

## Plane Poiseuille flow [edit]

Plane Poiseuille flow is flow created between two infinitely long parallel plates, separated by a distance  $h$  with a constant pressure gradient  $G = -dp/dx = \text{constant}$  applied in the direction of flow. The flow is essentially unidirectional because of infinite length. The [Navier-Stokes equations](#) reduce to

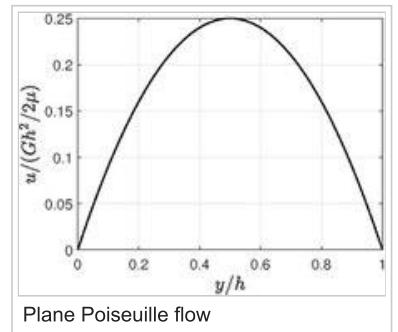
$$\frac{d^2u}{dy^2} = -\frac{G}{\mu}$$

with [no-slip condition](#) on both walls

$$u(0) = 0, \quad u(h) = 0$$

Therefore, the velocity distribution and the volume flow rate per unit length are

$$u(y) = \frac{G}{2\mu}y(h-y), \quad Q = \frac{Gh^3}{12\mu}.$$



## Poiseuille flow through some non-circular cross-sections [10]

