Effective Excitation Mechanism for Open Planar Microwave Circuits

Hasan H. Balik *Student Member,* IEEE , C. J. Railton *Member,* IEEE
University of Bristol
Centre of Communications Research
Faculty of Engineering
Bristol, England BS8 1TR
e–mail:H.H.Balik@bris.ac.uk

Abstract

For the last two decades, the high–speed computer has influenced the computation of electromagnetic problems, to the point that most practical computations of fields are now done numerically on computers. This is because most of the practical problems in the electromagnetics can be solved numerically but can not be done by analytically. Therefore computers are necessary for numerical solutions. As a result the science of numerically computation of electromagnetics is a mixture of electromagnetic theory, mathematics and numerical analysis.

The requirement to predict the behaviour of planar microwave circuits and components has existed for many years. The fundamental purpose of this paper is to develop an efficient technique to find the characterisation of the frequency response of open planar passive microwave circuits. The S–parameters of an general N port planar circuit at a spot frequency requires the solution of a matrix equation which has been yielded by using Method of Moments for the set of unknown coefficients.

The first step of the analysis is to expand the surface current as a set of known basis functions with unknown coefficients. The basis functions must be chosen to approximate the true but unknown current distribution on the metalization of the circuit. The choice of basis functions is crucial to the efficiency of the technique. If they are not chosen to represent the actual current distribution carefully then a large number of functions will be required for convergence.

The open planar circuit in this paper is represented as a black box which is connected to infinite feedlines from its ports. The conventional sub–domain current basis functions have been used to define the unknown current distribution on the metalization of the circuit. Three more basis functions and two more compensation functions will be introduced here to include the effect of the port in the circuits. Although a method was introduced by Jackson in 1985, his technique in contrast to the method described here is not complete and does not give accurate results at relatively low frequencies.

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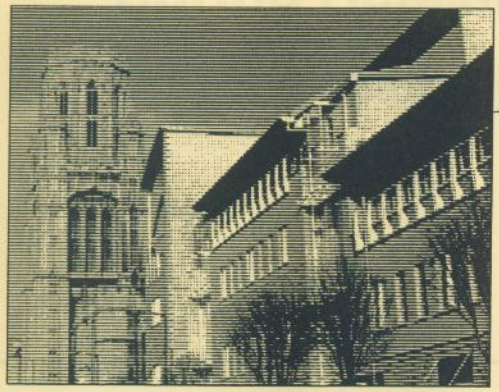

PROGRAMME/ABSTRACTS

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