

8.2 In order to estimate the theoretical fracture strength of this material it is necessary to calculate σ_m using Equation 8.1 given that $\sigma_0 = 1035$ MPa, $a = 0.5$ mm, and $\rho_t = 5 \times 10^{-3}$ mm. Thus,

$$\begin{aligned}\sigma_m &= 2\sigma_0 \left(\frac{a}{\rho_t} \right)^{1/2} \\ &= (2)(1035 \text{ MPa}) \left[\frac{0.5 \text{ mm}}{5 \times 10^{-3} \text{ mm}} \right]^{1/2} = 2.07 \times 10^4 \text{ MPa} = 207 \text{ GPa} \quad (3 \times 10^6 \text{ psi})\end{aligned}$$