

Ecoulements visqueux naturels et industriels

Prérequis :

Cinématique des fluides parfaits

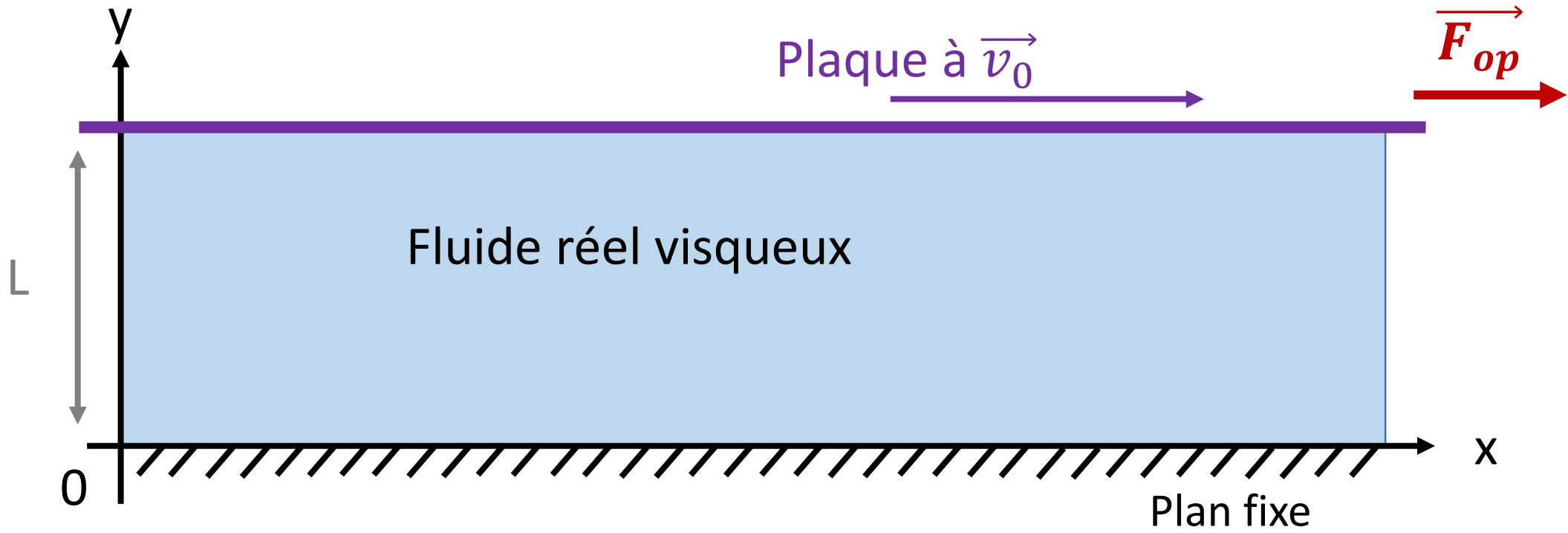
Description Eulerienne et Lagrangienne

