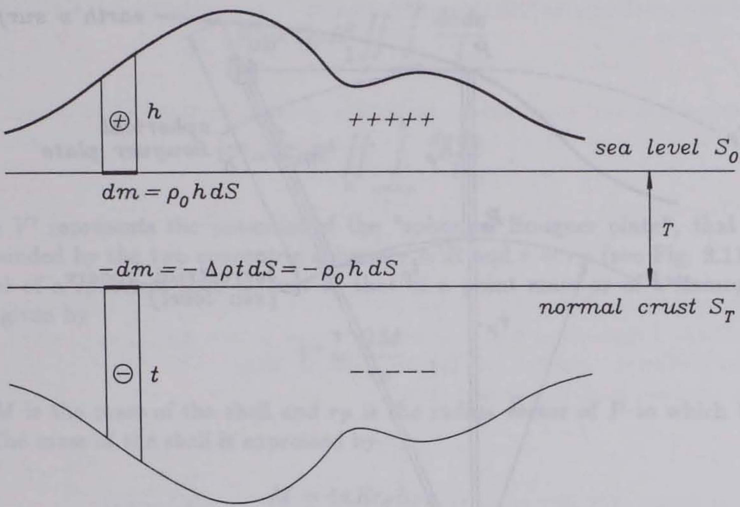

FIGURE 8.10: Topographic and isostatic masses form a dipole

This simplified concept of isostasy as a dipole field goes indirectly back to Helmert (1903) and was directly used by Jung (1956) and others. It is very useful for a deeper qualitative understanding of isostatic anomalies (cf. Turcotte and Schubert, 1982, p. 223). We shall follow (Moritz, 1968c).

8.2.1 Potential of the Topographic Masses

As a preparatory step, we first restrict ourselves to the topographic masses only, disregarding isostatic compensation until sec. 8.2.4. We shall restrict ourselves throughout to the usual *spherical approximation*, that is, we replace formally the geoid by a mean terrestrial sphere of radius R; see Fig. 8.11. The potential of the topographic masses (the masses outside the geoid) is

$$V = G\rho \iiint \frac{dv}{l} \quad . \tag{8–40}$$

The integral is extended over the exterior of the geoid ($R < r < R + h$); dv is the element of volume, and l is the distance between dv and the point P to which V refers. The density ρ is assumed to be constant (we shall now write ρ instead of ρ_0).

We have in (8–40)

$$dv = r^2 d\sigma dr \quad , \tag{8–41}$$

where $d\sigma$, as before is the element of solid angle, and

$$l = \sqrt{r_P^2 + r^2 - 2r_P r \cos\psi} \quad , \tag{8–42}$$