ECE 656: Week 5 References

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For alternative treatments of the Boltzmann Transport Equation, see the following classic texts.

J.M. Ziman, *Theory of Solids*, 2nd ed., Cambridge Univ. Press, New York, 1964.

N.W. Ashcroft and N.D. Mermin, *Solid State Physics*, Saunders College, Philadelphia, 1976.

Arthur C. Smith, James F. Janak, and Richard B. Adler, *Electronic Conduction in Solids,* McGraw-Hill, New York, 1967

Another introductory treatment of the BTE can be found in Chapter 7 of the text below.

Mildred Dresselhaus, Gene Dresselhaus, Stephen B. Cronin, and Antonio Gomes Souza Filho, *Solid State Properties: From Bulk to Nano*, Springer-Verlag, Berlin, 2018.

We showed that an equilibrium solution to the BTE demonstrates that to maintain equilibrium at all energies, the Fermi level and temperature must be constant. Nanostructures can be built with a single energy channel for conduction. For an interesting discussion of "energy-specific equilibrium," see:

T. E. Humphrey and H. Linke, "Reversible Thermoelectric Nanomaterials," *Physical Review Letters*, **94**, 096601, 2005.

When the RTA cannot be used, the near-equilibrium transport equations still have the same form, but to evaluate the transport coefficients, numerical methods are necessary. To see how this is done, consult the chapter by Rode:

D.L. Rode, "Low-field electron transport," in *Semiconductors and Semimetals*, Vol. 10, pp. 1-89, ed. by R.K. Willardson and A.C. Beer, Academic Press, NY, 1975.