Study of Transport in Electronic Devices with Stochastic Monte Carlo Method: Modeling and Simulation along with Submicron Gate (Lg=0.5um)

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Abstract : In this paper, we have developed a numerical simulation model to describe the electrical properties of GaInP MESFET with submicron gate (Lg = 0.5 µm). This model takes into account the three-dimensional (3D) distribution of the load in the short channel and the law effect of mobility as a function of electric field. Simulation software based on a stochastic method such as Monte Carlo has been established. The results are discussed and compared with those of the experiment. The result suggests experimentally that, in a very small gate length in our devices (smaller than 40 nm), short-channel tunneling explains the degradation of transistor performance, which was previously enhanced by velocity overshoot.