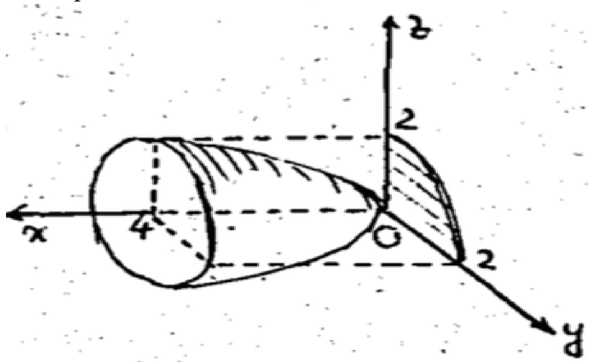
When S is given by (1') (or by 1"), dσ can be projected to one of the coordinate planes in which the transformed double integral is simpler. If S is projected onto xy-plane, say, (1') becomes

$\iint_S Pcos(\alpha) + 0cos(\beta) + Rcos(\gamma))sec(\gamma)dxdy$

Example 1. Evaluate where S is the surface $x = y^2 + z^2, 0 \leq x \leq 4$



Solution. R(yz) : $y^2 + z^2 = 4$

$$\int_2^2 \int_{-\sqrt{4-y^2}}^{\sqrt{4-y^2}} y^2 + z^2 - z\,dz\,dy.$$

$$\int_2^2 y^2 z + \frac{z^3}{3} - \frac{z^2}{2}\Big|_{-\sqrt{4-y^2}}^{\sqrt{4-y^2}} dy$$

$$2\int_{-2}^2 y^2\sqrt{4-y^2} + \frac{1}{3}(4-y^2)\sqrt{4-y^2}dy$$

$$2\int_{-2}^2 frac23y^2\sqrt{4-y^2} + \frac{4}{3}\sqrt{4-y^2}dy$$

$$= \frac{8}{3}\pi + \frac{16}{3}\pi = 8\pi$$

Example 2.Evaluate

$$I = \iint_S x^2 < dy\,dz + y^2xdzdx + xydxdy$$

where S is the cone $x^2 + y^2 = (z-4)^2$ with $0 \leq z \leq 4$