MICROWAVE NONDESTRUCTIVE TESTING

USING A WAVEGUIDE TECHNIQUE

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

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MAY 1997

ABSTRACT

This project work involves a testing of several samples of composite materials by using microwave non-destructive testing techniques. The techniques used is a waveguide technique which make it possible for the measurement of liquid samples. The frequency range is from 8.0 GHz to 12.5 GHz. This testing proposes to measure the complex permittivity of composite materials. The main equipment for testing is WILTRON 37269B Vector Network Analyzer. A computer program was developed for calculation of complex permittivity. Data Network Analyzer measurement is input to this program.

ACKNOWLEDGMENT

In the name of ALLAH, the most Gracious and the most Merciful.

I wish to express my sincere gratitude and appreciation to my supervisor, Dr Deepak Kumar Ghodgaonkar for providing the support and invaluable guidance towards the success of this project. All the regular discussion sessions that we had throughout the period of study have contributed to the success of this project.

I must also acknowledge the excellent service provided by the CADEM (ITM), School of Mechanical Engineering and School of Applied Science. Appreciation is given to all the school staff and colleagues in helping in the writing-up of the thesis and also to my family who give me encourage during my study in the Shah Alam.

MICROWAVE NONDESTRUCTIVE TESTING OF COMPOSITE MATERIALS USING A WAVEGUIDE TECHNIQUE

CONTENTS **Page Number**

CHAPTER 1

1.0 INTRODUCTION

Composite materials are widely used in many fields of application such as telecommunication, electronic parts, radar, industrial microwave heating system and aerospace materials. It is necessary to characterize these materials for absorption, transmission, reflection, dielectric properties and magnetic properties.

The microwave non-destructive testing is one of the method to measure the dielectric properties of such materials. Microwave are very sensitive to the dielectric properties of materials. The knowledge of the complex permittivity allows one to measured the primary physical properties of the materials, such as its moisture content.

The microwave non-destructive testing methods are also widely used for geometrical sizes and quality control of different materials such as composite materials, polymers, fiberglass, ceramics, woods etc. The control may be performed