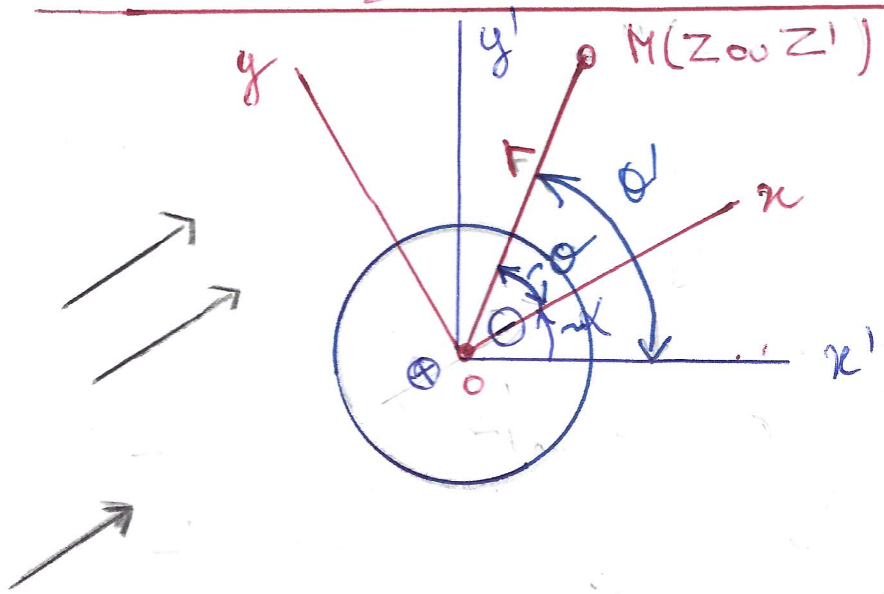
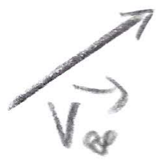
Angle d'incidence α :





$z = r e^{i\theta}$

$z' = r e^{i(\theta+\alpha)}$

$\theta' = \theta + \alpha$

$\cdot\; z = Re^{i\theta}$ dans $\{x, y\}$

$\cdot\; z' = Re^{i(\theta+\alpha)} = Re^{i\theta} e^{i\alpha} = z e^{i\alpha}$ dans $\{x', y'\}$

$$F(z) = V_\infty \left(z + \frac{a^2}{z} \right) - i \frac{\Gamma}{2\pi} \ln\left(\frac{z}{a}\right) \qquad (1)$$

posons $z = z' e^{-i\alpha}$ dans (1) :

$$F'(z') = F(z' e^{-i\alpha}) = V_\infty \left(z' e^{-i\alpha} + \frac{a^2}{z'} e^{i\alpha} \right) - i \frac{\Gamma}{2\pi} \ln\left(\frac{z' e^{-i\alpha}}{a} \right)$$

$z' = r e^{i\theta'}$

$$F'(z') = V_\infty \left(r e^{i\theta'} e^{-i\alpha} + \frac{a^2}{r} e^{-i\theta'} e^{i\alpha} \right) - i \frac{\Gamma}{2\pi} \ln\left(\frac{r e^{i\theta'} e^{-i\alpha}}{a} \right)$$

$$= r V_\infty \left[e^{-i\alpha} (\cos\theta' + i \sin\theta') + \frac{a^2}{r^2} e^{i\alpha} (\cos\theta' - i \sin\theta') \right]$$

$$- i \frac{\Gamma}{2\pi} \left[\ln\left(\frac{r}{a} e^{-i\alpha} \right) + \underbrace{\ln\left(e^{i\theta'}\right)}_{i\theta'} \right]$$

D'où :

$$\psi = r V_\infty \left(e^{-i\alpha} - \frac{a^2}{r^2} e^{i\alpha} \right) \sin\theta' - \frac{\Gamma}{2\pi} \ln\left(\frac{r}{a} e^{-i\alpha} \right)$$

Pour $r = a$: $\psi(a) = -\frac{\Gamma}{2\pi} \ln\left(e^{-i\alpha}\right) = $ constante.

LÉZÉ - LERONDA Fabrice

Ajoutons $\frac{\Gamma}{2\pi} \ln(e^{-i\alpha})$ à Ψ afin que cette fonction soit nulle sur le contour :

