

Strength Characteristics of CFRP Composites with Impact Damage

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Fig. 3. Installed specimen for the test.

Results and Discussion

Each test was performed three times, and the average results were compared. When the angle between the load direction and the fiber arrangement direction increases from 0° to 45°, it can be confirmed that the strength degrades as shown in Fig. 4. From these results, it can be seen that the angle between the load direction and the direction of arrangement of fibers has considerable effect on the strength.

The strength curve as per Eq. (3) and the experimental results for composite material with impact damage are represented by a solid line and solid squares, respectively, in Fig. 4. From these results, it can be seen that the strength function of the residual strength of impacted CFRP material for an arbitrary fiber arrangement can be determined using the tensile strength and the modified Tan's equation, since the strength function agrees well with the experimental results.

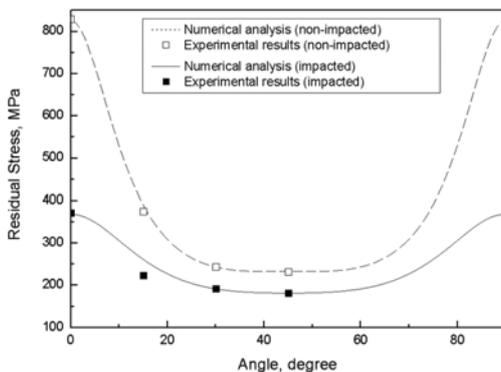


Fig. 4. Test results and numerical analysis curve of residual strength for impacted specimen

Conclusion

The residual strength test was performed according to the

variation of the fiber arrangement using carbon fiber composite material with impact damage. The strength function was calculated using the modified Tan's equation and the results of the residual strength test.

The residual strength of the 0°/90° specimen with impact damage decreased by about 55% but that of the +45°/-45° specimen decreased by about 22%. That is, it can be seen that the ratio of the degradation of the residual strength with impact damage decreases as the angle between the load and fiber arrangement increases.

The strength function of the residual strength of impacted CFRP material for an arbitrary fiber arrangement can be determined using the tensile strength and the modified Tan's equation, since the strength function agrees well with the experimental results.

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