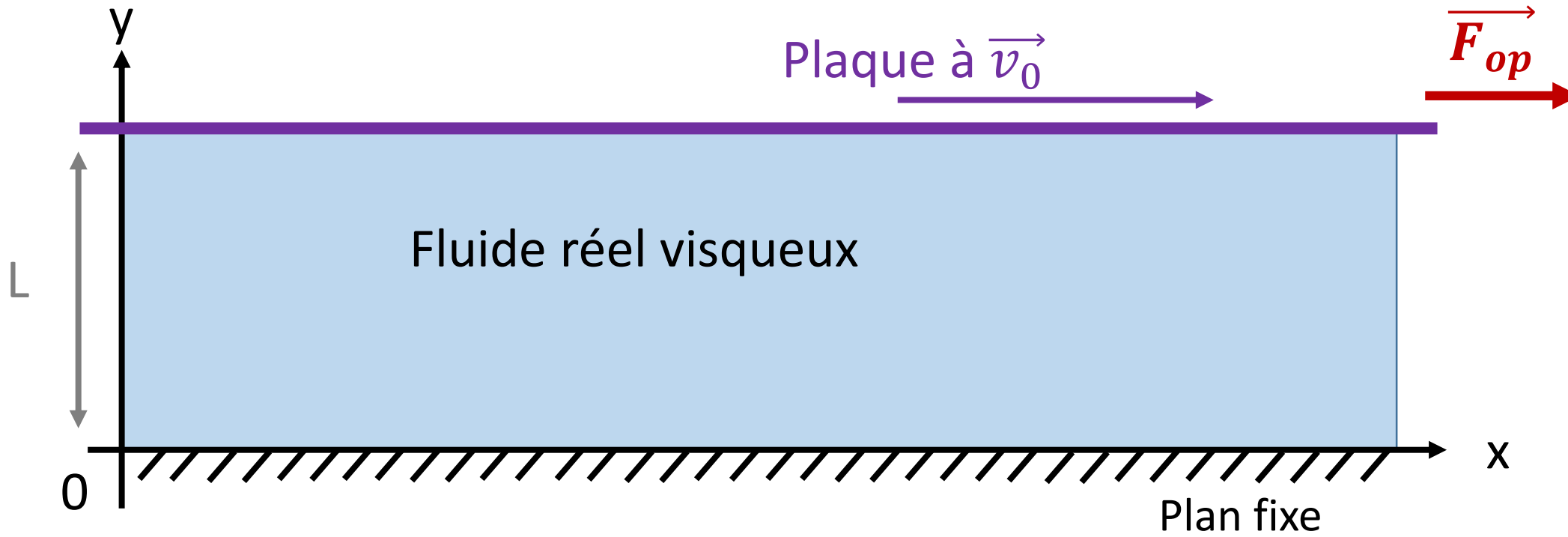
Fluide et Ecoulement incompressibles

Equation de conservation de la masse

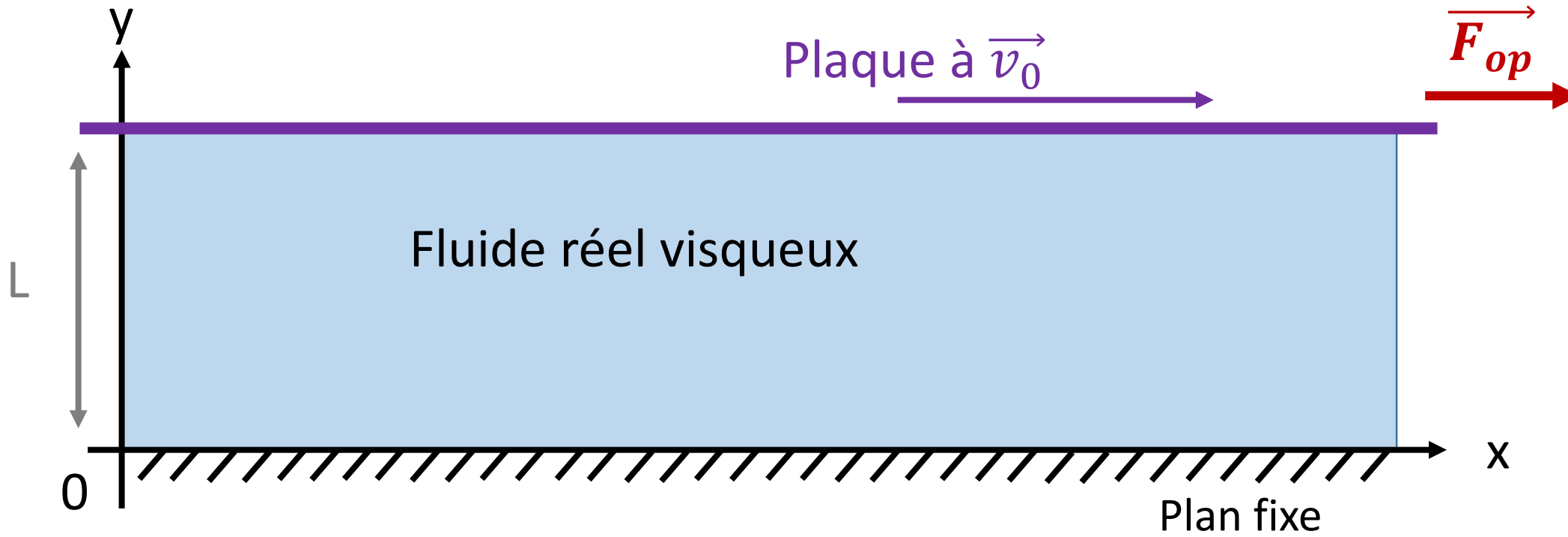
Equation d'Euler

Théorème de Bernoulli



