(Tentative) Calculating Green Function

Taper

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Abstract

This is a note for reading the paper [1], and for understanding the code produced from that file.

Contents

1 Chapter 1 - Introductions

This chapter is really a nice introduction to the current fields of mesoscopic physics. The writing is clear and it traces the develpment of this field. It gives me a lucid and holistic historical account of both the important discoveries and motives behind them. I should find those marked regions on pdf inside this part very useful.

References

[1] Electronic Transport in Mesoscopic Systems, by von Georgo Metalidis. (Link found via Google)

2 Chapter 2 - 2 Landauer-Büttiker formalism

This chapter introduces the Landauer-Büttiker formalism for calculating the transport properties. The typical setup is illustrated below:

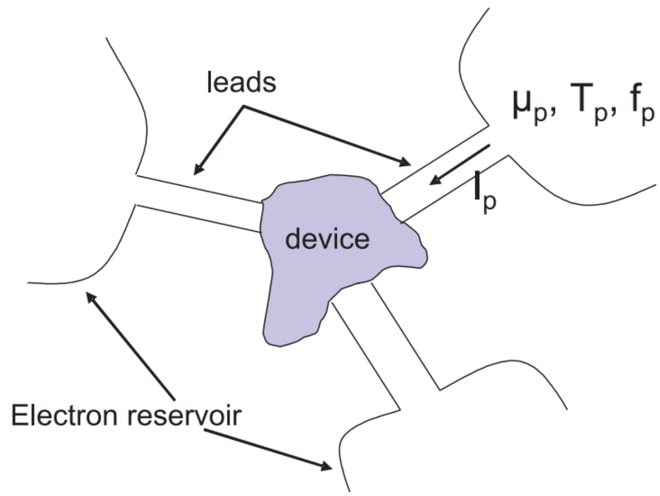

Figure 1: Setup for the Landauer-Büttiker formalism

In that formalism, the currents following through the leads have the following expression:

$$I_p = \frac{-e}{h} \sum_q \int T_{qp}(E) \left(f_p(E) - f_q(E)\right) \mathrm{d}E \tag{2.0.1}$$

where T_{pq} is the transmission coefficients for electrons to go from lead q to lead p. This formula can be simplified/linearized into:

$$I_p = \frac{e^2}{h} \sum_q T_{pq}(E_F)(V_p - V_q) \tag{2.0.2}$$

An obvious advantage of Landauer-Büttiker formalism is that it makes the dependence of I_p on experimental setup explicit in the formula.

This chapter continue to discuss some time reversal symmetry (TR) properties of this formula, centring/centering around the coefficient T_{pq}. But I am perplexed by that he, while discussing TR, mentions the magnetic field B and formulae like:

$$T_{12}(+B) = T_{12}(-B) \tag{2.0.3}$$

3 Chapter 3 Tight-binding model

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