Computer Simulation of the Depth of Quantum Well in Center of CNTFET Channel on the PDP in Order to Performance Analyze

Seyed Davoud Hosseini*,Seyed Ali Sedigh Ziabari,

Abstract: In this thesis,the using structure is transistors based on carbon Nanotube field-effect transistors (CNTFET) that due to the excellent electron properties, it has ability to be replaced over silicon CMOS circuits. By using two-dimensional simulation on the basis of the Nonequilibrium Green's function (NEGF) method.we simulated the electronic features of transistor, lightly doped regions between the intrinsic channel and the highly doped source and drain regions,which we call the "lightly doped drain and source CNTFET (LDDS-CNTFET) on one of the most likely CMOS replacements. In proposed method, first by two-dimensional simulation on the basis of Nonequilibrium Green's function (NEGF) method and making changes in depth and width of quantum well at the center of CNTFET channel,we simulated the effects of this phenomenon on the PDP index with the purpose of transistor efficiency analysis of carbon nanotube field effect. Due to the superiority of this transistors to some transistors with step and linear impurity, ion of this transistor at the bottom edge of Source-Drain. The effect of halo implant just only with impurity of n type on the transistors of field effect with light impurity at the bottom edge of source and drain has been conducted by computerized quantum simulation. For this purpose, MOSCNT simulation code has been used which is obtained by NEGF method in circuits based on CNTFET and can be applied in MATLAB software. The results of investigations show that the changes formed in depth and width of quantum well on the base structure has led to output flow surface, the Ion/Ioff ratio smaller and moreover, PDP shrinkage. According to the obtained results in this research, this superiorities will tangibly improve by increasing the depth and width of constructed well up to usable area. The analysis of these comparisons indicate the superiority of switching motion in both models of type.1 and type.2 proposed models rather to LDDS-CNTFET base structure;and in fact,the

modified structure of LDDS-CNTFET can be considered as an appropriate candidate for applications with high speed and low power.

Keywords : Keywords: CNTFET, Quantum Wells, PDP, NEGF,LDDS-CNTFET, Circuits Based on Carbon Nanotubes.