Abstract

By scaling down the feature size of CMOS technology deeply in nanoranges, many problems and challenges, such as short channel effects, will restrict its usefulness for the near future robust and energy efficient applications. The CNFET nanodevice seems to be a feasible alternative for bulk CMOS due to its unique electrical properties and similarities with MOSFET. In this paper, efficient CNFET-based analog inverter, half-wave rectifier and full-wave rectifier circuits are proposed for nanoelectronics. The proposed rectifiers are designed based on a CNFET-based 2-transistor analog inverter and a 2-transistor MAX structure. While the previous designs have suffered from a high number of transistors or threshold loss problem, the unique properties of CNFET nanodevice, such as tunable threshold voltage, are utilized in the proposed circuits to reach efficient, full-swing and high-precision designs. The proposed circuits are simulated using HSPICE based on the standard MOSFET-like CNFET model, valid for \texttt{\textbackslash GreaterEqual}; 10 nm technology nodes and the functionalities are verified with both DC and transient analyses.
References

Efficient CNFET-based Rectifiers for Nanoelectronics

Index Terms

Computer Science  Circuits And Systems

Keywords

Nanoelectronics  Carbon nanotube field effect transistor (CNFET)  rectifier  Analog inverter