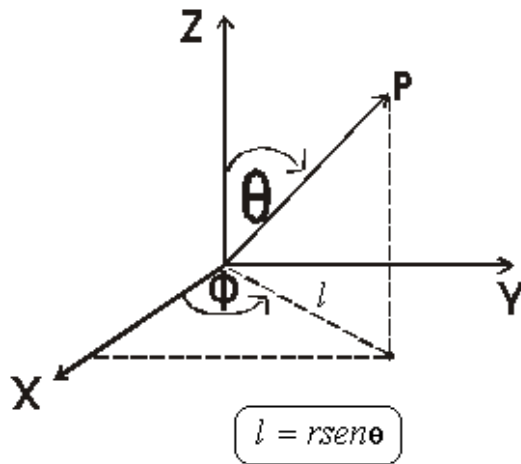


Coordenadas Esféricas



P en coordenadas cartesianas: (x, y, z)

P en coordenadas esféricas: (r, θ, ϕ)

θ = colatitud

* $\theta = 0$ en el polo norte

* $\theta = \pi$ en el polo sur

ϕ = longitud (meridional)

ϕ de 0 a 2π

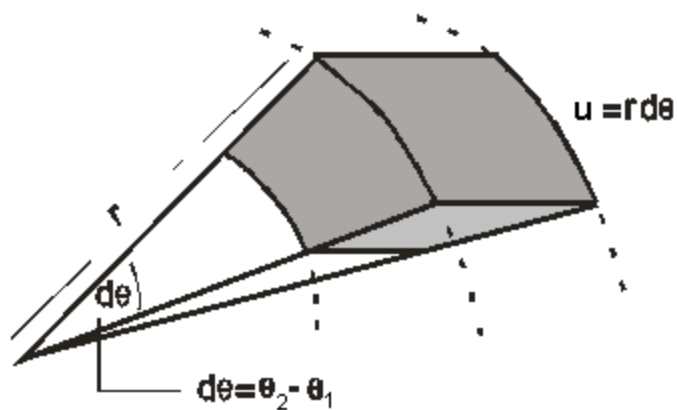
Importante

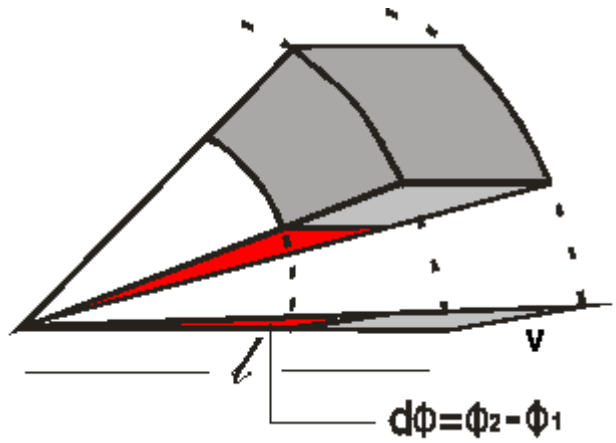
$$x = l \cos \phi = r \operatorname{sen} \theta \cos \phi$$

$$y = l \operatorname{sen} \phi = r \operatorname{sen} \theta \operatorname{sen} \phi$$

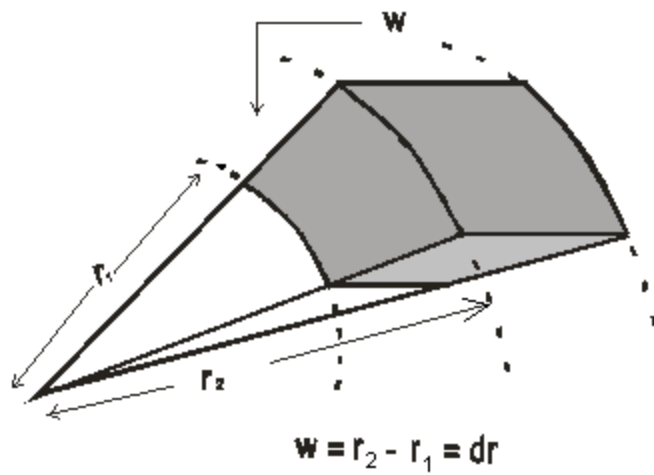
$$z = r \cos \theta$$

Elemento de volumen





$$v = l d\phi = (r \text{sen} \theta) d\phi$$



Finalmente:

$$dVol = u v w = r^2 \text{ Sen} \theta \, dr \, d\theta \, d\phi$$

