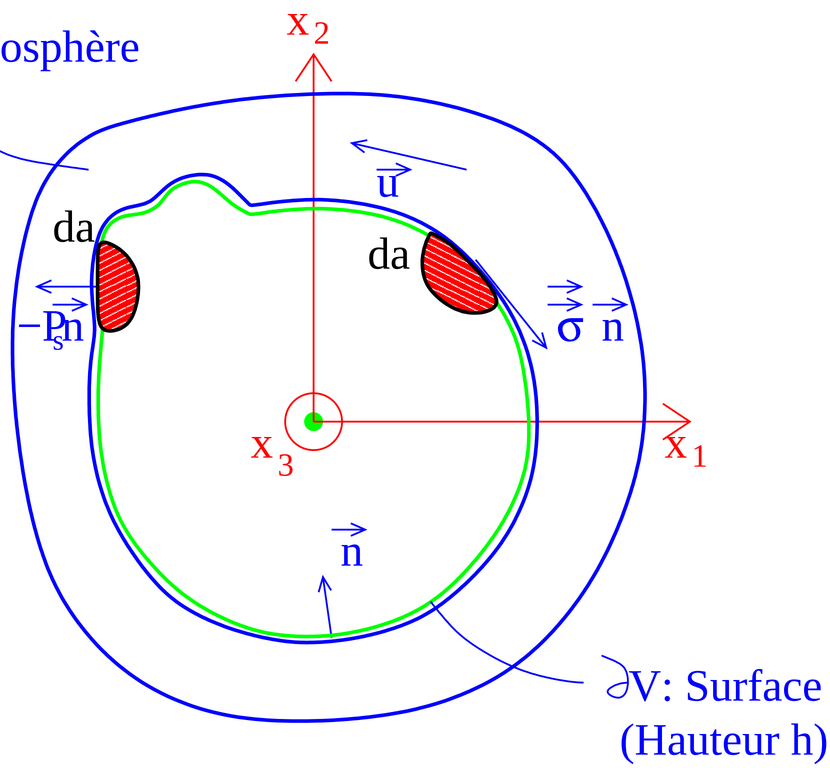
Atmosphère seule, composante polaire (selon x_3)



$$\frac{d}{dt}M = \frac{d}{dt}(M_R + M_\Omega) = T_M + T_B$$

Atmosphère mince et hydrostatique:

Moment angulaire de vent (relatif):

$$M_r = \int_V \rho r \cos\theta u dV = \int_0^{2\pi}\int_{-\pi/2}^{\pi/2}\int_0^{P_s} r^2\cos\theta r\cos\theta u \frac{dp}{g} d\lambda d\theta$$

Moment angulaire de masse:

$$M_\Omega = \int_{\partial V} r\cos\theta \ (\Omega r\cos\theta) \ \frac{P_s}{g} da = \int_0^{2\pi}\int_{-\pi/2}^{\pi/2}\frac{r^4\Omega}{g}\cos\theta^3 P_S d\lambda d\theta$$

Couple des montagnes:

$$T_M = -\int_{\partial V} P_s \frac{\partial h}{\partial \lambda} da = -\int_0^{2\pi}\int_{-\pi/2}^{\pi/2} r^2\cos\theta P_s \frac{\partial h}{\partial \lambda} d\theta d\lambda$$

Couple du à la friction de couche limite:

$$T_F = \int_{\partial V} r\cos\theta \tau_{s\lambda} da = \int_0^{2\pi}\int_{-\pi/2}^{\pi/2} r^2\cos\theta r\cos\theta\tau_{s\lambda} d\theta d\lambda$$

r rayon de la terre, g gravité, Ω taux de rotation moyen, u vent zonal. p pression, P_S pression au sol, λ longitude, θ latitude.