

Cours de Thermique du bâtiment

Vidéo n°6

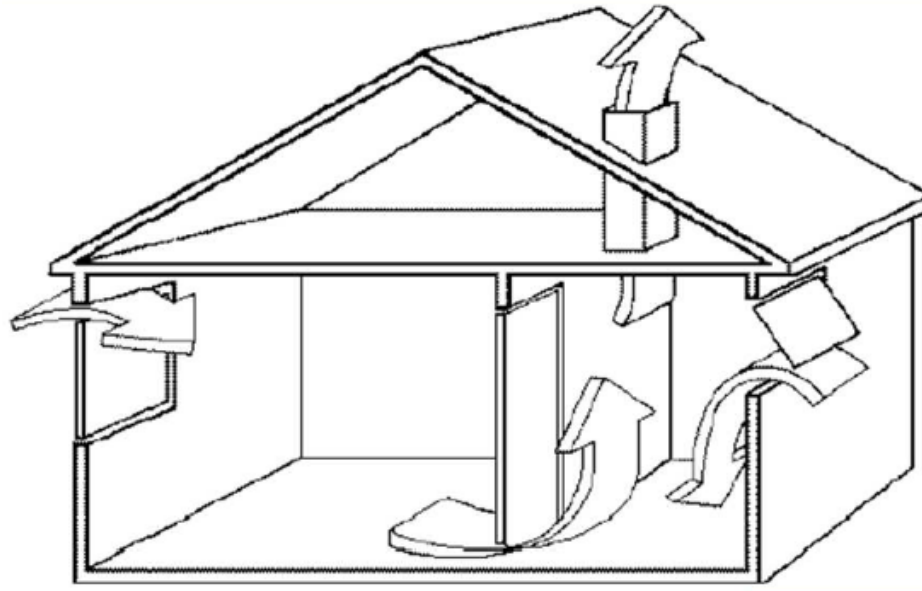
# Ventilation des bâtiments

## Effet du vent et du tirage thermique

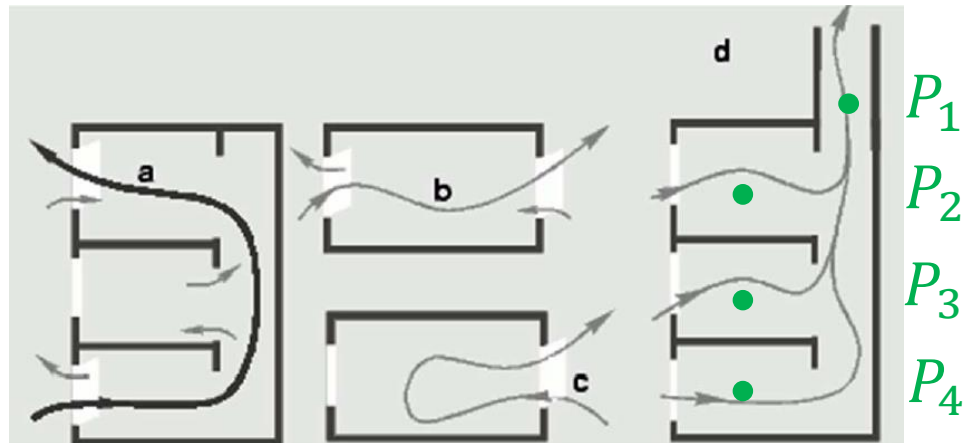
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vidéo réalisée le 19/10/2015



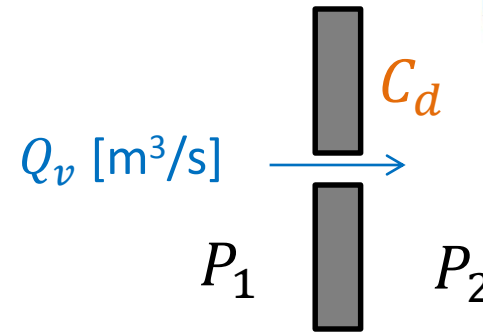


$Q_v$  [ $\text{m}^3/\text{s}$ ]  
 $\dot{m}$  [ $\text{kg}/\text{s}$ ]



