Abstracts

Nonlinear Models for the Intermodulation Analysis of FET Mixers

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An accurate, detailed analysis program has been developed for intermodulation distortion (IMD) simulation of FET mixers. This program is very efficient at calculating the IMD from multiple RF inputs. We have proposed a simplified nonlinear model for IMD analysis of FET gate mixers. The accuracy of the simplified model has been verified experimentally using two different MESFET mixers and one HEMT mixer at X band. All the tests show good agreement between measured results and the calculated results for second- and third-order IMD. The simplified model is based on modeling the derivative of the device transconductance by a sum of a Gaussian function and a linear function of the gate voltage. Drain bias dependence is ignored. The advantage of this model is that it can be used for both MESFET and HEMT mixers, and its fitting parameters can be easily determined from a nonlinear characterization of the devices at low frequencies.

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