

Implikasi Kriteria 1

(Tenaga)

$$\Delta E_{CV} = 0,$$

Dari Prinsip Keabadian Tenaga;

$$\frac{dE_{CV}}{dt} = \dot{Q} - \dot{W} + \sum_{in} \dot{m}(h + ke + pe) - \sum_{out} \dot{m}(h + ke + pe)$$

→ = 0

susun & dpt. Persamaan Tenaga Aliran Mantap

(PerTAMa)

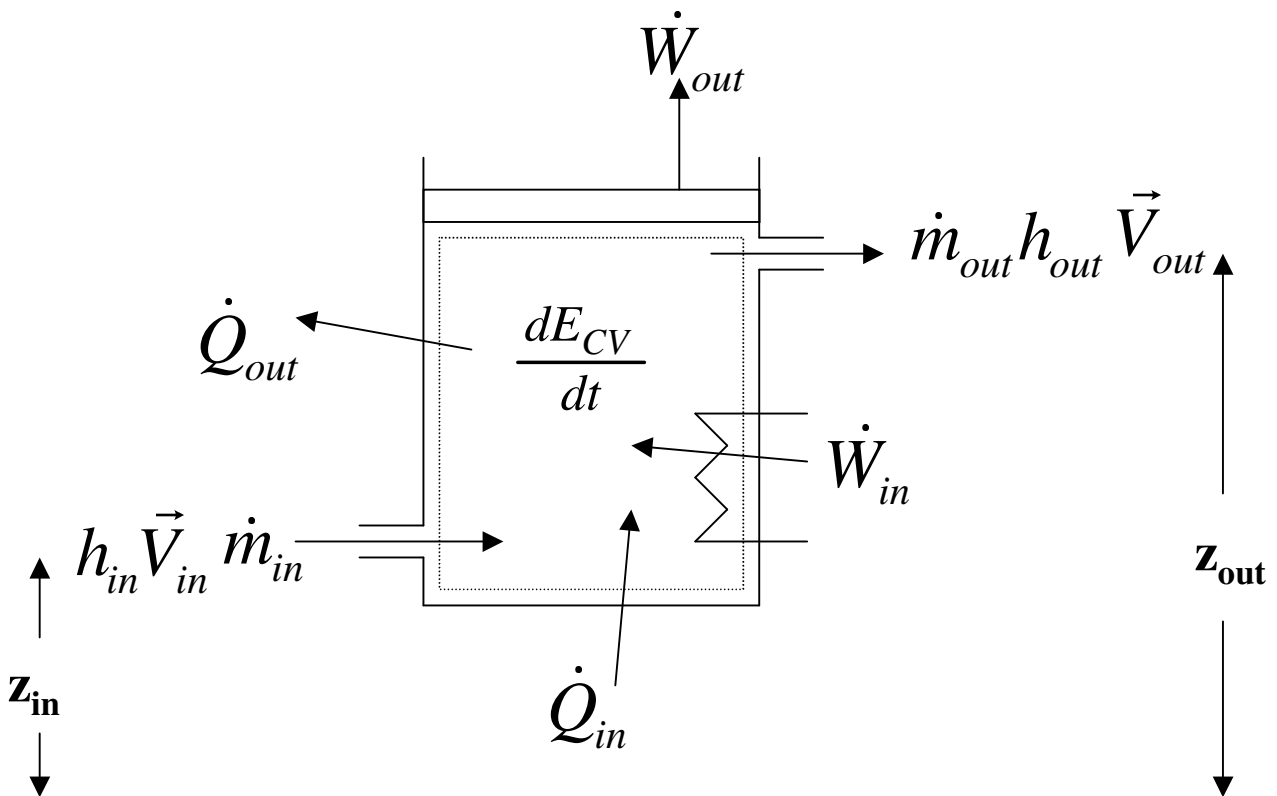
$$\dot{Q} - \dot{W} = \sum_{out} \dot{m}(h + ke + pe) - \sum_{in} \dot{m}(h + ke + pe)$$

PerTAMa

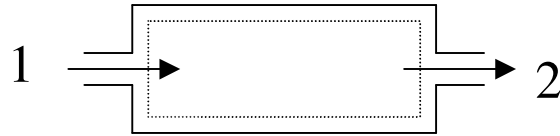
$$\dot{Q} - \dot{W} = \sum_{out} \dot{m} \left(h + \frac{\vec{V}^2}{2} + gz \right) - \sum_{in} \dot{m} \left(h + \frac{\vec{V}^2}{2} + gz \right)$$

utk. setiap salur
keluar

utk. setiap salur
masuk



PerTAMa untuk 1 masuk / 1 keluar



Jisim

$$\dot{m}_{in} = \dot{m}_{out} \quad \text{atau} \quad \dot{m}_1 = \dot{m}_2$$

Tenaga

$$\dot{Q} - \dot{W} = \dot{m}_2 \left(h_2 + \frac{\vec{V}_2^2}{2} + gz_2 \right) - \dot{m}_1 \left(h_1 + \frac{\vec{V}_1^2}{2} + gz_1 \right)$$

$$\dot{m}_1 = \dot{m}_2 = \dot{m}$$

$$\dot{Q} - \dot{W} = \dot{m} \left[(h_2 - h_1) + \left(\frac{\vec{V}_2^2 - \vec{V}_1^2}{2} \right) + g(z_2 - z_1) \right]$$

$$\frac{\dot{Q}}{\dot{m}} - \frac{\dot{W}}{\dot{m}} = (h_2 - h_1) + \left(\frac{\vec{V}_2^2 - \vec{V}_1^2}{2} \right) + g(z_2 - z_1)$$

$$q - w = \Delta h + \Delta ke + \Delta pe \quad (1 \text{ masuk / 1 keluar })$$

$$(\Delta = \text{keluar} - \text{masuk})$$

PerTAMa utk. byk. salur ttp Δke , Δpe diabaikan

$$\dot{Q} - \dot{W} = \sum \dot{m}_{out} h_{out} - \sum \dot{m}_{in} h_{in}$$

$$\sum \dot{m}_{in} = \sum \dot{m}_{out}$$