NUCL 563 Homework ReDo - Problem 3.5

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Angrist 3-5. Check the accuracy of the assumption that $f(\epsilon) \approx \exp\left[\frac{-(\epsilon-\epsilon_f)}{kT}\right]$ for $\left(\epsilon-\epsilon_f\right) \geq 2kT$

The Fermi function is given by [1, p. 82]

$$f(\epsilon) = \frac{1}{\exp\left[\frac{(\epsilon-\epsilon_f)}{kT}\right]+1}$$

To check the accuracy of the assumption given in the problem statement, a plot was made for $0 \leq \epsilon \leq 5kT$. This is shown in figure 1. It is clear that, past the value for $2kT$, it can be seen that the assumption and the Fermi function tend towards each other.

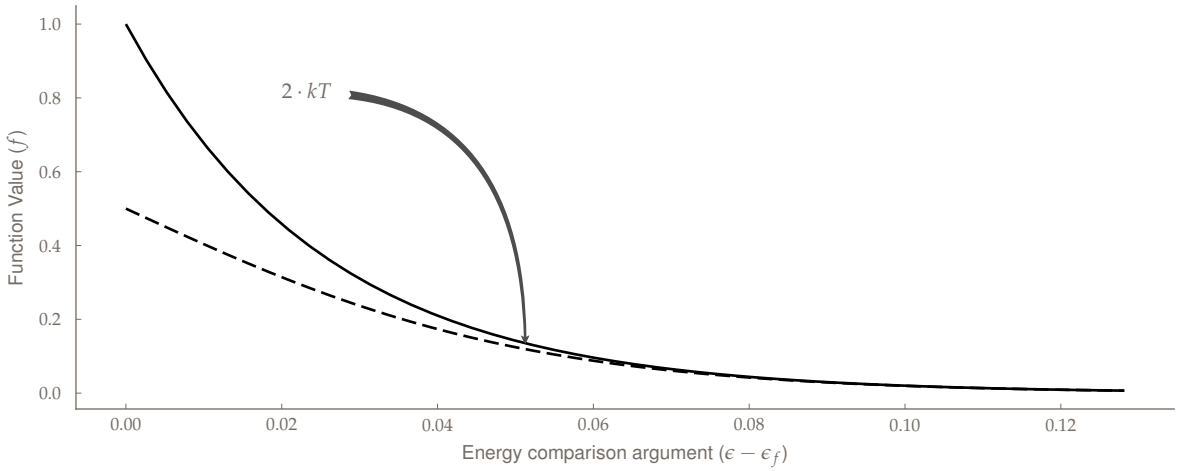

Figure 1: Fermi function versus assumption for $\left(\epsilon-\epsilon_f\right) \geq 2kT$ at 300K

References

[1] Stanley W. Angrist. *Direct Energy Conversion*. Allyn and Bacon, Inc., Boston, MA, USA, 4th edition, 1982.