**Homework #4 Due Tuesday 10/19/2010 (no extension!)**

**ECEN 5060, Computational Semiconductor Physics**

Consider a bulk (3D) GaSb with parabolic conduction band.

Calculate and plot the electrical conductivity and Seebeck coefficient versus temperature from T=10K to 900K.

Use the following assumptions:

1. N-type GaSb is doped with concentration of 1020 cm-3.
2. Dominant scattering mechanisms are due to the ionized impurities and deformation potential of acoustic phonons, and polar longitudinal optical phonons.
3. Consider two conduction bands at Г and L points and ignore state filling in other bands.
4. Use the matthiessen rule.
5. Mobility is calculated from:

where mc is the conductivity effective mass and is the average relaxation time calculated from:

f(E) is the Fermi-Dirac distribution and g(E) is the density of states. The limits of integrals are to be chosen appropriately.

1. ml= mt 0.98me; mt= 0.19me; εr=11.68; Cl=98x109 N/m2; DA=9 eV