Abstracts

Unified equivalent-circuit model of planar discontinuities suitable for field theory-based CAD and optimization of M(H)MIC's

Lei Zhu and Ke Wu. "Unified equivalent-circuit model of planar discontinuities suitable for field theory-based CAD and optimization of M(H)MIC's." 1999 Transactions on Microwave Theory and Techniques 47.9 (Sep. 1999, Part I [T-MTT]): 1589-1602.

Unified dynamic equivalent-circuit model for characterizing planar unbounded discontinuities is reported for use in the field-theory-based computer-aided design and optimization of high-frequency integrated circuits and structures such as monolithic and hybrid microwave integrated circuits (M(H)MIC's). The proposal of the circuit model is stemmed from a new scheme called the short-open calibration (SOC) technique. This SOC technique is directly accommodated in a full-wave method-of-moments (MoM) algorithm. The developed MoM algorithm is applied to the modeling of unbounded planar discontinuities that can be segmented into two distinct sections: static model of feed lines and dynamic model of circuit discontinuity. In this paper, the MoM, is formulated in such a way that the port voltages and currents are explicitly represented through relevant network matrices. The SOC technique is used to remove or separate unwanted parasitics brought by the approximation of the impressed voltage source and also the problem of resulting consistency between the two-dimensional and three-dimensional simulations. Results for a class of planar circuit discontinuities are very well compared with measurements and also available publications. Generalized end-to-end coupling structure having offset and unequal input/output lines (to name a specific example) is studied to indicate the parametric and dispersion effects on its equivalent capacitance and radiation conductance. Advantageous features of the proposed unified circuit model suggests its practical usefulness and high accuracy in the design and optimization of a wide range of M(H)MIC's and planar antennas.

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