Abstracts

Traveling-Wave Inverted-Gate Field-Effect Transistors: Concept, Analysis, and Potential

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The inverted-gate FET (INGFET) is very promising as a traveling-wave transistor. A unified approach to the analysis of the traveling-wave INGFET is presented. The equivalent circuit parameters of the GaAs inverted-gate FET, with submicron gate Iength, are obtained using a two-dimensional computer model which takes into account the nonstationary electron dynamics. The parameters of the passive transmission line, corresponding to the INGFET structure, are obtained using a quasi-TEM wave approach. The conductor losses of this structure are estimated using the incremental inductance rule. The coupled mode theory is used to derive the wave equation describing this traveling-wave transistor. The results show the existence of a rapidly growing mode along the device electrodes. It is also shown that this mode can be excited alone by appropriate matching and feeding arrangements. Improper matching and feeding lead to a narrower bandwidth due to the resonance phenomenon of the resulting standing wave.

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