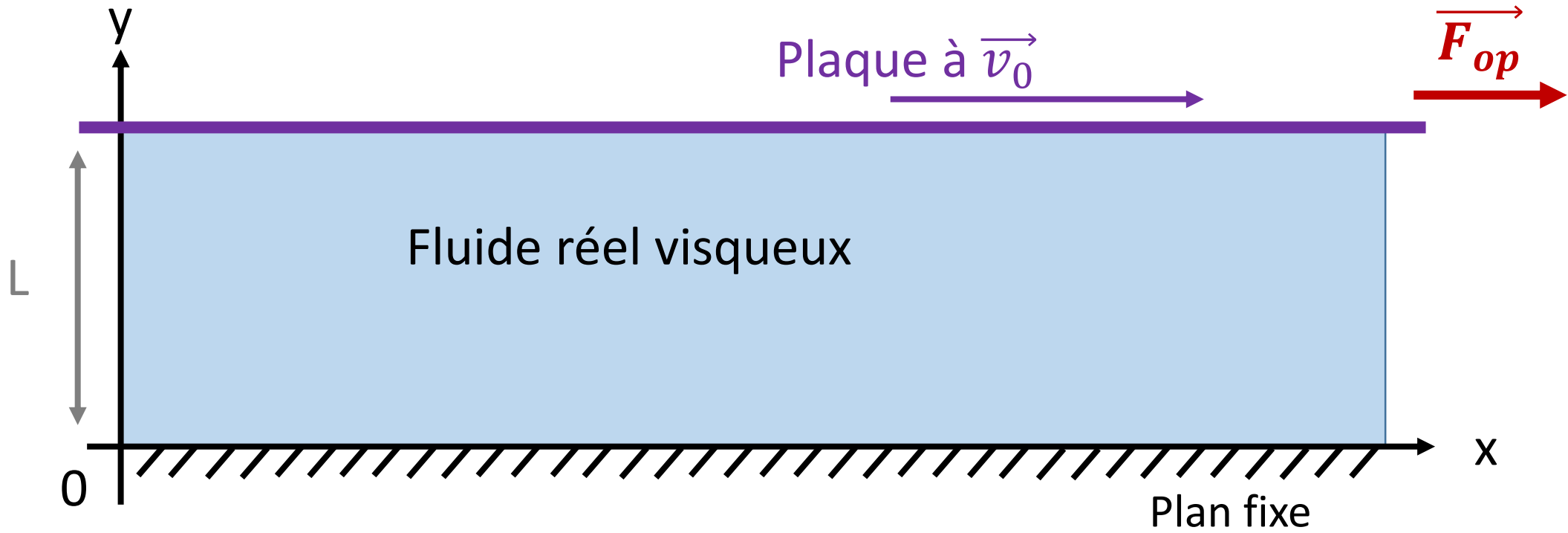


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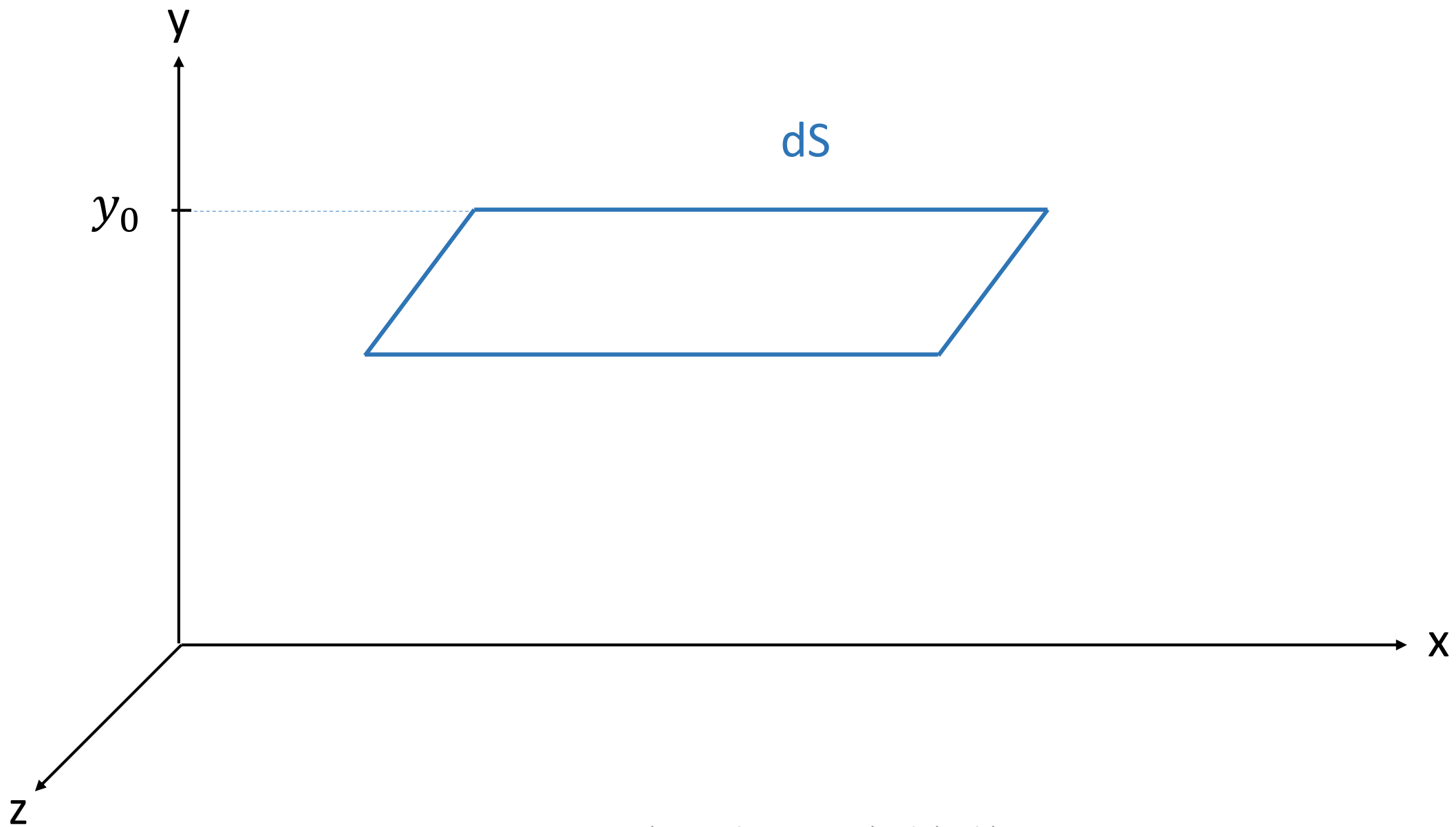
La viscosité dynamique η est le coefficient de proportionnalité.

