$$= \frac{(0.35)(0.015 \text{ x } 10^{-3} \text{ m})}{(4)(80 \text{ MPa})(5 \text{ x } 10^{-3} \text{ m})} = 3.28 \text{ x } 10^{-6} \text{ (MPa)}^{-1} \quad \left[2.23 \text{ x } 10^{-8} \text{ (psi)}^{-1}\right]$$

Furthermore,

$$b = -V_f = -0.35$$

And

$$c = \sigma_{cd}^* - \sigma_m'(1 - V_f)$$

$$= 1200 \text{ MPa} - (6.55 \text{ MPa})(1 - 0.35) = 1195.74 \text{ MPa} \quad (174{,}383 \text{ psi})$$

Now solving the above quadratic equation for σ_f^* yields

$$\sigma_f^* = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-(-0.35) \pm \sqrt{(-0.35)^2 - (4)\left[3.28 \text{ x } 10^{-6} \text{ (MPa)}^{-1}\right](1195.74 \text{ MPa})}}{(2)\left[3.28 \text{ x } 10^{-6} \text{ (MPa)}^{-1}\right]}$$

$$= \frac{0.3500 \pm 0.3268}{6.56 \text{ x } 10^{-6}} \text{ MPa} \quad \left[\frac{0.3500 \pm 0.3270}{4.46 \text{ x } 10^{-8}} \text{ psi}\right]$$

This yields the two possible roots as

$$\sigma_f^*(+) = \frac{0.3500 + 0.3268}{6.56 \text{ x } 10^{-6}} \text{ MPa} = 103{,}200 \text{ MPa} \quad (15.2 \text{ x } 10^6 \text{ psi})$$

$$\sigma_f^*(-) = \frac{0.3500 - 0.3268}{6.56 \text{ x } 10^{-6}} \text{ MPa} = 3537 \text{ MPa} \quad (515{,}700 \text{ psi})$$

Upon consultation of the magnitudes of σ_f^* for various fibers and whiskers in Table 16.4, only $\sigma_f^*(-)$ is reasonable. Now, using this value, let us calculate the value of l_c using Equation 16.3 in order to ascertain if use of Equation 16.18 in the previous treatment was appropriate. Thus