

복합신소재구조학회 논문집

Journal of the Korean Society for
Advanced Composite Structures

2023 4

$$V_f = \frac{\frac{w_f}{\rho_f}}{\left\{ \frac{w_f}{\rho_f} + \frac{w_m}{\rho_m} \right\}}$$

$$E_{11} = E_f V_f + E_m V_m$$

$$\sigma = \begin{pmatrix} \sigma_1 \\ \sigma_2 \\ \tau_{12} \end{pmatrix} = \begin{bmatrix} Q_{11} & Q_{12} & Q_{16} \\ Q_{21} & Q_{22} & Q_{26} \\ Q_{61} & Q_{62} & Q_{66} \end{bmatrix} \begin{pmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \gamma_{12} \end{pmatrix}$$

$$E_{22} = \frac{1}{\left\{ \frac{V_f}{E_f} + \frac{V_m}{E_m} \right\}}$$

LAMINATE

$$\begin{pmatrix} N_x \\ N_y \\ N_{xy} \\ M_x \\ M_y \\ M_{xy} \end{pmatrix} = \begin{bmatrix} A_{11} & A_{12} & A_{16} & B_{11} & B_{12} & B_{16} \\ A_{12} & A_{22} & A_{26} & B_{12} & B_{22} & B_{26} \\ A_{16} & A_{26} & A_{66} & B_{16} & B_{26} & B_{66} \\ B_{11} & B_{12} & B_{16} & D_{11} & D_{12} & D_{16} \\ B_{12} & B_{22} & B_{26} & D_{12} & D_{22} & D_{26} \\ B_{16} & B_{26} & B_{66} & D_{16} & D_{26} & D_{66} \end{bmatrix} \begin{pmatrix} \varepsilon_x \\ \varepsilon_y \\ \gamma_{xy} \\ \kappa_x \\ \kappa_y \\ \kappa_{xy} \end{pmatrix}$$

$$V_m = 1 - V_f$$

$$A_{ij} = \sum_{n=1}^N \int_{Z_n}^{Z_{n+1}} \bar{Q}_{ij} dz$$

$$B_{ij} = \sum_{n=1}^N \int_{Z_n}^{Z_{n+1}} \bar{Q}_{ij} z dz$$

$$D_{ij} = \sum_{n=1}^N \int_{Z_n}^{Z_{n+1}} \bar{Q}_{ij} z^2 dz$$

$$G_{12} = \frac{1}{\left\{ \frac{V_f}{G_f} + \frac{V_m}{G_m} \right\}}$$

