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Eg. 6.8 (question in handout)

$$\varepsilon_f^* = \sigma_f^* / E_f = \frac{1900\times10^6}{86\times10^9} = 2.21\times10^{-2} \leftarrow$$

$$\varepsilon_m^* = \sigma_m^* / E_m = \frac{60\times10^6}{2.4\times10^9} = 2.5\times10^{-2}$$

ε_f^* smaller $\Rightarrow$ brittle fibres

$$\sigma_m' = (E_m)(\varepsilon_f^*) = (2400\,\text{MPa})(2.21\times10^{-2}) = 53.0\,\text{MPa}$$

$$\sigma_1 = \phi_f \sigma_f^* + (1-\phi_f)\sigma_m'$$

$$(0.55)(1.90) + (0.45)(0.053) = \underline{1.07\,\text{GPa}}$$

ALTERNATIVE

$$\sigma_1 = \phi_m \sigma_m^* = (0.45)(60) = 27\,\text{MPa}$$

$$\therefore \boxed{\sigma_1^* = 1.07\,\text{GPa}}$$ Higher of two

Axial Tensile $\rightarrow$ $\sigma_1^* / \cos^2\theta$ = 1,212 MPa

Axial Shear $\rightarrow$ $\tau_{12}^* / (\cos\theta\sin\theta)$ = $\boxed{\underline{171\,\text{MPa}}}$

Transverse Tensile $\Rightarrow$ $\sigma_2^* / (\sin^2\theta)$ = 213 MPa

$$\sigma_\theta^* = 171\,\text{MPa} \quad (\text{lowest of } 3)$$

failure mode: Axial shear failure