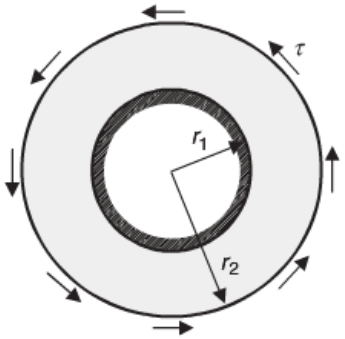
8-15, 26 and 48

8.15 Consider the axisymmetric problem of an annular disk with a fixed inner radius and loaded with uniform shear stress τ over the outer radius. Using the Airy stress function term $a_4\theta$, show that the stress and displacement solution for this problem is given by

$$\sigma_r = \sigma_\theta = 0, \quad \tau_{r\theta} = \tau\frac{r_2^2}{r^2}$$

$$u_r = 0, \quad u_\theta = \frac{1+\nu}{E}\tau r_2^2\left(\frac{r}{r_1^2} - \frac{1}{r}\right)$$



8.26* Using superposition of the stress field (8.4.15), develop solution (8.4.18) for the equal but opposite biaxial loading on a stress-free hole shown in Figure 8.15(a). Also justify that this solution will solve the shear loading case shown in Figure 8.15(b). Construct a polar plot (similar to Figure 8.13) of $\sigma_\theta(a,\theta)/T$ for this case.

8.48 Solve the rotating disk problem of Example 8.11 for the case of an annular disk with inner radius a and outer radius b being stress free. Explicitly show that for the case $b >> a$, the maximum stress is approximately twice that of the solid disk.