Capacitance Extraction of Graphene Field-Effect Transistors from Time-Domain Pulse Responses

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We demonstrate a simple extraction method for capacitances in graphene field-effect transistors (GFETs). Intrinsic gate-oxide and parasitic capacitances from time-domain pulse responses are separately extracted by using a small-signal equivalent circuit model together with a differential equation of RC time constant. In particular, transient currents were measured in GFETs mounted on an aluminum coplanar waveguide, when rectangular pulses are applied to a gate electrode. The validity of the extraction method is proved in the case of MOSFETs under similar experimental conditions. Compared with previous calculations using a large-scale fixture for measurement, our characterization method is remarkably effective in nano-scale area without considering fixture designs\cite{1,2}.