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Quantum Capacitance Effect in Graphene-Metal-Oxide-Semiconductor Field Effect Transistor with Large Area Graphene Channel

This paper presents a physics-based quasianalytic modeling for graphene–metal-oxide-semiconductor field effect transistor (GFETs) with large area graphene based on energy-balance equation solver using two-dimensional density of states for the calculation of drain current. This model felicitates the reader with analysis of quantum capacitance effect and velocity saturation in GFETs. Formulation of the current velocity saturation equations at the steady state for determining energy of graphene phonon and their scattering rate is done by Monte Carlo simulation method. Estimated various quantum capacitance values, and the result are compared with the exiting methods. The proposed method gives the better results as compared with the state of art methods available in the literature.

References

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Figures

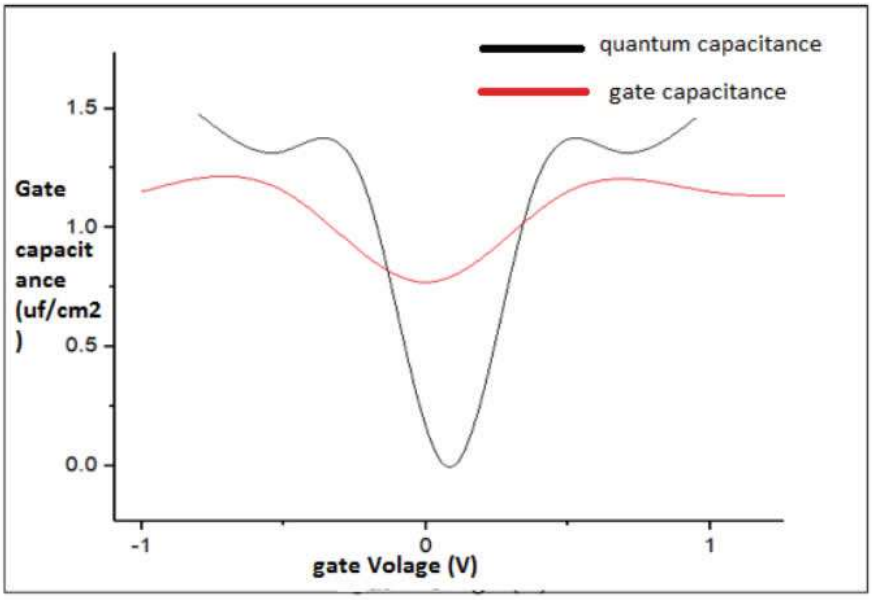

Figure 1: Iquantum capacitance vs gate voltage