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Power MOSFET Models Including Quasi-Saturation Effect

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Abstract : In this paper, accurate power MOSFET models including quasi-saturation effect are presented. These models have no internal node voltages determined by the circuit simulator and use one JFET or one depletion mode MOSFET transistors controlled by an “effective” gate voltage taking into account the quasi-saturation effect. The proposed models achieve accurate simulation results with an average error percentage less than 9%, which is an improvement of 21 percentage points compared to the commonly used standard power MOSFET model. In addition, the models can be integrated in any available commercial circuit simulators by using their analytical equations. A description of the models will be provided along with the parameter extraction procedure.

Keywords : power MOSFET, drift layer, quasi-saturation effect, SPICE model
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