

Analysis of 2D Symmetrically Coupled Vertical Microstrip Lines between Two Infinite Grounded Planes using HBEM

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Abstract— This paper presents an application of the hybrid boundary element method, developed at our Department of Theoretical Electrical Engineering, for calculating the parameters of symmetrically coupled vertical microstrip lines placed between two infinite grounded planes. Even and odd modes are taken into account and the quasi TEM analysis is applied. A computer code has been written to obtain numerical solutions for the observed microstrip lines. The characteristic impedance and the effective dielectric permittivity will be determined and compared to corresponding ones obtained by the finite element method. All results will be given in tables and presented graphically. The basic idea of the hybrid boundary element method is that an arbitrary shaped electrode can be replaced by equivalent electrodes. Also, an arbitrary shaped boundary surface between any two dielectric layers can be replaced by discrete equivalent total charges per unit length placed in the air. The discretization technique is similar to the method of moments and is not new, but combined with a new variant of the boundary element method and the equivalent electrodes method can be applied for solving large number of very complex 2D microstrip lines with or without symmetry. The hybrid boundary element method can be also successfully applied to 3D problems solving.