EQUAZIONI DI BILANCIO PER FLUIDI MONOFASE IN SISTEMI MONODIMENSIONALI

BILANCIO	EQUAZIONE DIFFERENZIALE	EQUAZIONE INTEGRATA SU UN CIRCUITO CHIUSO O SU DI UN TRATTO DEL CIRCUITO
DI MASSA	$\frac{¶ r}{¶ t}+\frac{1}{A}\frac{¶}{¶ s}(G A)=0$	$r = r_0\left[1-b(T-T_0)\right]\approx r_0$ $\quad b \equiv -\frac{1}{r}\left(\frac{\partial r}{\partial T}\right)_p$ $W=W(t)$ (non dipende dalla posizione)
DELLA QUANTITA' DI MOTO	$\frac{¶ G}{¶ t}+\frac{1}{A}\frac{¶}{¶ s}\left(\frac{G^2 A}{r}\right)=-\frac{\partial p}{\partial s}-r\, g \sin q - t_w \frac{P_f}{A}$ $\frac{\partial p}{\partial s}=-\frac{¶ G}{¶ t}-\frac{1}{A}\frac{¶}{¶ s}\left(\frac{G^2 A}{r}\right)-r\, g \sin q - t_w \frac{P_f}{A}$	$r = r_0\left[1-b(T-T_0)\right]\approx r_0$ $\quad b \equiv -\frac{1}{r}\left(\frac{\partial r}{\partial T}\right)_p$ $t_{w,k}=\frac{f_k L_k}{D_k}\frac{1}{2} r_0\, w_k^2$ $\left[\sum_k \frac{L_k}{A_k}\right]\frac{dW}{dt}=r_0\, g\, b \oint_{loop} T(s)\sin q\, ds-\left[\sum_k \frac{1}{A_k^2}\left(K_k+\frac{f_k L_k}{D_k}\right)\right]\frac{\lvert W\rvert W}{2 r_0}$
DELL'ENERGIA	$\frac{¶ (r e)}{¶ t}+\frac{1}{A}\frac{¶}{¶ s}\left[G A(e+p v)\right]=q''\frac{P_h}{A}+q'''$	$\frac{\partial T}{\partial t}+\frac{W}{r_0 A_k}\frac{\partial T}{\partial s}=\frac{4 q_k''}{r_0 c_p D_k}$ $\quad (k = 1, \ldots, N)$

$$\Delta T=\frac{\dot Q}{c_p W}$$

$$W=\sqrt[3]{\frac{2 r_0^2\, g\, b\, A^2 \dot Q H}{c_p\left(\sum_k K_k+\frac{f(\mathrm{Re})L}{D}\right)}}$$

$$Q=u A_{exch}\frac{\Delta T}{\ln\frac{\Delta T_e}{\Delta T_u}} \Rightarrow \Delta T_e=\Delta T_u \exp\left(\frac{u A_{exch}\Delta T}{Q}\right) \Rightarrow \Delta T_u+\Delta T=\Delta T_u \exp\left(\frac{u A_{exch}\Delta T}{Q}\right) \Rightarrow \Delta T_u=\frac{\Delta T}{\exp\left(\frac{u A_{exch}\Delta T}{Q}\right)-1} \Rightarrow T_{freddo}=T_{ref}+\frac{\Delta T}{\exp\left(\frac{u A_{exch}\Delta T}{Q}\right)-1}$$