MODE OF FAILURE ANALYSIS OF FIBER REINFORCED COMPOSITE PLATE

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A thesis submitted in partial fulfilment of the requirements for the award of Bachelor Engineering (Hons.) (Mechanical)

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OCTOBER 2004

ACKNOWLEDGEMENTS

BISMILLAHIRRAHMANIRRAHIM...

In the name of Allah S.W.T, The Most Gracious who has given me strength and ability to complete this project. All perfect praises belong to Allah S.W.T, Lord of Universe. May His blessing upon the Prophet Muhammad S.A.W and members of the family and companions.

First of all, we would like to convey our gratitude and thank you to our project advisor, En. Jamaluddin Mahmud for his guidance, supervision, encouragement and discussion throughout the work on this project.

Last but not least, thank you to our classmates for their encouragement throughout this year. Thank you and appreciation to all mentioned above and any other parties, which involved directly or indirectly in preparation of this project. May Allah bless all of you.

ABSTRACT

This thesis is aimed to analyse the mode of failure of selected fiber reinforced composite plates under transverse loading. A mathematical model and computational model are presented for the analysis. Higher Order Shear Deformation plate theory is utilised to predict the deformation of the plates. A failure criterion with the existence of coupling terms is employed to predict the failure. A program based on a finite element method is developed using Fotran-90 to determine the lamina stresses. These stresses are then used in the present failure model to determine the Mode of Failure. Finally, the Mode of Failure results for Glass Epoxy composite plates are analysed. The results of the mode of failure analysis have shown that the present failure models could offer a better prediction of failure for any composite laminate. The results could also aid in designing optimum composite laminates.

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CHAPTER I

INTRODUCTION

1.1 Overview

In composite materials, failure is distinguish by its mode of failure. In fiber reinforced composite plate, failure in one direction of any single layer implies neither total failure of that layer, nor the whole structure load. Therefore, the most common way to deal with the failure of composite plates is by using First Ply Failure and Last Ply Failure [1]. Thus, mode of failure analysis is performed to observe better the progress and the characteristic of the failure. It could offer a comprehensive failure analysis and gives a more significance results in aiding an optimum composite lamination design.

1.2 Objectives

The aims of this project are to analyse the mode of failure of fiber-reinforced composite plate between the First Ply Failure and Last Ply Failure; and also to develop a 2-D and 3-D finite element model of mode of failure analysis of fiber-reinforced laminated glass/epoxy composite plate.