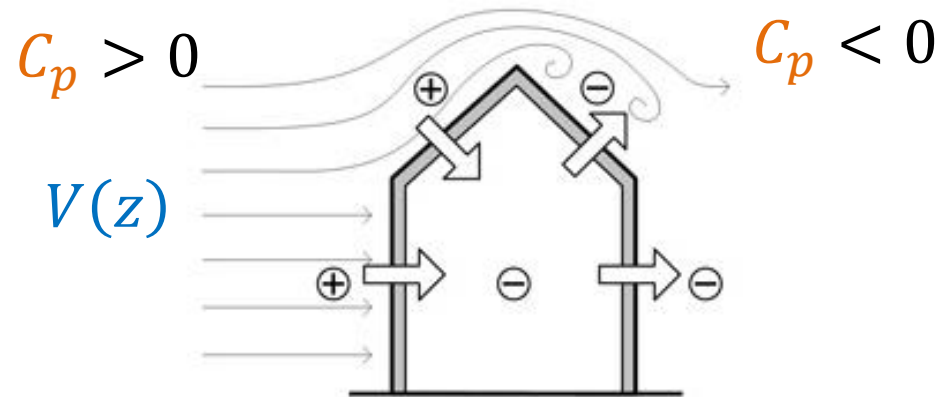
- Débit à travers une ouverture

$$P_1 - P_2 = \frac{\rho Q_v^2}{2 S^2 C_d^2}$$



- Influence du vent

$$P = P_{atm} + C_p \cdot \frac{1}{2} \rho V^2$$

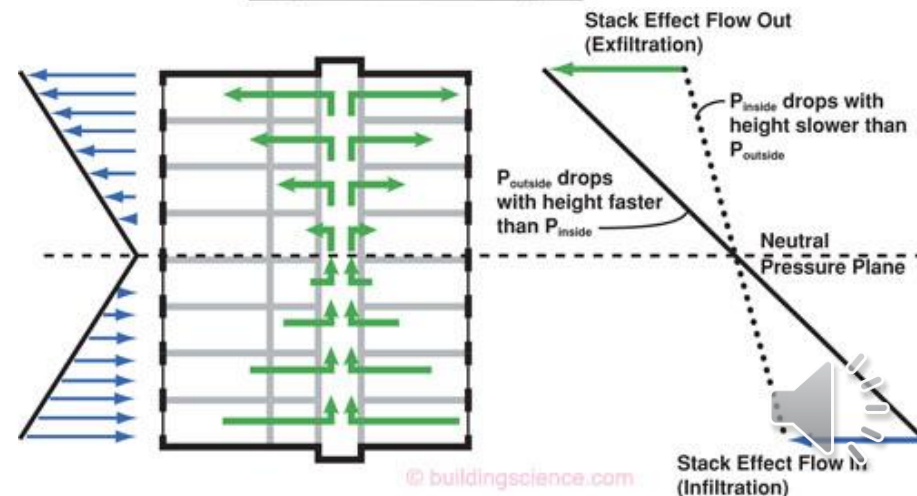


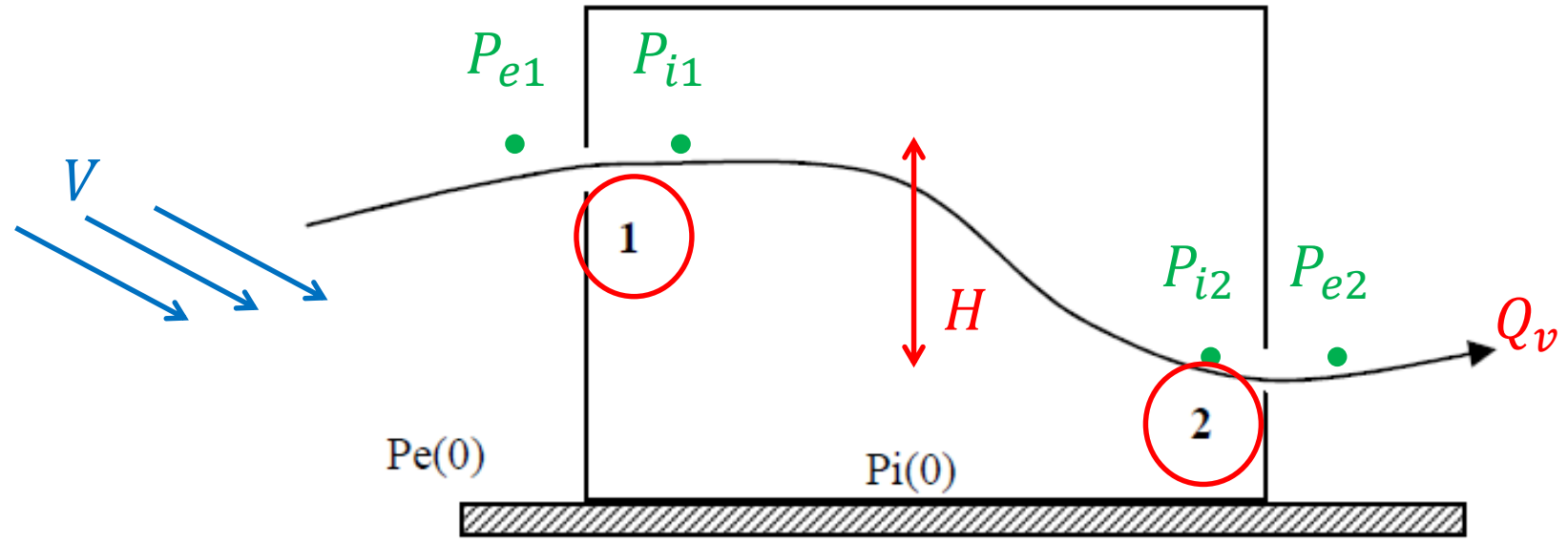
- Tirage thermique

$$P(z) = P(0) - \rho g z$$

$$z_n = \frac{P_e(0) - P_i(0)}{g (\rho_i - \rho_e)}$$

$$\Delta P(z) = g (\rho_e - \rho_i) (z_n - z)$$





$$(1) \quad \left( P_{e1} + C_{p1} \cdot \frac{1}{2} \rho_e V^2 \right) - P_{i1} = \frac{\rho_e Q_v^2}{2 S_1^2 C_{d1}^2}$$

$$(2) \quad P_{i2} - \left( P_{e2} + C_{p2} \cdot \frac{1}{2} \rho_e V^2 \right) = \frac{\rho_i Q_v^2}{2 S_2^2 C_{d2}^2}$$

