Abstracts

An Analytical Method for Direct Calculation of E & H-Field Patterns of Conductor-Backed Coplanar Waveguides

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A new direct method of computing the electromagnetic field patterns surrounding the conductor-backed coplanar waveguide (CPW) structure is proposed. Analytical closed-form expressions describing the quasi-TEM field pattern in both the air and the dielectric substrate for conductor-backed CPW's are presented. This approach is based on a new technique which employs a series of inverse conformal mappings to transform a known field pattern from a rectangular structure back into the CPW structure in order to obtain its unknown field pattern directly. A computer program based on this method has demonstrated the speed at which the fields can be plotted compared to existing methods which require repetitive application. Graphical results of these field patterns are presented as a function of the CPW's geometry and dielectric substrate thickness. These field maps which have been directly drawn with true curvilinear squares enable the determination of power flow density, since the same power flows through each square. This direct method of characterizing the power flow density throughout the CPW structure could become an important design tool for the modeling of coplanar monolithic microwave integrated circuits (CMMIC's).

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