where $N = a^2 - b^2 + (a^2 + b^2) \log b/a$, where the log is a natural logarithm. For the restraints shown in Fig. 2.11(a) the solution for displacements is given by

$$u_r = \frac{P}{NE}\left\{ \left[\frac{1}{2}(1-3\nu)r^2 - \frac{a^2b^2(1+\nu)}{2r^2} - (a^2+b^2)(1-\nu)\log r - K\right]\sin\theta \right.$$
$$\left. + (a^2+b^2)(2\theta-\pi)\cos\theta \right\}$$
$$u_\theta = -\frac{P}{NE}\left\{ \left[\frac{1}{2}(5+\nu)r^2 - \frac{a^2b^2(1+\nu)}{2r^2} + (a^2+b^2)[(1-\nu)\log r + (1+\nu)] + K\right]\cos\theta \right.$$
$$\left. + (a^2+b^2)(2\theta-\pi)\sin\theta \right\}$$

where for $u_r(a, \pi/2) = 0$ we obtain

$$K = \left[\frac{1}{2}(1-3\nu)a^2 - \frac{b^2(1+\nu)}{2} - (a^2+b^2)(1-\nu)\log a\right] .$$

In the above E and ν are the elastic modulus and Poisson ratio; a and b are the inner and outer radii, respectively (see Fig. 2.11).