(Fig. 8.4, (b)). Since the upper boundary is to remain horizontal, the total effect is a thickening of the plate. If m_P denotes the mass of the point load, then its weight, or the force it exerts on the plate, obviously is $m_P g$, g being gravity as usual.

Fig. 8.5 shows the lower boundary of this plate. This boundary surface is obtained

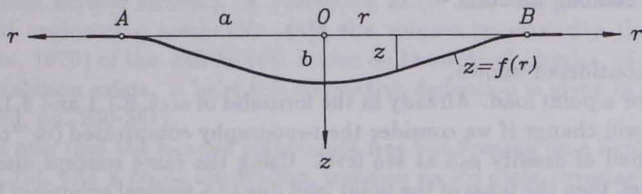

FIGURE 8.5: The bending curve

by rotating the bending curve around the z-axis; we obviously presuppose isotropy. We further assume the curve to be nonzero only in the region $r < a$, $a = AO = OB$, and to be tangent to the coordinate axes at the end points A and B. (In modern terminology, $f(r)$ is a "function of compact support", cf. sec. 7.5.)

The equilibrium condition obviously is

$$(\rho_1 - \rho_0) \iint_S f(r) dS = 1 \quad , \tag{8–18}$$

if the mass m_P of the point load P is considered 1 (1 kg or 1 ton, say), S being the circle of radius a around O. This equation expresses the fact that the point load of mass 1 (right–hand side) is balanced by the hydrostatic uplift caused by the density difference $\rho_1 - \rho_0$ (left–hand side).

The bending curve is given by Hertz' theory of the bending of an elastic plate, as we shall see below. What we need now are only the principal functional values (Table 8.1). The constants l (Vening Meinesz' "degree of regionality") and b must be

TABLE 8.1: The bending curve after Hertz and Vening Meinesz

r	$f(r)$
0	b
l	$0.646\, b$
$2\, l$	$0.258\, b$
$3\, l$	$0.066\, b$
$3.887\, l$	0.000

selected appropriately; obviously

$$a = 3.887\, l \quad . \tag{8–19}$$