

Compact Charge Model for Ultra-thin Nanoscale Double Gate MOSFETs

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Abstract:

In this work, a new approach to investigate the inversion charge behavior in ultra-thin nanoscale Double Gate MOSFETs by using the Gradual Channel approximation (GC) and Genetic algorithm optimization technique (GA) is presented. Our proposed analytical approach combines the universal optimization and fitting capability of GA and the cost-effective optimization concept of quantum correction, to achieve accurate and simple compact models for nanoscale circuits design. The obtained results showed that the predictions of the quantum capacitance, threshold voltage shift and quantum inversion charge density are in close agreement with the 2-D numerical simulations. The developed models can also be implemented into circuits simulators to study the nanoscale CMOS-based devices without impact on the computational time and data storage.