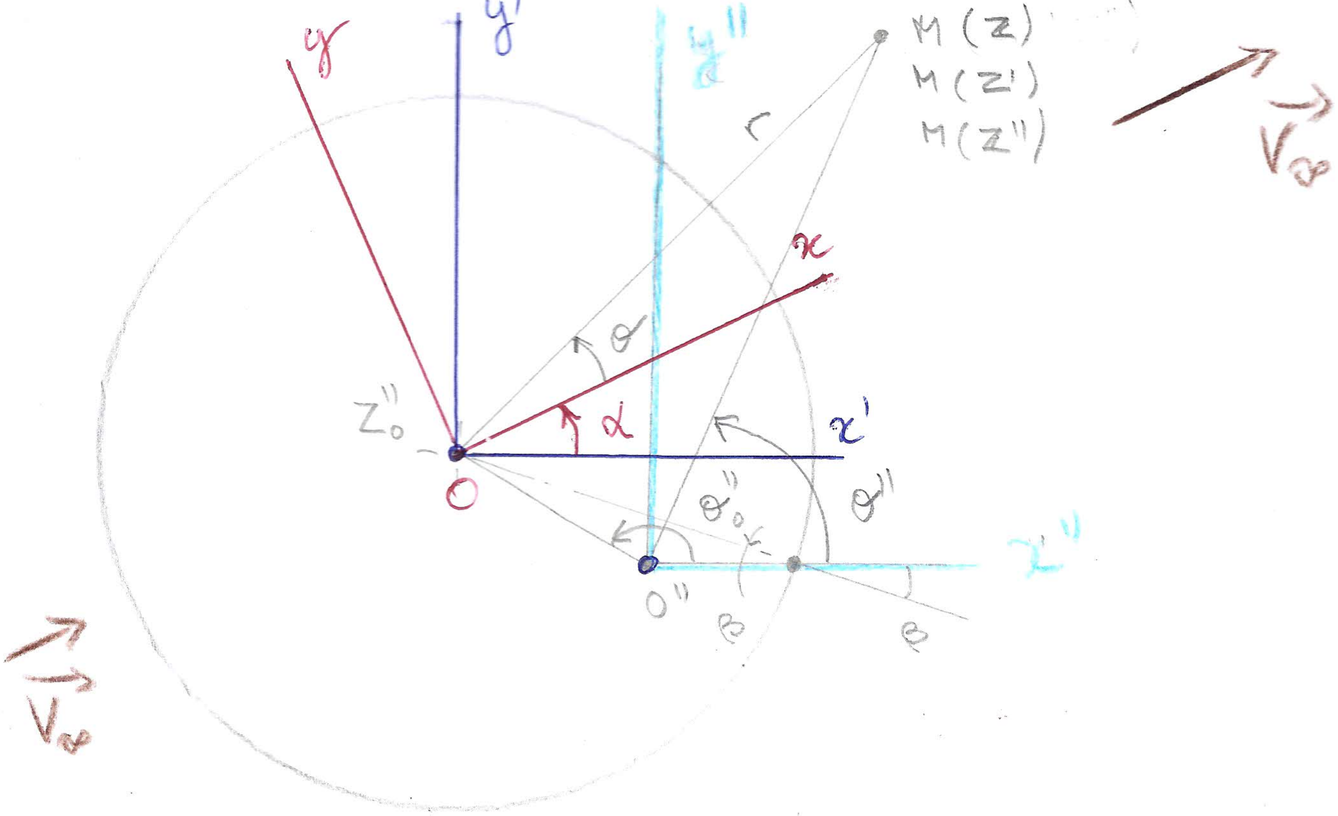
$$\Psi = r V_\infty \left(e^{-i\alpha} - \frac{a^2}{r^2} e^{i\alpha}\right) \sin\theta' - \frac{\Gamma}{2\pi} \ln\left(\frac{r}{a}\right)$$

$$F(Z') = V_\infty \left(Z' e^{-i\alpha} + \frac{a^2}{Z'} e^{i\alpha}\right) - i \frac{\Gamma}{2\pi} \ln\left(\frac{Z'}{a}\right)$$

- Circulation : $\Gamma = 4\pi a V_\infty \sin\theta_i$ dans $\{\vec{x}, \vec{y}\}$
- Position angulaire du point d'arrêt sur contour :
  - θ_i dans $\{\vec{x}, \vec{y}\}$
  - $\theta'_i = \theta_i + \alpha$ dans $\{\vec{x'}, \vec{y'}\}$

$\Rightarrow \theta_i = \theta'_i - \alpha.$

- Circulation : $\Gamma' = 4\pi a V_\infty \sin(\theta'_i - \alpha)$ dans $\{\vec{x'}, \vec{y'}\}$.



$$\theta' = \alpha + \theta$$

$$z = r e^{i\theta}$$

$$z' = r e^{i(\alpha+\theta)} = r e^{i\theta} e^{i\alpha} = z e^{i\alpha}$$

$$z'' = z''_0 + z' \Rightarrow z' = z'' - z''_0 .$$

DÉPLACEMENT DU CENTRE D'UN CONTOUR

Dans $\{\vec{x'}, \vec{y'}\}$:

$$F'(z') = V_\infty \left(z' e^{-i\alpha} + \frac{a^2}{z'} e^{i\alpha} \right) - i \frac{\Gamma}{2\pi} \ln \left(\frac{z'}{a} \right)$$

$$\Gamma' = 4\pi a V_\infty \sin(\theta'_i - \alpha)$$

$$V'(z') =$$

Dans $\{\vec{x''}, \vec{y''}\}$: $\quad z' = z'' - z''_0$

$$F''(z'') = V_\infty \left[(z'' - z''_0) e^{-i\alpha} + \frac{a^2}{z'' - z''_0} e^{i\alpha} \right] - i \frac{\Gamma}{2\pi} \ln \left(\frac{z'' - z''_0}{a} \right)$$

$$V(z'') = \frac{d F''(z'')}{d z''} =$$

$$\Gamma = -4\pi V_\infty a \sin(\alpha - \beta)$$