CHAPTER 8

FAILURE

PROBLEM SOLUTIONS

Principles of Fracture Mechanics

8.1 This problem asks that we compute the magnitude of the maximum stress that exists at the tip of an internal crack. Equation 8.1 is employed to solve this problem, as

$$\sigma_m = 2\sigma_0 \left(\frac{a}{\rho_t} \right)^{1/2}$$

$$= (2)(140 \text{ MPa}) \left[\frac{\dfrac{3.8 \text{ x } 10^{-2} \text{ mm}}{2}}{1.9 \text{ x } 10^{-4} \text{ mm}} \right]^{1/2} = 2800 \text{ MPa} \quad (400{,}000 \text{ psi})$$