

I. Fluides en écoulement

1. Bilan de masse

$$\frac{dm}{dt} = \boxed{\dot{m} = \rho V \Omega}$$

En régime permanent : $\boxed{\sum \dot{m}_s = \sum \dot{m}_e}$

2. Bilan énergétique en régime permanent

$$\dot{E} = \dot{m}e$$

$$\underline{h = u + Pv = u + \frac{P}{\rho}} \quad \boxed{h_T = h + e_c + e_p} = h + \frac{v^2}{2} + gz$$

$$\boxed{\sum \dot{m}_s h_{T_s} - \sum \dot{m}_e h_{T_e} = \dot{W}_u + \dot{Q}}$$

$$\underline{h_{T_s} - h_{T_e} = q + w_u} \quad q = \frac{\dot{Q}}{\dot{m}} = \frac{\delta Q}{\delta m} \quad w_u = \frac{\dot{W}_u}{\dot{m}} = \frac{\delta \dot{W}_u}{\delta m}$$

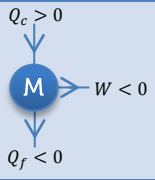
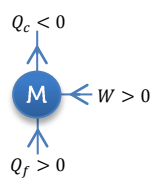
3. Divers dispositifs

	$\dot{Q}$	$\dot{W}_u$	Δe_c	Δe_p	Δh
Détente	0	0	$\neq 0$	0	
Turbine	0	< 0	$\neq 0$	0	
Compresseur	0	> 0	0	0	
Vanne	0	0	0	0	$\Delta h = 0$
Echangeur	$\neq 0$ (interne)	0	0	0	

II. Machines thermiques

1. Evolution cycliques

$$\Delta U_{cycle} = \Delta H_{cycle} = \Delta S_{cycle} = 0 \quad W_{cycle} = \dot{W} \Delta t_{cycle}$$

Fonctionnent	Principe	Rendement
Moteur		$\eta = \frac{ W }{Q_c} < 1$
Pompe à chaleur		$\eta = \frac{ Q_c }{W}$
Réfrigérateur		$\eta = \frac{Q_f}{W} > 1$