Abstracts

Intermodulation Distortion Analysis of MESFET Amplifiers Using the Volterra Series Representation

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Third-order intermodulation distortion generated in a MESFET amplifer is analyzed by means of the Volterra series representation. A transistor model is used which enables direct analytical determination of the nonlinear elements from small-signal measurements. The four nonlinearities considered are the gate capacitance, transconductance, drain feedback capacitance, and output conductance. Volterra transfer functions are derived for a simplified model and closed-form expressions for the third-order intermodulation ratio and intercept point are determined. The equations show the dependence of distortion on frequency, terminating impedances, and transistor parameters. Principal sources of distortion are identified and the influence of device parameters and network terminations is investigated. Experimental verification on specific MESFET amplifiers, with 2-µm and 1-µm gate devices, comparing predicted and measured intermodulation products for various load conditions is presented.

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