ECE 656: Fall 2009
Lecture 14 Homework

The purpose of this homework assignment is to solve the Boltzmann Transport Equation for a particle with charge $+Zq$, where Z is an integer > 1. This may occur in problems like the flow of ions through channels in cell walls or the flow of ions inside a battery.

1) Solve the BTE in the relaxation time approximation assuming a constant relaxation time, and a small electric field, but no concentration gradient. Use the result to derive an equation for the drift current.

2) Solve the BTE in the relaxation time approximation assuming a constant relaxation time, and a small concentration gradient, but no electric field. Use the result to derive an equation for the diffusion current.

3) Find the Einstein relation for these charged particles.