Abstracts

Simultaneous Thermal and Electrical Analysis of Nonlinear Microwave Circuits

V. Rizzoli, A. Lipparini, V.D. Esposti, F. Mastri and C. Cecchetti. "Simultaneous Thermal and Electrical Analysis of Nonlinear Microwave Circuits." 1992 Transactions on Microwave Theory and Techniques 40.7 (Jul. 1992 [T-MTT] (Special Issue on Process-Oriented Microwave CAD and Modeling)): 1446-1455.

The paper introduces a new software tool for the simultaneous determination of the thermal and electrical steady-state regimes of nonlinear microwave circuits containing temperature-dependent active devices. The analysis technique is an extension of the classic piecewise harmonic-balance method, and is quite general-purpose. It can be applied to networks operating under multipletone excitation, including pulsed-RF regimes. The simulation problem is reduced to a nonlinear algebraic solving system whose unknowns are electrical and thermal state-variable harmonics. Advanced numerical techniques are used to effectively overcome the difficulties arising from the high degree of nonlinearity and from the very large number of unknowns of the numerical problem. The program incorporates a facility for the evaluation of the thermal constants of multiple-finger planar devices starting from geometrical data.

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