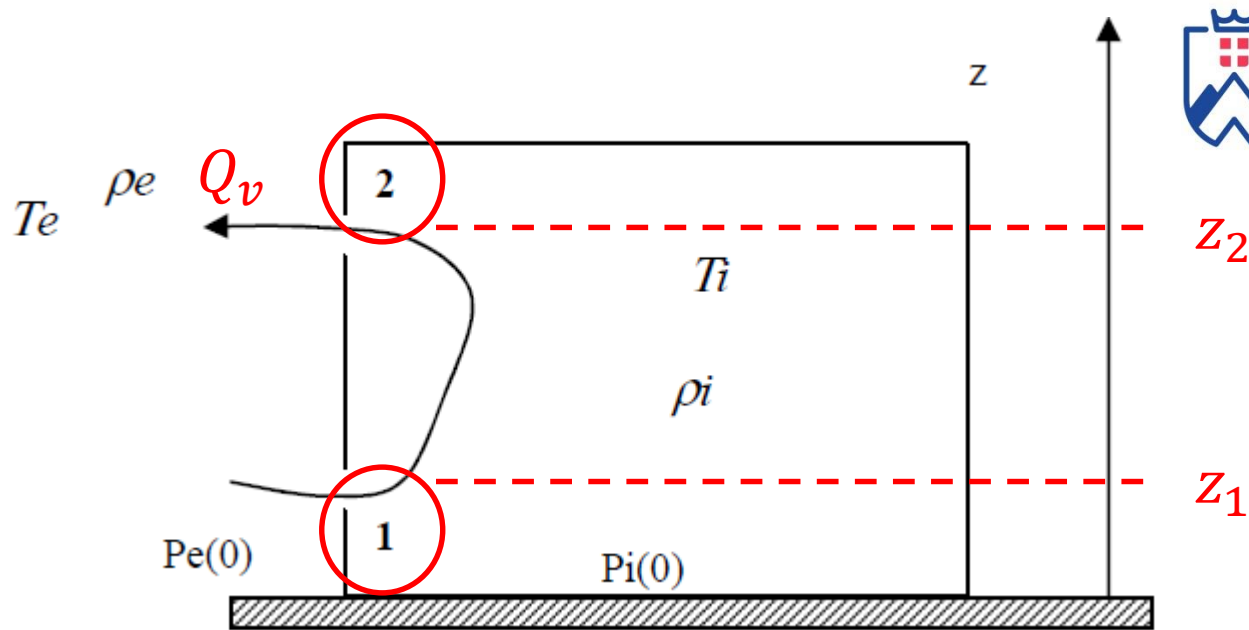
$$P_{i1} - P_{i2} = -\rho_i g H$$

$$P_{e2} - P_{e1} = \rho_e g H$$

$$\begin{aligned} \rho_e &= \rho_i \\ S_1 &= S_2 \\ C_{d1} &= C_{d2} \end{aligned}$$

$$Q_v = S C_d V \sqrt{\frac{C_{p1} - C_{p2}}{2}}$$





(1) en  $z_1$

$$P_e(z_1) - P_i(z_1) = \frac{\rho_e Q_{v1}^2}{2 S_1^2 C_{d1}^2}$$

$$(P_e(0) - \rho_e g z_1) - (P_i(0) - \rho_i g z_1) = \frac{\rho_e Q_{v1}^2}{2 S_1^2 C_{d1}^2}$$

(2) en  $z_2$

$$(P_i(0) - \rho_i g z_2) - (P_e(0) - \rho_e g z_2) = \frac{\rho_i Q_{v2}^2}{2 S_2^2 C_{d2}^2}$$

(1) + (2)

$$\dot{m} = C_d \sqrt{\frac{2 g H (\rho_e - \rho_i)}{\frac{1}{\rho_e S_1^2} + \frac{1}{\rho_i S_2^2}}}$$

$$\rho \approx \frac{353}{1}$$
