

HW5 (due 4/28/2009)

EE230

1. Using the code given at the back of the book reproduce the results shown in Fig 11.2.7.
 - (i) What can you say about the phase breaking and momentum breaking processes from these results?
 - (ii) Will your conclusions be different for a nano scale structure compared to a bulk structure?

You may be able to use the code to produce results that substantiate your arguments.

2. Using the code given at the back of the book, reproduce Fig. 11.3.3.
 - (i) Modify the code to create a 100 nm one dimensional lattice with a 20 nm thick barrier positioned at 40-60 nm. Show the energy current as a function of length.
 - (ii) Plot the power density (as a function of length) defined as $P(z) = -d/dz(J_E)$ where J_E is the energy current density defined in Eq. 11.3.1. What can you conclude from these results?
 - (iii) Now modify the program to create 3 successive tunnel barriers each having a width of 10 nm and separated from each other by 10 nm. Plot the power density as a function of length. Again, what can you conclude from the results?