> # *BRANCHE PRINCIPALE #*

local *Vbp*, *Vbp_moy*, *Rebp*, *λbp*, *ΔPlin_bp*, *ΔPsing_bp*, *ΔPtot_bp*; # ***Variables***

> $Dbp := 14E-3$; $\nu := 8.30E-7$; $Qp := 8.33E-6$; $Lr := 1$; $\rho := 784$; $\zeta entrée := 1$;
Données utilisateurs

$$Dbp := 0.014$$
$$\nu := 8.30\ 10^{-7}$$
$$Qp := 0.00000833$$
$$Lr := 1$$
$$\rho := 784$$
$$\zeta entrée := 1 \quad \textbf{(1)}$$

> $Vbp := \dfrac{Qp}{\left(\dfrac{\mathrm{Pi}\cdot Dbp^2}{4}\right)}$; $Rebp := \dfrac{Vbp\cdot Dbp}{\nu}$;

$$Vbp := 0.05411268064$$
$$Rebp := 912.7440108 \quad \textbf{(2)}$$

>

> **if** $Rebp < 2300$ **then**
$\lambda bp := \dfrac{64}{Rebp}$;
$Vbp\_moy := \dfrac{1}{2}\cdot Vbp$
else
$\lambda bp := 0.3164\cdot Rebp^{-0.25}$;
$Vbp\_moy := \dfrac{2}{3}\cdot Vbp$
end if;

$$\lambda bp := 0.07011823603$$
$$Vbp\_moy := 0.02705634032 \quad \textbf{(3)}$$

> $\Delta Plin\_bp := \dfrac{\lambda bp\cdot Lr}{Dbp}\cdot\dfrac{\rho\cdot Vbp\_moy^2}{2}$; $\Delta Psing\_bp := \zeta entrée\cdot\dfrac{\rho\cdot Vbp\_moy^2}{2}$; $\Delta Ptot\_bp := \Delta Plin\_bp + \Delta Psing\_bp$;

$$\Delta Plin\_bp := 1.437232798$$
$$\Delta Psing\_bp := 0.2869618562$$
$$\Delta Ptot\_bp := 1.724194654 \quad \textbf{(4)}$$

> # *BRANCHE 1 et 2 #*

local *ζbuse*, *ζé*, *ζclapet*, *ζconvergent*, *λb1*, *λb2*, *k1*, *k2*, *n*, *x*, *Reb1*, *Reb2*, *Vb12*, *Vb12_moy*, *Vb23*, *Vb23_moy*, *Vb24*, *ΔPlin_b1*, *ΔPsing_b1*, *ΔPtot_b1*, *ΔPlin_b2*, *ΔPsing_b2_conv*, *ΔPsing_b2_div*, *ΔPtot_b2*, *β2*, *β3*, *ζ'*; # ***Variables***

> $Lbuse := 3E-2$; $Lconv := 15E-2$; $dbuse := 0.7E-3$; $d\_cd := 6E-3$; $\zeta sortie\_tube := 1$; $\zeta divergent := 0.319$; $\zeta sortie\_diffuseur := 0.308$; $\beta := 0.279253$; α

$:= \arctan\left(\frac{(Dbp - dbuse)}{2 \cdot Lbuse}\right)$; $\boldsymbol{h} := 1.5\text{E}{-3}$; $D0 := 6\text{E}{-3}$; $Q1_n := \frac{2}{3} \cdot Qp$; $Q2_n := \frac{1}{3} \cdot Qp$;

 # *Données utilisateurs*

$$Lbuse := 0.03$$
$$Lconv := 0.15$$
$$dbuse := 0.0007$$
$$d\_cd := 0.006$$
$$\zeta sortie\_tube := 1$$
$$\zeta divergent := 0.319$$
$$\zeta sortie\_diffuseur := 0.308$$
$$\beta := 0.279253$$
$$\alpha := 0.2181394718$$
$$h := 0.0015$$
$$D0 := 0.006$$
$$Q1_n := 0.000005553333333$$
$$Q2_n := 0.000002776666667$$ **(5)**

> $\beta 2 := \frac{0.8}{\left(\frac{h}{D0}\right)}$; $\beta 3 := \frac{0.14}{\left(\frac{h}{D0}\right)^2}$; $\zeta clapet := 2.7 - \beta 2 + \beta 3$; $n := \frac{Dbp}{d\_cd}$; $x := \frac{n}{4} \cdot \frac{(n^4 - 1)}{(n - 1)}$;

$$\beta 2 := 3.200000000$$
$$\beta 3 := 2.240000000$$
$$\zeta clapet := 1.740000000$$
$$n := 2.333333333$$
$$x := 12.53086419$$ **(6)**