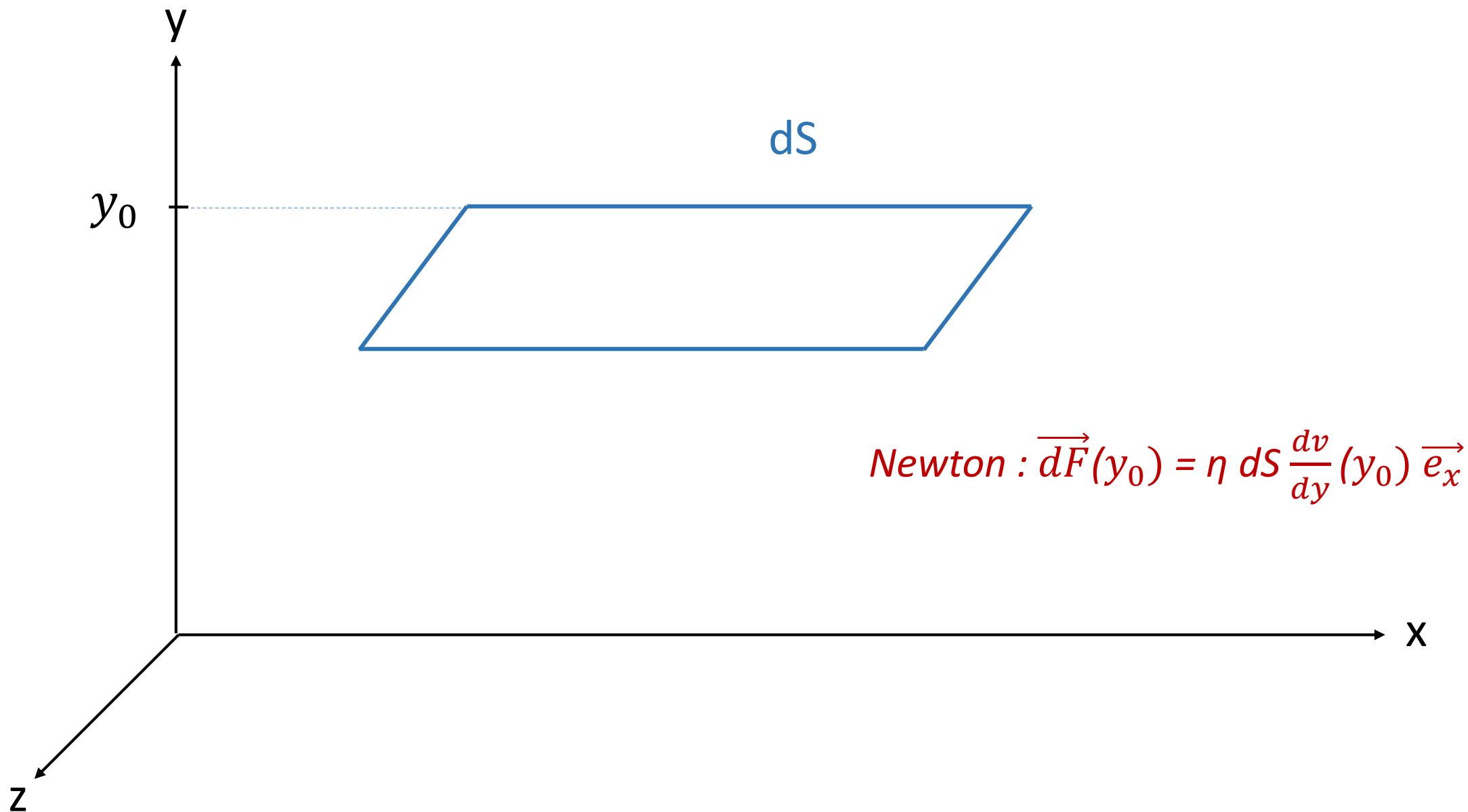


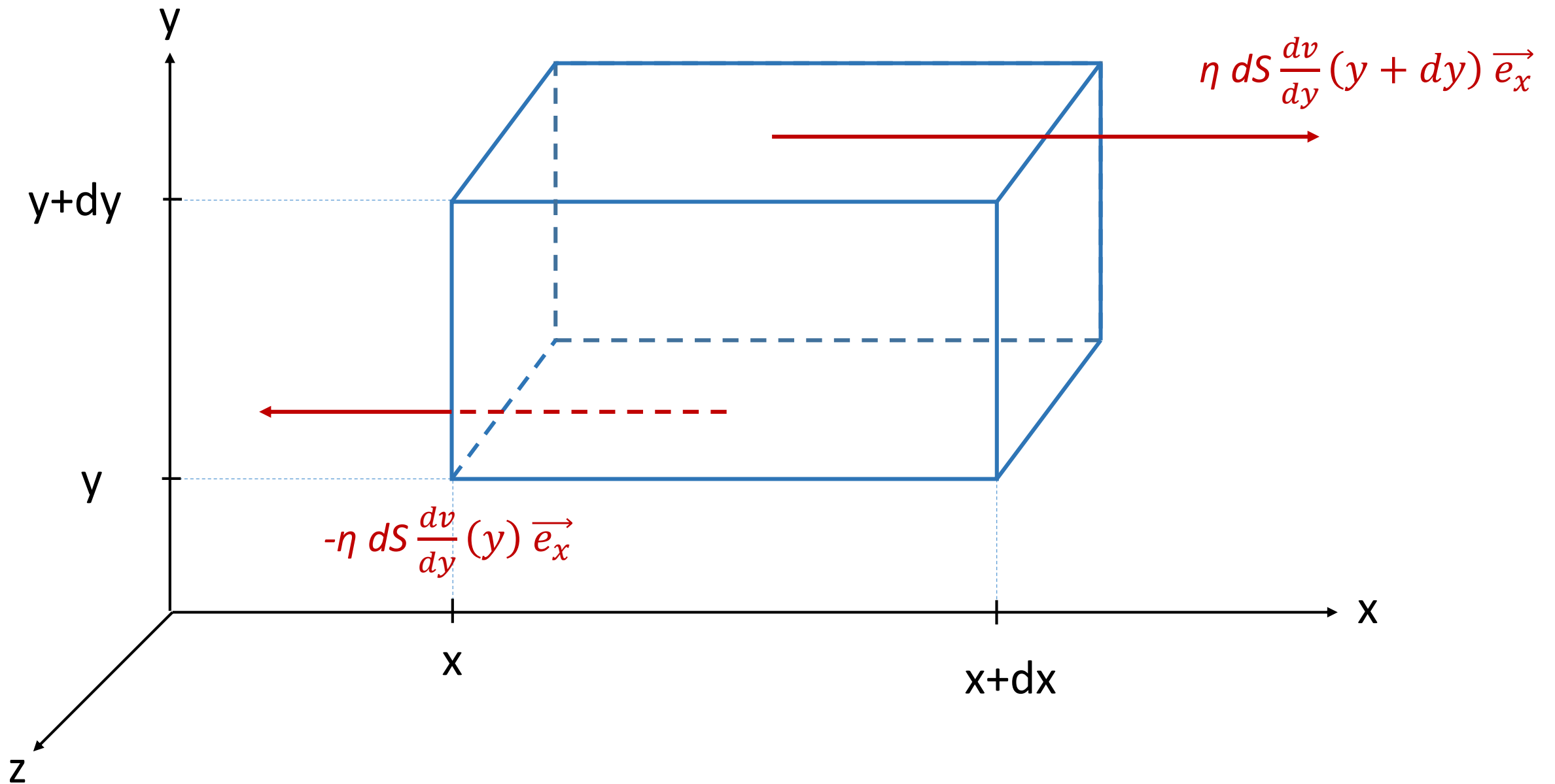
$$\vec{F}_{op} = \eta \frac{S v_0}{L} \vec{e}_x$$

