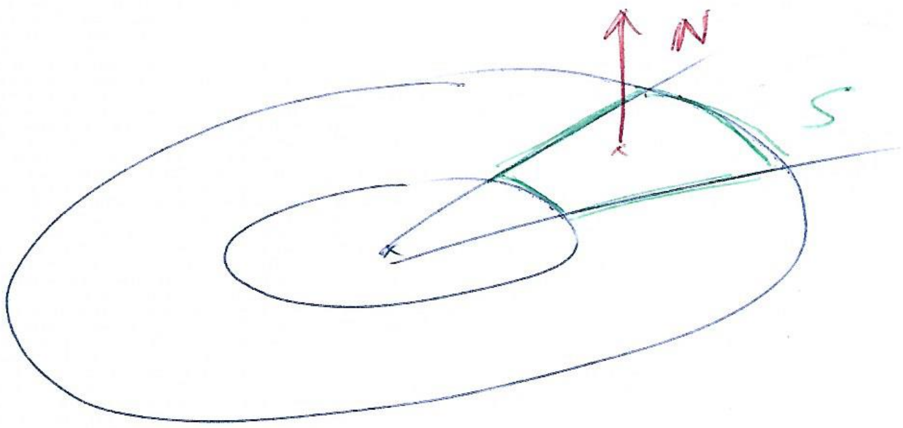
Frein à disque

I) Contact disque / plaquette

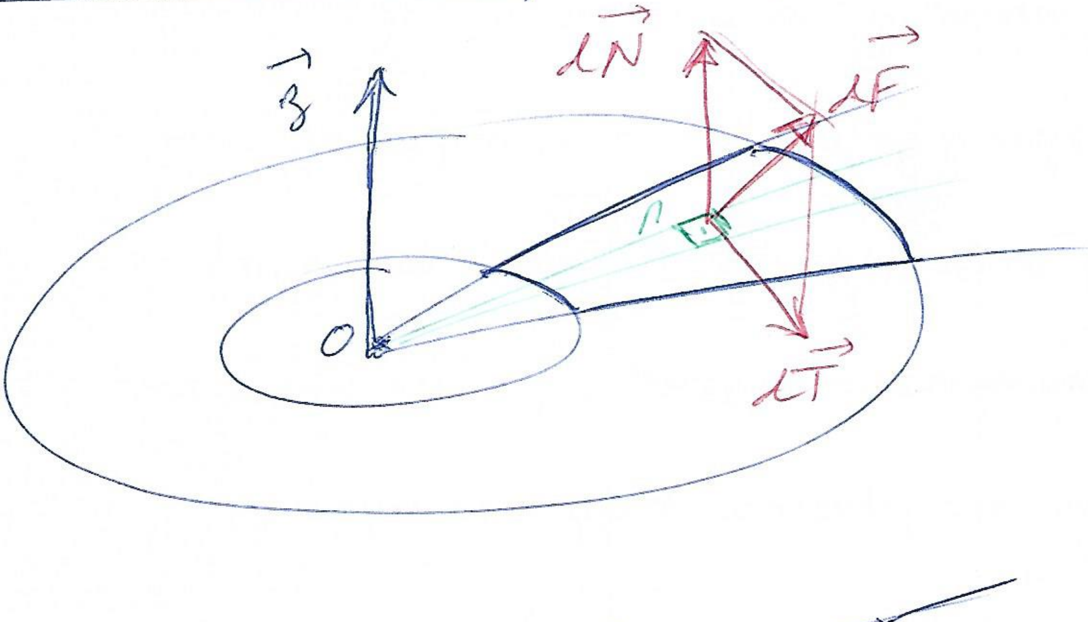


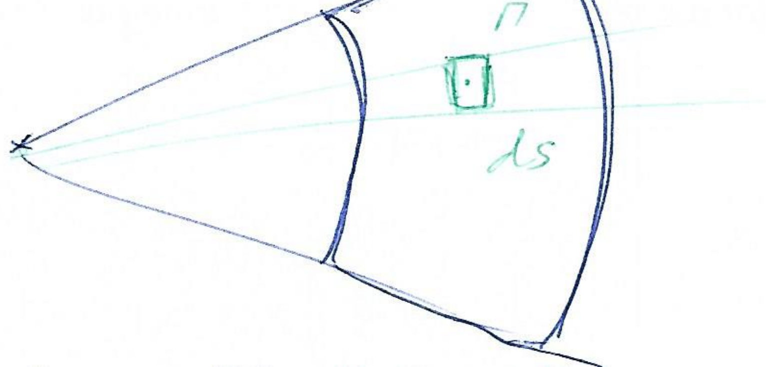
p : pression de contact. (uniforme)

$$N = p \cdot S = p\,\alpha\left(r_2^2 - r_1^2\right) \Longrightarrow p = \frac{N}{\alpha\left(r_2^2 - r_1^2\right)}$$

<u>Remarque</u> : avec le disque complet $S = \pi\left(r_2^2 - r_1^2\right)$

II) Contact local disque / plaquette.





(2)

<u>Au point M</u> (contact avec frottements, $V \neq 0$)

$$d\vec{F} = d\vec{N} + d\vec{T}$$

$dT = f \cdot dN$ (on est sur le cône)

$$\left.\begin{array}{l} dN = p \cdot dS \\ dS = r\,dr\,d\theta \end{array}\right\} \Longrightarrow dT = f\,p\,r\,dr\,d\theta.$$

<u>Moment élémentaire de freinage</u> autour de $(O, \vec{z})$

$$d\vec{M}(O) = dM(O) \cdot \vec{z}$$

Moment = Force × Bras de levier

$$dM(O) = dT \times r = f\,p\,r^2\,dr\,d\theta.$$

<u>Moment de freinage</u> (couple de freinage).

$$\vec{M}(O) = \int_S d\vec{M}(O)$$

$$M(O) = f\,p \int_{r_1}^{r_2} r^2 \int_{-\alpha}^{\alpha} d\theta = f\,p \left[\frac{r^3}{3}\right]_{r_1}^{r_2} \left[\theta\right]_{-\alpha}^{\alpha}$$

$$M(O) = f\,p\,\frac{r_2^3 - r_1^3}{3} \times 2\alpha$$

$$\text{avec } p = \frac{N}{\alpha(r_2^2 - r_1^2)}$$

$$M(O) = \frac{2 f N (r_2^3 - r_1^3)}{3 (r_2^2 - r_1^2)} \longleftarrow \text{Pour une plaquette !}$$