> **while** $Q1_{n+1} - Q1_n > 0.5$ **and** $Q2_{n+1} - Q2_n > 0.5$ **do**

$Vb12 := \frac{Q1_n}{\left(\frac{\text{Pi} \cdot dbuse^2}{4}\right)}$; $Reb1 := \frac{Vb12 \cdot Dbp}{\nu}$;

if $Reb1 < 2300$ **then**

$\lambda b1 := \frac{64}{Reb1}$;

$Vb12\_moy := \frac{1}{2} \cdot Vb12$

else

$\lambda b1 := 0.3164 \cdot Reb1^{-0.25}$;

$Vb12\_moy := \frac{2}{3} \cdot Vb12$

end if;

$$\zeta buse := \frac{\lambda b1}{8 \cdot \sin\left(\frac{\alpha}{2}\right)} \cdot \left(1 - \left(\frac{\left(\frac{\mathrm{Pi} \cdot (dbuse^2)}{4}\right)}{\frac{\mathrm{Pi} \cdot (Dbp^2)}{4}}\right)^2\right);$$

$$Vb23 := \frac{Q2_n}{\left(\frac{\mathrm{Pi} \cdot Dbp^2}{4}\right)}; Reb2 := \frac{Vb23 \cdot Dbp}{\nu}; Vb24 := \frac{Q2_n}{\left(\frac{\mathrm{Pi} \cdot d\_cd^2}{4}\right)};$$

if $Reb2 < 2300$ **then**

$\lambda b2 := \frac{64}{Reb2};$

$Vb23\_moy := \frac{1}{2} \cdot Vb23$

else

$\lambda b2 := 0.3164 \cdot Reb2^{-0.25};$

$Vb23\_moy := \frac{2}{3} \cdot Vb23$

end if;

if $Reb2 > 10000$ **then** $\zeta' := 0.23$ **else** $\zeta' := 0$ **end if**;

$$\zeta convergent := \left(1 - \left(\frac{\left(\frac{\mathrm{Pi} \cdot (d\_cd^2)}{4}\right)}{\frac{\mathrm{Pi} \cdot (Dbp^2)}{4}}\right)\right) \cdot \zeta' + \frac{\lambda b2}{8 \cdot \sin\left(\frac{\beta}{2}\right)} \cdot \left(1 - \left(\frac{\left(\frac{\mathrm{Pi} \cdot (d\_cd^2)}{4}\right)}{\frac{\mathrm{Pi} \cdot (Dbp^2)}{4}}\right)^2\right);$$

$$\zeta té := 0.4 \cdot \left(1 - \left(\frac{Q2_n}{Qp}\right)\right)^2;$$

$$\Delta Plin\_b1 := \frac{\lambda b1 \cdot Lbuse}{dbuse} \cdot \frac{\rho \cdot Vb12\_moy^2}{2}; \Delta Psing\_b1 := (\zeta sortie\_tube + \zeta buse) \cdot \frac{\rho \cdot Vb12\_moy^2}{2}; \Delta Ptot\_b1 := \Delta Plin\_b1 + \Delta Psing\_b1;$$

$$\Delta Plin\_b2 := x \cdot \frac{\lambda b2 \cdot Lconv}{Dbp} \cdot \frac{\rho \cdot Vb23\_moy^2}{2}; \Delta Psing\_b2\_conv := (\zeta divergent + \zeta té) \cdot \frac{\rho \cdot Vb12\_moy^2}{2}; \Delta Psing\_b2\_div := (\zeta sortie\_diffuseur + \zeta clapet) \cdot \frac{\rho \cdot Vb24^2}{2}; \Delta Ptot\_b2 := \Delta Plin\_b2 + \Delta Psing\_b2\_conv + \Delta Psing\_b2\_div;$$

$$k1 := \left(\zeta sortie\_tube + \zeta buse + \frac{\lambda b1 \cdot Lbuse}{dbuse}\right) \cdot \left(\frac{1}{2 \cdot 9.81 \cdot \left(\frac{\mathrm{Pi} \cdot dbuse^2}{4}\right)^2}\right);$$

$$k2 := \left(\zeta divergent + \zeta sortie\_diffuseur + \zeta té + \zeta clapet + \frac{\lambda b2 \cdot 2 \cdot Lconv}{Dbp}\right)$$

$$\cdot\left(\frac{1}{2\cdot 9.81\cdot\left(\frac{\mathrm{Pi}\cdot Dbp^2}{4}\right)^2}\right);$$

$$solve\left(\left\{Qp = Q1_n + Q2_n,\ Q1_n{}^2\cdot k1 = Q2_n{}^2\cdot k2\right\},\ \left\{Q1_n,\ Q2_n\right\}\right);$$

$$Q1_n := Q1_{n+1};\ Q2_n := Q2_{n+1}$$

end do;

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