NOTCHED STRENGTH OF FIBER-REINFORCED POLYMER (FRP)

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"I declare that this thesis is the result of my own work except the ideas and summaries which I have clarified their sources. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any degree."

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ABSTRACT

This project involved in the study of notched strength reduction and determination of damage zone, a_o, of E-glass, Kevlar and Carbon Fiber/Epoxy composite laminates. The specimen configuration used for this project was 101.6 mm×101.6 mm with 30 mm diameter central hole and was subjected to bi-axial loading condition using a special grip and fixture.

The damage zones, a_o, was determined experimentally using optical microscope. Using the values a_o, the notched strength of the laminates were then determined using both Average Stress Criterion (ASC) and the Fracture Mechanics Criterion (FMC). These calculated values of notched strengths were then compared with that determined through experimentation.

In this project, the results indicated that the notched strengths of the glass fiber/epoxy using the Average Stress Criterion and Fracture Mechanics Criterion are comparable. However, the notched strength predicted by the Fracture Mechanics Criterion was about 50% indifference with the Average Stress Criterion for Kevlar and carbon fiber/epoxy. This might be due to the determination of fracture toughness, K_c, using isotropic solution may not be suitable for these materials.

Experimental values of the notched strengths of the laminates under bi-axial loading in the experiments cannot be acceptable due to the problems occurred at the grip. Further improvements are needed to overcome the grip problems or new fixture should be designed and constructed in order to obtain better results in the future.

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