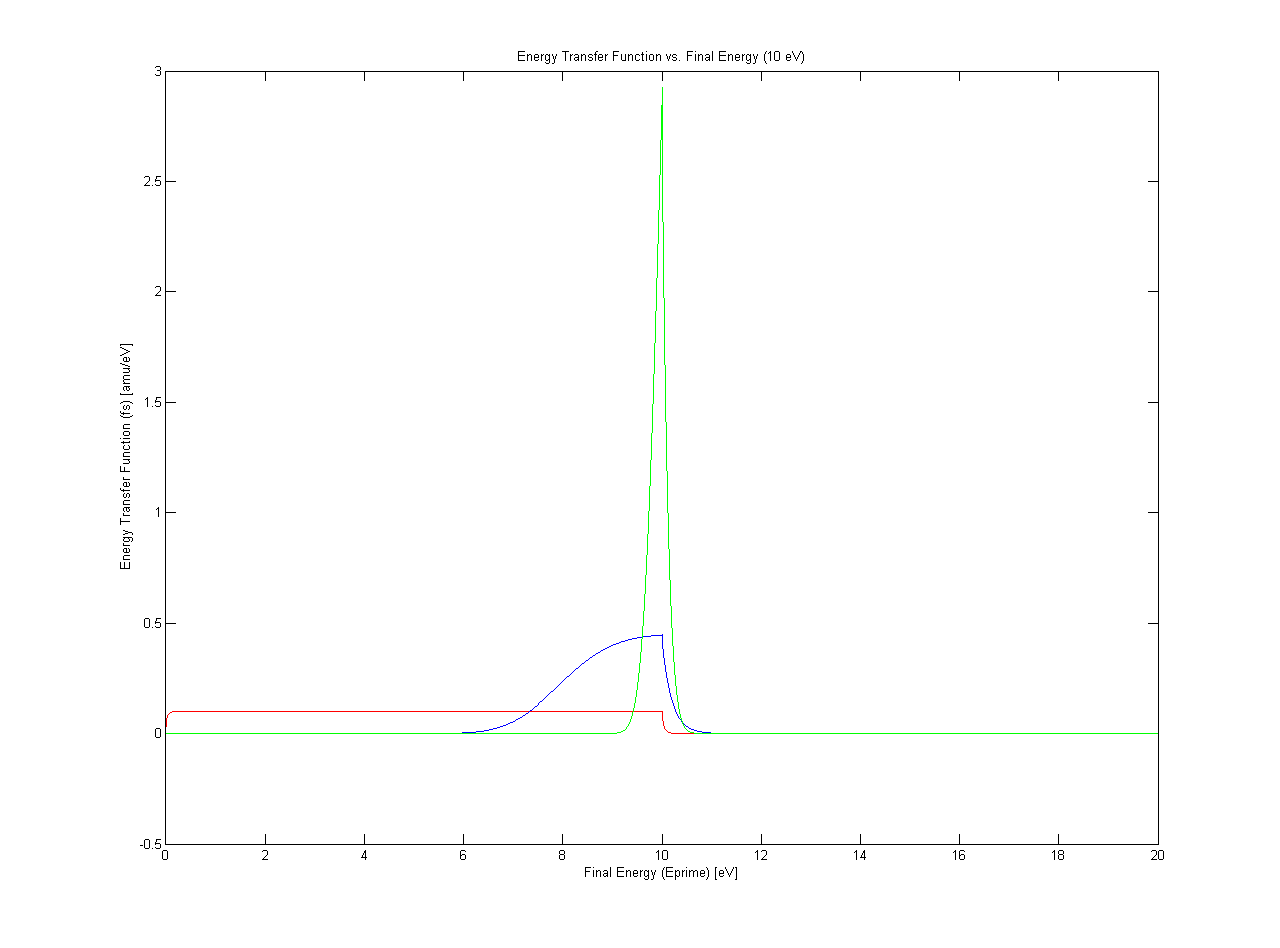


Figure Energy Transfer function vs Final Energy (10 eV)

