Computational Microelectronics [HW-12]

Professor: Sung-Min Hong

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Student ID: 20172106

Student name: Hyo Seok, Kim

1. Simulation explanation

In this report, we have learned how to solve the Poisson equation and the continuity equation simultaneously. We treated the system of N^+NN^+ structure at equilibrium. We are going to compare the self-consistent electron density and the electron density calculated by the nonlinear Poisson equation. We consider the results for the numerical simulations depending on the spacing which are 0.5(0.2) nm, 1nm, and 10(5) nm for the long structure (the short structure).

Elementary charge, [C]	1.602192e-19
Vacuum permittivity, [F/m]	8.854187817e-12
Boltzmann constant, [J/K]	1.380662e-23

Temperature, [K]	300.0
Intrinsic electron density [/cm3]	1.075e10
Relative permittivity for Si	11.7

Table.1: Simulation parameters

2. Result and discussion

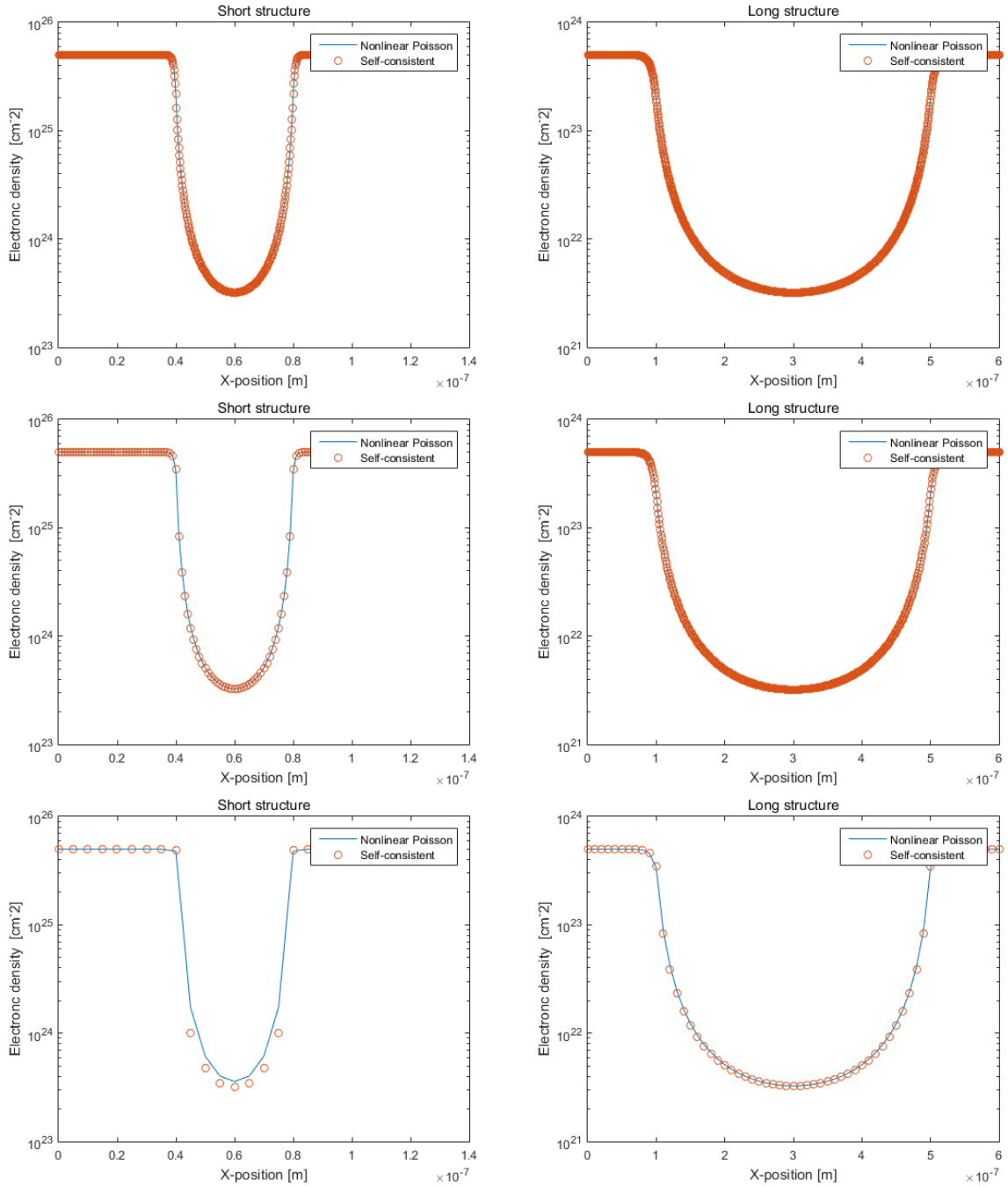

Figure 1. Electron density vs distance in the conditions with the long structure and the short structure.

As we can see in Figure 1, this graph indicates that the difference between self-consistent solution and Nonlinear Poisson’s equation solver approaches zero when increasing the number of points and the structure is large.