$$\rho_c = f\,\rho_f + (1-f)\,\rho_m$$

$$f = \frac{\rho_c - \rho_m}{\rho_f - \rho_m}$$

$$\delta = \frac{F s\left(3L^2 - 4s^2\right)}{48\,E\,I}$$

$$I = \frac{wh^3}{12}$$

$$E_f^{\text{ax}} = \text{Axial fibre modulus}$$

$$E_1 = \text{Axial composite modulus}$$

$$E_1 = fE_f^{ax} + (1-f)E_m$$

$$E_f^{ax} = \frac{E_1 - (1-f)E_m}{f}$$

$$E_f^{\text{tr}} = \text{Transverse fibre modulus}$$

$$E_2 = \text{Transverse composite modulus}$$

$$E_2 = E_m\,\frac{1+\eta f}{1-\eta f}$$

$$\eta = \frac{\left(\dfrac{E_f^{\text{tr}}}{E_m}\right) - 1}{\left(\dfrac{E_f^{\text{tr}}}{E_m}\right) + 1} = \frac{E_f^{\text{tr}} - E_m}{E_f^{\text{tr}} + E_m}$$

$$E_f^{\text{tr}} = E_m\,\frac{1+\eta}{1-\eta}$$

$$\kappa = \frac{2\sin\big[\tan^{-1}\big(\frac{\delta}{x}\big)\big]}{\sqrt{x^2+\delta^2}}$$

$$\Delta\varepsilon = \Delta\alpha\,\Delta T$$

$$\kappa = \frac{24\,E_1 E_2}{E_1^2 + 14E_1E_2 + E_1^2}\;\frac{\Delta\varepsilon}{h}$$

$$\Delta\alpha = h\,\frac{E_1^2 + 14E_1E_2 + E_2^2}{12\,E_1E_2\,\Delta T}\;\frac{\sin\left[\tan^{-1}\left(\dfrac{\delta}{x}\right)\right]}{\sqrt{x^2+\delta^2}}$$

$$\alpha_{ax,c} = \frac{\alpha_m(1-f)E_m + \alpha_f^{ax} f E_f^{ax}}{(1-f)E_m + fE_f^{ax}}$$

$$\alpha_{tr,c} = \alpha_m(1-f)(1+\nu_m) + \alpha_f^{tr} f(1+\nu_f) - \alpha_{ax,c}\,\nu_{12,c}$$

$$\nu_{12,c} = f\nu_f + (1-f)\nu_m$$

$$\alpha_m = \frac{\alpha_f^{\mathrm{tr}}\, f(1+\nu_f) \;-\; \Delta\alpha \;-\; \dfrac{(1+\nu_{12,c})\,\alpha_f^{\mathrm{ax}}\, f\, E_f^{\mathrm{ax}}}{(1-f)E_m + fE_f^{\mathrm{ax}}}}{\dfrac{(1+\nu_{12,c})(1-f)E_m}{(1-f)E_m + fE_f^{\mathrm{ax}}} \;-\; (1-f)(1+\nu_m)}$$