1135-VN-2346 **Alan Ghazarians*** (alan.ghazarians@sjsu.edu). *A Numerical Study of the van Roosbroeck System for Semiconductors.* Preliminary report.

In 1950, van Roosbroeck described the fundamental semiconductor device equations as a system of three nonlinear coupled PDEs. The equations include two drift-diffusion equations for electrons and holes and a Poisson equation for the electric potential. This system poses a challenge numerically because of its strong nonlinearity and coupled equations. Its difficulties lie in simultaneously solving drift-diffusion equations for electrons and holes and using their solutions to solve a Poisson equation. To start off, we will numerically solve the one-dimensional drift diffusion equation with constant velocity using unwinding techniques and illustrate the results using MATLAB for a toy model. Then we will point out the difficulties of solving the drift-diffusion equation when we have a non-constant velocity. This attempt will only complicate solving two drift-diffusion equations and will not suffice in solving the full system. Thus, we will analyze the standard finite difference scheme proposed by Scharfetter and Gummel that deals nicely with the nonlinearity and coupled equations. Then we will compare and contrast the solutions by the standard finite difference scheme proposed by Scharfetter and Gummel and direct discretization of the fluxes in Slotboom variables. (Received September 26, 2017)