ODG η :

- Air : $1,8 \cdot 10^{-5}$ Pa.s
- Eau : $1,0 \cdot 10^{-3}$ Pa.s
- Huile : 0,1 Pa.s
- Glycerine : environ 1 Pa.s

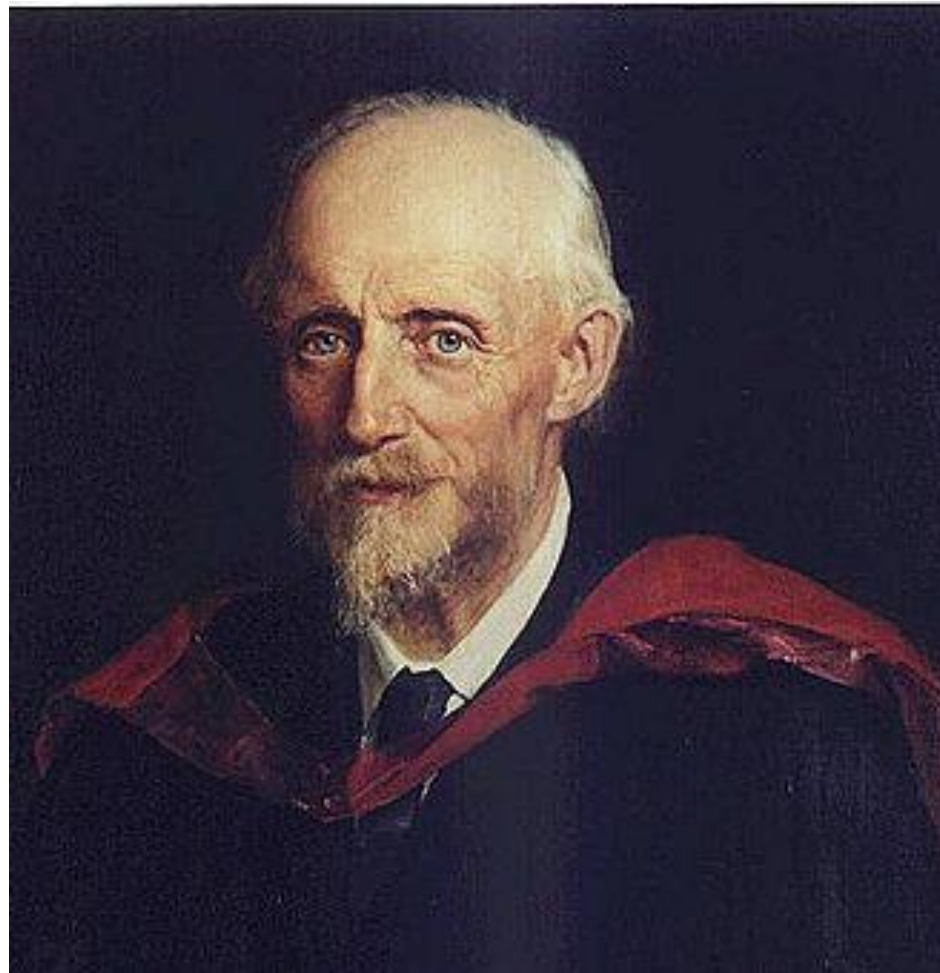




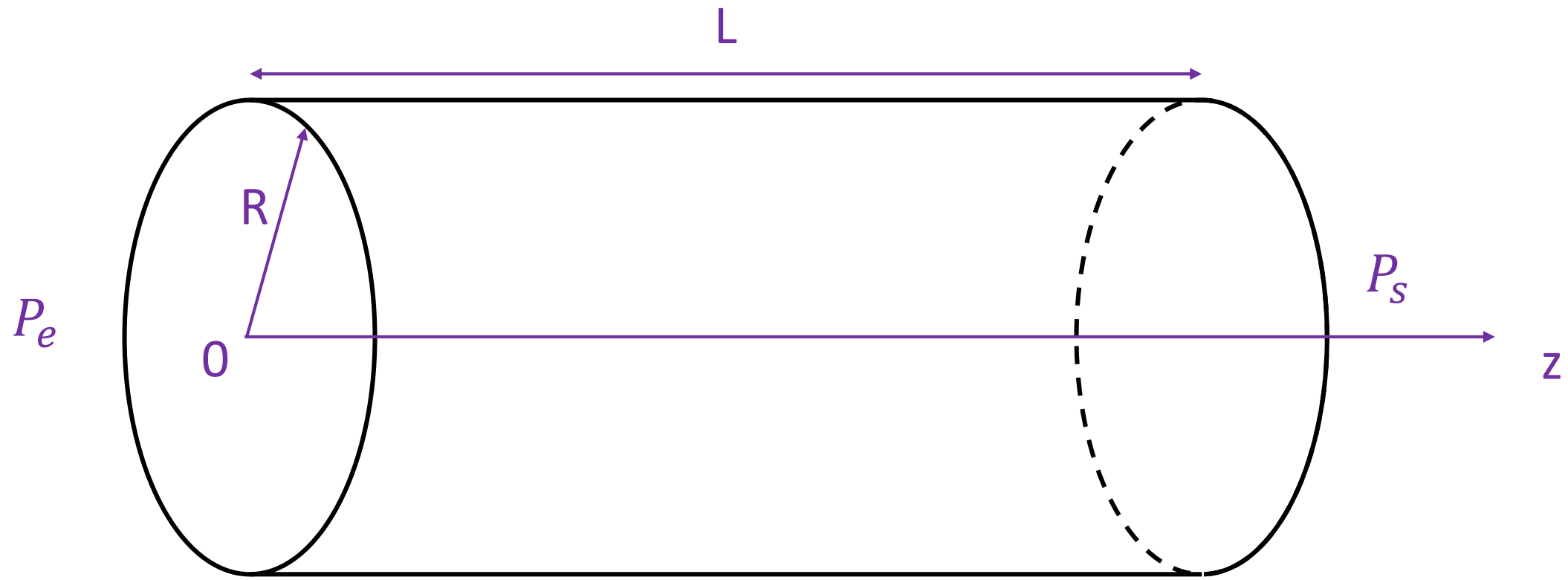


Le $\vec{\Delta}$ n'est simple qu'en cartésien :

$$\vec{\Delta} \vec{v} = \begin{cases} \Delta v_x = \frac{\partial^2 v_x}{\partial x^2} + \frac{\partial^2 v_x}{\partial y^2} + \frac{\partial^2 v_x}{\partial z^2} \\ \Delta v_y = \frac{\partial^2 v_y}{\partial x^2} + \frac{\partial^2 v_y}{\partial y^2} + \frac{\partial^2 v_y}{\partial z^2} \\ \Delta v_z = \frac{\partial^2 v_z}{\partial x^2} + \frac{\partial^2 v_z}{\partial y^2} + \frac{\partial^2 v_z}{\partial z^2} \end{cases}$$



Osborne Reynolds
(1842-1912)



$$P_e > P_s$$

$$P_e - P_s = \Delta P > 0$$

