

층내 하이브리드화가 케블라/스펙트라
복합재료의 층간 성질과 잔류 열응력에 미치는 영향

Effect of Intraply Hybridization on the
Interlaminar Properties and Thermal Residual Stresses
of Kevlar/Spectra Woven Laminated Composites

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The effect of intraply hybridization of the reinforced fiber on the interlaminar properties of Kevlar/Spectra hybrid laminated composites has been studied. The interlaminar shear strength of the laminated composite has been reduced by intraply hybridization of the reinforced fiber. However, the hybrid composite showed an improved impact properties..

The intraply hybrid composites showed an impaired interlaminar properties including interlaminar shear strength. The hybrid composite showed higher anisotropy in thermal expansion coefficient as well as elastic modulus. This results in higher residual internal thermal stresses after curing of the composite, and this has a profound influence on the fiber/matrix interfacial strength of the composite.

The interlaminar thermal residual stresses and fiber/matrix interfacial strength with the hybridizations of the reinforced fiber have been analyzed. The hole drilling residual stress measuring technique has been adapted to evaluate the thermal residual stresses. Mode I edge delamination test and short beam shear test at elevated temperature have been performed to evaluate the interlaminar properties of the hybrid composite..

An analytical model has established to explain the hybridization effects on the thermal residual stresses and the fiber/matrix interfacial strength as well as the interlaminar properties.

The hybrid composite showed higher thermal residual stresses, especially the thermal residual compressive stresses which exist in the fiber directions. Tensile property of the hybrid composite had slightly increased because of the residual compressive stresses in fiber directions. The fiber/matrix interfacial strength had reduced as the hybrid composite have higher expansion in Z-direction of the composite. This results in reduced interlaminar strength of the hybrid composite.

Key word : hybridization, thermal residual stress, interlaminar property, interfacial strength