Abstracts

Efficient Large-Signal FET Parameter Extraction Using Harmonics (Dec. 1989 [T-MTT])

We present a novel approach to nonlinear large-signal FET model parameter extraction for GaAs MESFET devices measured under large-signal conditions. Powerful nonlinear adjoint-based optimization which employs the harmonic balance method as the nonlinear circuit simulation technique, simultaneously processes multibias, multipower inputs, multi-fundamental-frequency excitations, and multiharmonic measurements to uniquely reveal the parameters of the intrinsic FET. In contrast to other methods by which the model parameters are extracted using dc and small-signal measurements, our new approach can provide more accurate and reliable large-signal model parameters extracted under actual operating conditions. The modified Materka and Kacprzak FET model serves as an example. Numerical results verify that our approach can effectively determine the parameters of this model. Including harmonics in parameter extraction results in a reliable large-signal model. Real data provided by Texas Instruments have also been employed. The technique has been implemented in a new program called HarPE.

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