changes, the induced stresses are expected to change accordingly and the critical points on the boundary will change as well.

Elliptical opening

An elliptical opening is defined in Fig. 7.11 under field stresses σ_{max} and σ_{min}, where L_1 // σ_{min} and L_2 // σ_{max}. Based on elasticity theory, the tangential stress at critical Point A (or B, along the direction of σ_{min}) on the opening boundary is given by:

$$\sigma_{\theta A} = \sigma_{max} (1 + 2 L_1/L_2 - k) \tag{7.14}$$

or

$$\sigma_{\theta A} = \sigma_{max} (1 + \sqrt{2 L_1/r_A} - k) \tag{7.14a}$$

and at Point C (or D, along the direction of σ_{max}) is given by

$$\sigma_{\theta C} = \sigma_{max} [k(1 + 2 L_2/L_1) - 1] \tag{7.15}$$

or

$$\sigma_{\theta C} = \sigma_{max} [k(1 + \sqrt{2 L_2/r_C}) - 1] \tag{7.15a}$$

where r_A and r_C are the radii of curvature at A and C.

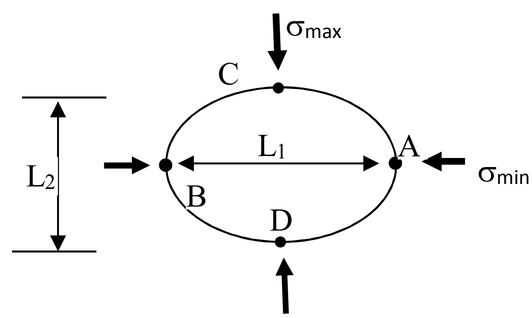

Fig. 7.11 Dimension of elliptical opening.

The above equations have in fact included Eqns. 7.12 and 7.13 for a circular opening if $L_1 = L_2$ is used. Equations 7.14 and 7.15 include two important factors: the curvature at a corner, represented by radius r and the opening orientation, (represented by L_2/L_1 ratio), relative to the major stress in the field. The effects of the two factors are examined below.