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Backscattering Coefficient Accurate Model for Nanoscale Si- MOSFET Transistor

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Abstract: In this paper, a new model for total backscattering coefficient (RBT) is proposed for both elastic and inelastic carrier scattering in silicon metal oxide semiconductor field effect transistor (MOSFET) nanoscale devices. The effect of the injection velocity (Vinj) as a function of the electric field (E) and low field mobility (?0) is included and analyzed for both the elastic and inelastic scattering. The channel potential profile, V(x), as a function of the channel length is also modeled. Inelastic scattering degrades the drain current (Ids) due to the charge accumulation effect. The mean free path (?) is the same for both elastic and inelastic scattering and becomes independent from electric field at higher values. Simulation results of the proposed model and BSIM4 model using HSPICE with 22nm channel length show a very good agreement and high accuracy.