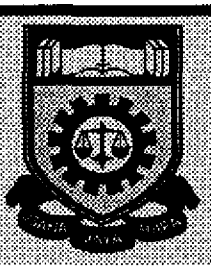
CALCULATION OF NORMALIZED INPUT ADMITTANCE FOR DIELECTRIC MEASUREMENTS OF LOSSY MATERIALS

(SOFTWARE DEVELOPMENT)

Thesis is presented in partial fulfilment for the award of the Bachelor of Electrical Engineering (Hons) of
INSTITUT TEKNOLOGI MARA



MOHAMAD RIZAL BIN MAAROF
School of Electrical Engineering
INSTITUT TEKNOLOGI MARA
40450 Shah Alam
DECEMBER 1996

ABSTRACT

Knowledge of the dielectric properties of lossy dielectric materials is necessary for determining absorption of electromagnetic energy in lossy dielectric material and for understanding lossy dielectric material interaction with electromagnetic fields.For non-destructive testing of lossy dielectric materials, an algorithm is developed for calculation of normalized input admittance of a smaller waveguide radiating into a larger waveguide. In this project,we describe a computer program using FORTRAN 77 for calculation of input admittance of a smaller waveguide radiating into a larger waveguide. Results are reported for input admittance of lossy dielectric slabs.

ACKNOWLEDGEMENTS

All praise be to Allah the Beneficient , the Merciful. Thee do I worship and thee do I beseech help. My ever-lasting thank to Allah for granting me patience in completing this project.

I am obliged and grateful to my Supervisor, Dr Deepak Kumar Ghodgaonkar , for his comments and ideas behind this project, without him , this project probably would not have been successful.

Special thanks to numerous friends and classmates for their understanding and made important contributions to the completion of this project.

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CHAPTER 1

1.0 INTRODUCTION

Beside their conventional applications in fields of telecommunications and radars, microwaves are rapidly expanding into new areas , in particular those dealing with industrial measurements. Microwaves are very sensitive to the dielectric properties of materials: the knowledge of the complex permittivity allows one to to determine the primary physical properties of the materials measured, such as its moisture content. However, an important draw back encountered in practice is that most usual methods used to measure permittivity require cutting machining (to close tolerance) of samples. Spheres or cylinders are required for cavity perturbation methods , rectangular plugs , or slabs in waveguide methods. In many instances, the work and delay necessary to prepare samples may prove inconvenient, while samples cutting may not be permissible at all in other cases.The technique presented here can be used when the following requirements are satisfied:

1) The material to be measured presents one flat surface on which the measuring apparatus can be placed firmly.