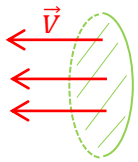
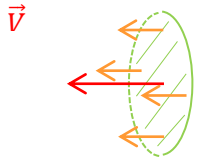
Rotationnel :

On reprend la même conduite, on a tjrs $div\vec{V} = 0$ car le fluide est incompressible. Mais on s'intéresse maintenant à l'écoulement du fluide : laminaire ou turbulent :

Ecoulement laminaire :



Ecoulement turbulent :

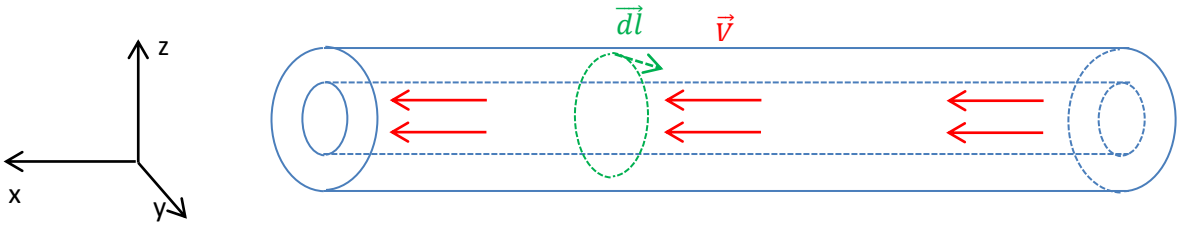


Cas laminaire :

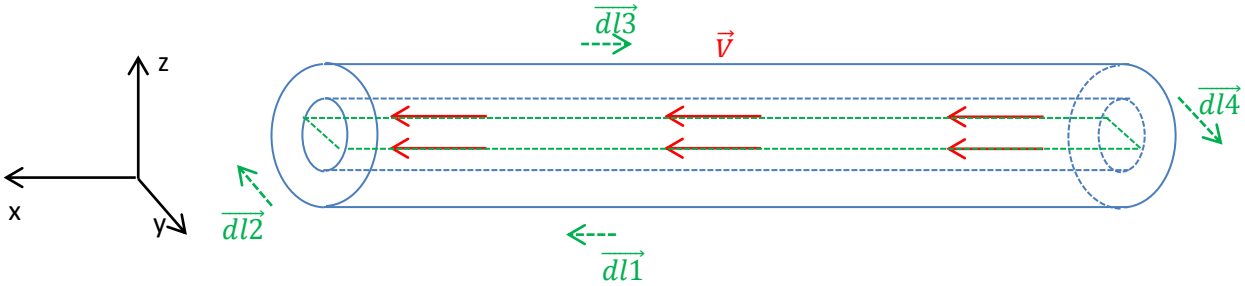
On appelle rotationnel : la variation du flux autour d'un axe (on se soucie des variations du flux sur le plan orthogonal à l'axe):

$$\overrightarrow{rot\ V} = \begin{cases} \frac{\partial Vz}{\partial y} - \frac{\partial Vy}{\partial z} \\ \frac{\partial Vx}{\partial z} - \frac{\partial Vz}{\partial x} \\ \frac{\partial Vy}{\partial x} - \frac{\partial Vx}{\partial y} \end{cases} = 0$$

=> Quel est le bon contour ?



=>La circulation est nulle car le contour est orthogonal au champ ????????

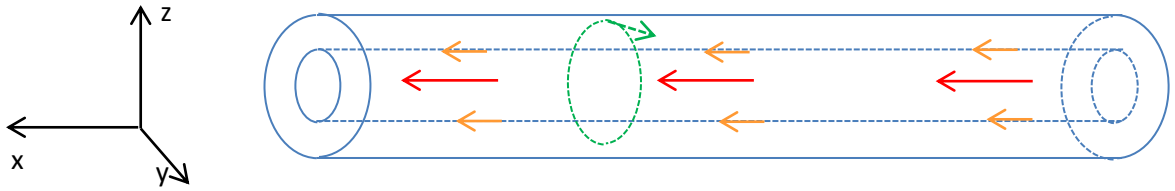


=>La circulation est nulle car on aurait : $\int_0^L \vec{V}.\overrightarrow{dl}1 + \int_L^0 \vec{V}.\overrightarrow{dl3} = 0$??????????

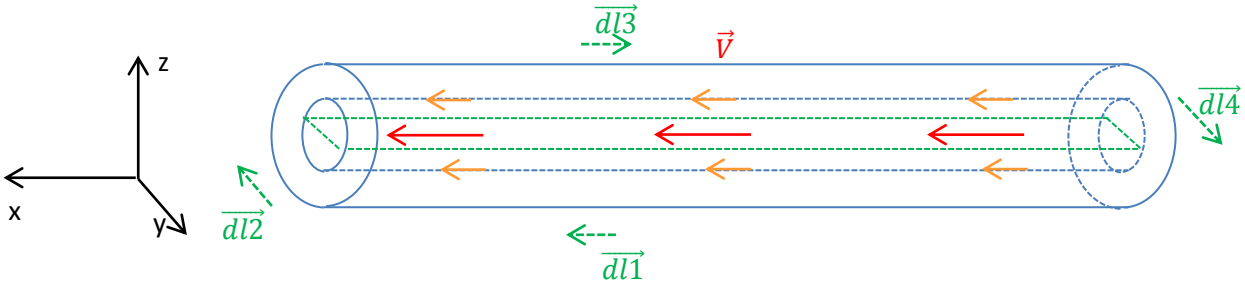
Cas turbulent :

$$\overrightarrow{rot\,V} = \begin{cases} \dfrac{\partial Vz}{\partial y} - \dfrac{\partial Vy}{\partial z} \\ \dfrac{\partial Vx}{\partial z} - \dfrac{\partial Vz}{\partial x} = \dfrac{\partial Vx}{\partial z}.\vec{y} - \dfrac{\partial Vx}{\partial y}.\vec{z} \\ \dfrac{\partial Vy}{\partial x} - \dfrac{\partial Vx}{\partial y} \end{cases}$$

Quel est le bon contour



=>La circulation est nulle car le contour est orthogonal au champ ????????



=>La circulation est nulle car on aurait : $\int_0^L \vec{V}.\overrightarrow{dl1} + \int_L^0 \vec{V}.\overrightarrow{dl3} = 0$??????????