In view of (5–252) this gives

$$\zeta = -\frac{\Delta}{\sigma'} \; . \tag{5–255}$$

The flattening of the surfaces of constant density may then be expressed by

$$f = \frac{(r_0 + \zeta_a) - (r_0 + \zeta_b)}{r_0 + \zeta_a} \doteq \frac{\zeta_a - \zeta_b}{r_0} \quad , \tag{5–256}$$

where ζ_a and ζ_b are the values of ζ at the equator and at the poles, respectively. By (5–255) this becomes (with r_0 replaced by r)

$$f = -\frac{\Delta_a - \Delta_b}{r\sigma'} = \frac{\Delta_a - \Delta_b}{r^2(2b_0 + 4b_2 r^2)} \quad . \tag{5–257}$$

The singularity in ellipsoidal coordinates. Before studying (5–257) further, we must consider a strange singularity of the ellipsoidal coordinate system. The equatorial plane, coinciding with the xy-plane in Fig. 5.4, is given by two equations: *outside*

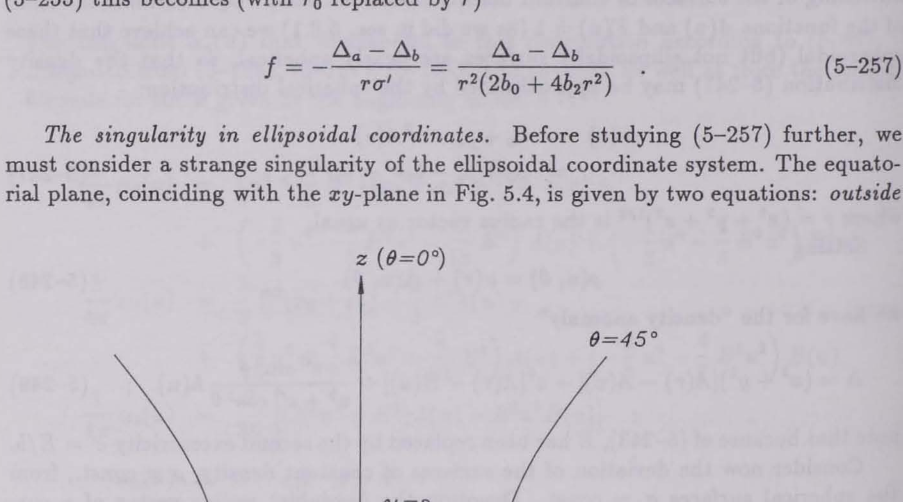

FIGURE 5.4: The "focal disc singularity" in the ellipsoidal coordinate system; ϵ is an arbitrary small number (dimensionless if $b = 1$)

the "focal disc" obtained by rotating OF_2 around the z-axis and indicated by the segment F_1F_2 in Fig. 5.4, we have (e.g., for point A):

$$\theta = 90° \quad , \tag{5–258}$$