* 1. 100 eV

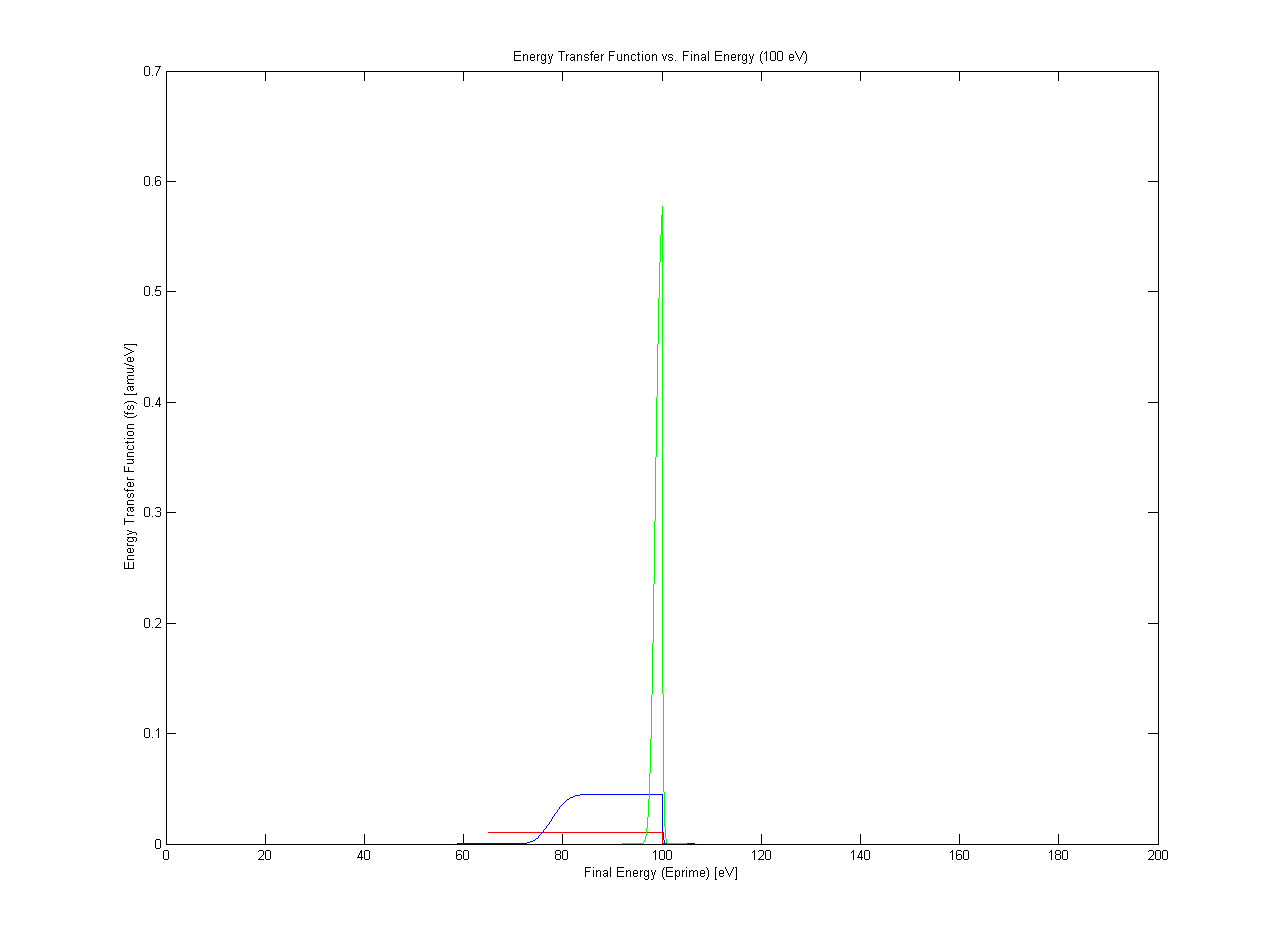


Figure Energy Transfer function vs Final Energy (100 eV)

Code:

function [etfunction,energy]=swavescattering(E,A,T)

res=2\*E/1000;

k=8.6173E-5; %boltzmann's constant in eV/K

T=T+273.15; %conversion to kelvins

etfunctionfirsthalf=[]; %initializing constants

etfunctionsecondhalf=[];

energyfirsthalf=[];

energysecondhalf=[];

eta=((A+1)/(2\*sqrt(A))); %eta and rho from definitions in assignment

rho=(A-1)/(2\*sqrt(A));

for eprime=0:res:E %E'<E case fs calculation (appending to vector to plot)

fs=((eta^2)/(2\*E))\*(erf((eta\*sqrt(eprime/(k\*T)))-rho\*sqrt(E/(k\*T)))+(erf((eta\*sqrt(eprime/(k\*T)))+rho\*sqrt(E/(k\*T))))+exp((E-eprime)/(k\*T))\*(erf((eta\*sqrt(E/(k\*T)))-rho\*sqrt(eprime/(k\*T)))-(erf((eta\*sqrt(E/(k\*T)))+rho\*sqrt(eprime/(k\*T))))));

etfunctionfirsthalf=[etfunctionfirsthalf,fs];

energyfirsthalf=[energyfirsthalf,eprime];

end

for eprime=E:res:2\*E %E'>E case fs calculation (appending to vector to plot)

fs=((eta^2)/(2\*E))\*(erf((eta\*sqrt(eprime/(k\*T)))-rho\*sqrt(E/(k\*T)))-(erf((eta\*sqrt(eprime/(k\*T)))+rho\*sqrt(E/(k\*T))))+exp((E-eprime)/(k\*T))\*(erf((eta\*sqrt(E/(k\*T)))-rho\*sqrt(eprime/(k\*T)))+(erf((eta\*sqrt(E/(k\*T)))+rho\*sqrt(eprime/(k\*T))))));

etfunctionsecondhalf=[etfunctionsecondhalf,fs];

energysecondhalf=[energysecondhalf,eprime];

end

energy = [energyfirsthalf,energysecondhalf]; %concatenating vectors

etfunction = [etfunctionfirsthalf,etfunctionsecondhalf];