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Abstract
Recent years, MESFET's has been considerable due to it can satisfy the ULSI technology. However, there are very few models for three-dimensional SOI-MESFET's device. In this case, three-dimensional SOI-MESFET model explores the short-channel effect and narrow-width effect. From three-dimensional Poisson's equation has been developing by superposition principle. There is a numbers of complicated Fourier series are derived.
The minimum bottom potential can be obtained by the three-dimensional Poisson's equation. Furthermore, the threshold voltage also can be achieved from the bottom potential. Numerical analysis compare with the DAVINCI simulation result are proposed. The parameters of device structure, like channel length, channel width, and silicon film thickness can affect the threshold voltage shift. Besides, the increased drain-source bias will initiate the DIBL (drain-induced barrier lowering) effect. The DIBL effect for the short-channel device may be demonstrated by the bottom potential.
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