Problems for week 3 - 2017

(1) Derive Eq. (5.4) in Davies and show that (5.7) follows. Start from the wave function sketched in Figure 5.1 rather than the most general case.

(2) Problem 5.1 in Davies. Hint: start by rewriting Eq. (5.5) in terms of energy rather than wavenumber.

(3) Problem 5.2 in Davies.

(4) Problem 5.12 in Davies.

(5) Problem 5.15 in Davies. You can assume large bias voltage and low temperature. Compare the result with Figure 5.13 (3D case) and the 1D case we discussed in the lectures.

If you want, you can also:

(6) Derive Eq. (5.83) in Davies. Start from Eq. (5.67) and use the special form of \( T(E) \) for a resonant tunneling diode. Note that low temperature and large applied bias is assumed.