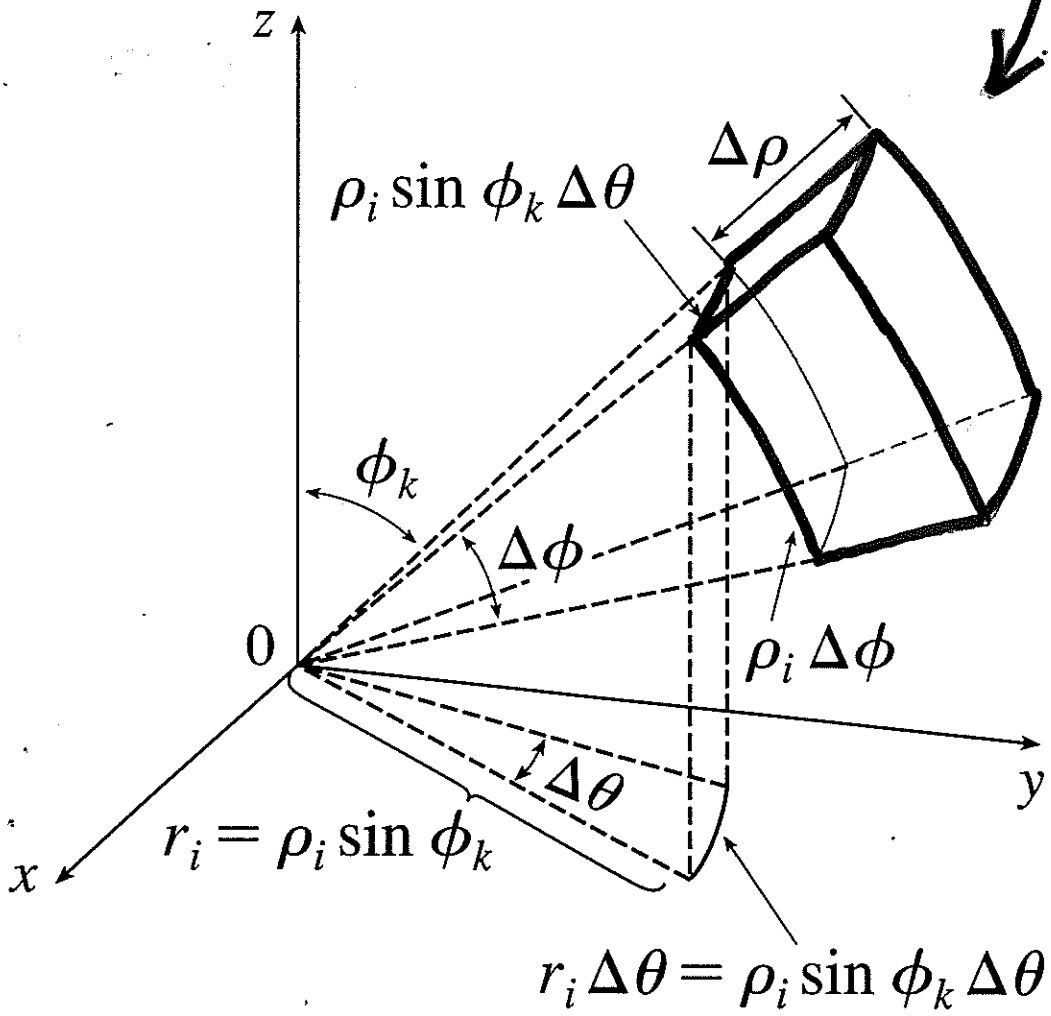
Spherical Volume Element

$$dV = \rho^2 \sin\phi \, d\rho \, d\theta \, d\phi$$



Spherical Coordinates

$$dV = \rho^2 \sin\phi \, d\rho \, d\theta \, d\phi$$

Outer: $d\phi$ ϕ normally varies from cone $\phi = \alpha$ (LL) to cone $\phi = \beta$ (UL).

Middle: $d\theta$ θ may vary from curve $\theta = g(\phi)$ to curve $\theta = h(\phi)$.

Inner: $d\rho$ ρ may vary from inner surface $\rho = a(\theta, \phi)$ to outer surface $\rho = b(\theta, \phi)$.

So

$$\iiint_E dV = \int_\alpha^\beta \int_{g(\phi)}^{h(\phi)} \int_{a(\theta,\phi)}^{b(\theta,\phi)} f \cdot \rho^2 \sin\phi \, d\rho \, d\theta \, d\phi$$