THE STUDY OF THE ELECTROMAGNETIC FIELD FROM THE SHIELDED MICROSTRIP LINE USING THE ELECTRODYNAMIC METHOD

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Abstract. *The present article is the first from a series of three papers which will be published in this journal, and which provides a brief presentation of the book, "Microwave - numerical solutions", written by the same author. The main objective of the present article is to describe the development of rigorous mathematical models for the optimal design of microwave circuits which use microstrip lines. The models will use real input data regarding the propagation characteristics of the electromagnetic field and the configuration of all existing wave modes in the line and will provide useful results for customer specific microwave applications.*

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I. Introduction

The book "Microwave-Numerical solutions" written by the same author aims to make an essential contribution to the elucidation of many of the challenges of the electromagnetic field in the microstrip line. In addition, the book highlights a suite of interactive program packages designed to study the dynamic behaviours of the electromagnetic field using S-parameters in shielded microstrip line and related microwave circuits.

The present article, the first in a series of three papers which will be published in the present and the next volumes of the "Annals of Academy of Romanian Scientists" is briefly aiming the mathematical description of the electrodynamic method applied to the shielded microstrip line.

In a series of specialized works, [1]÷[7], the analysis and calculation of the parameters of the microstrip lines is carried out under the assumption of the quasi-static approximation, which assumes that the fundamental mode of the propagation wave can be approximated with the transverse electromagnetic mode (TEM). Such approach allows to obtain satisfactory results only for the values of the longest wavelengths in the microwave frequency range, when the wavelength considerably exceeds the transverse dimensions of the line. Recent achievements in the field of microwaves require, however, the operation of microstrip lines at much higher frequencies, reaching hundreds of GHz, as well as the use of substrates with high relative permittivity. As the working frequency increases, the

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