

Bölüm 1-2: $v = \mathcal{V} / m = 1 / \rho$, $\bar{v} = \mathcal{V} / n$, $m = Mn$, $E = U + \frac{1}{2} m |\mathbf{V}|^2 + mgz = me$, $h = u + Pv$, $x = \frac{m_g}{m}$, $v = v_f + x(v_g - v_f)$

$$Z = Pv / RT, \quad P_R = P / P_{kr}, \quad T_R = T / T_{kr}$$

Bölüm 3 : $W_e = VI\Delta t$, $W = \int_1^2 P d\mathcal{V}$, $W = \int_1^2 P_K d\mathcal{V}$, $W_{\text{yay}} = \frac{1}{2} k_{\text{yay}} (x_2^2 - x_1^2)$, $Pv^n = \text{sabit} \rightarrow W = \int_1^2 P(\mathcal{V}) d\mathcal{V} = \frac{P_2 \mathcal{V}_2 - P_1 \mathcal{V}_1}{1-n}$,

$$dE = \delta Q - \delta W, \quad E_2 - E_1 = Q_{12} - W_{12}, \quad c_v = \left(\frac{\partial u}{\partial T} \right)_v, \quad c_p = \left(\frac{\partial h}{\partial T} \right)_p, \quad \Delta u = u_2 - u_1 = \int_1^2 c_v(T) dT \quad (\cong c_{v0}(T_2 - T_1)),$$

$$\Delta h = h_2 - h_1 = \int_1^2 c_p(T) dT \quad (\cong c_{p0}(T_2 - T_1)), \quad c_{p0} = c_{v0} + R, \quad k = c_{p0} / c_{v0}$$

Bölüm 4 : $\dot{m} = \rho AV = \frac{AV}{v} = \rho \dot{V}$, $\left(\frac{dm}{dt} \right)_{KH} + \sum_{CIKAN} \dot{m} - \sum_{GIREN} \dot{m} = 0$, $\left(\frac{dE}{dt} \right)_{KH} + \sum_{CIKAN} \dot{m}(e + Pv) - \sum_{GIREN} \dot{m}(e + Pv) = \dot{Q} - \dot{W}$

Bölüm 5 : $W_{\text{net}} = Q_H - Q_L$, $\eta = \frac{W_{\text{net}}}{Q_H} = 1 - \frac{Q_L}{Q_H}$, $COP_{SM} = \frac{Q_L}{W_{\text{net}}}$, $COP_{IP} = \frac{Q_H}{W_{\text{net}}}$, $\frac{Q_L}{Q_H} = \frac{T_L}{T_H}$ (Tersinir makinada)

Bölüm 6 : $S_2 - S_1 = \int_1^2 \frac{\delta Q}{T} + S_{\text{URE},12}$, Çevre $(\Delta S)_o = \frac{\dot{Q}_o}{T_o}$, Kaynak $(\Delta S)_R = \frac{\dot{Q}_R}{T_R}$

$$\left(\frac{dS}{dt} \right)_{KH} + \sum_{CIKAN} \dot{m}s - \sum_{GIREN} \dot{m}s = \sum_i \frac{\dot{Q}_i}{T_i} + \dot{S}_{\text{URE},KH}, \quad \text{Çevre} \left(\frac{dS}{dt} \right)_o = \frac{\dot{Q}_o}{T_o}, \quad \text{Kaynak} \left(\frac{dS}{dt} \right)_R = \frac{\dot{Q}_R}{T_R}, \quad ds = \frac{du}{T} + \frac{Pdv}{T} = \frac{dh}{T} - \frac{vdP}{T}$$

Mükemmel Gazlar

$$ds = c_v \frac{dT}{T} + R \frac{dv}{v} = c_p \frac{dT}{T} - R \frac{dP}{P} = c_v \frac{dP}{P} + c_p \frac{dv}{v}, \quad s_2 - s_1 = s_2^o - s_1^o - R \ln \frac{P_2}{P_1}$$

$$s_2 - s_1 = c_{v0} \ln \frac{T_2}{T_1} + R \ln \frac{v_2}{v_1} = c_{p0} \ln \frac{T_2}{T_1} - R \ln \frac{P_2}{P_1} = c_{v0} \ln \frac{P_2}{P_1} + c_{p0} \ln \frac{v_2}{v_1}, \quad \frac{T_2}{T_1} = \left(\frac{P_2}{P_1} \right)^{\frac{k-1}{k}} = \left(\frac{v_1}{v_2} \right)^{k-1},$$

$$w_{ir} = - \int_{1g}^{2c} v dP - \frac{1}{2} |\mathbf{V}|^2 - gz, \quad \eta_{\text{türbin}} = \frac{\dot{W}_t}{\dot{W}_{t,s}} \cong \frac{h_1 - h_2}{h_1 - h_{2s}}, \quad \eta_{\text{komp}} = \frac{\dot{W}_{k,s}}{\dot{W}_k} \cong \frac{h_{2s} - h_1}{h_2 - h_1}, \quad \eta_L = \frac{V_{2s}^2}{V_{2s}^2} \cong \frac{h_1 - h_2}{h_1 - h_{2s}}$$

Bölüm 7 :

$$-\dot{W}_y = -(\dot{W} - \dot{W}_\varphi) = -(\dot{W} - P_o \frac{d\mathcal{V}}{dt}) = \frac{d}{dt} (E + P_o V - T_o S) - \sum_i \dot{Q}_i \left(1 - \frac{T_o}{T_i} \right) + T_o \dot{S}_{U,KK} = \frac{d}{dt} (E + P_o V - T_o S) - \sum_R \dot{Q}_R \left(1 - \frac{T_o}{T_R} \right) + T_o \dot{S}_{U,T}$$

$$\begin{aligned} -\dot{W}_y &= -(\dot{W} - P_o \frac{d\mathcal{V}}{dt}) = \frac{d}{dt} (E + P_o \mathcal{V} - T_o S) + \sum_{CIKAN} \dot{m}(e + Pv - T_o s) - \sum_{GIREN} \dot{m}(e + Pv - T_o s) - \sum_i \dot{Q}_i \left(1 - \frac{T_o}{T_i} \right) + T_o \dot{S}_{U,KK} \\ &= \frac{d}{dt} (E + P_o \mathcal{V} - T_o S) + \sum_{CIKAN} \dot{m}(e + Pv - T_o s) - \sum_{GIREN} \dot{m}(e + Pv - T_o s) - \sum_R \dot{Q}_R \left(1 - \frac{T_o}{T_R} \right) + T_o \dot{S}_{U,T} \end{aligned}$$

$$\Phi = E - U_o + P_o (\mathcal{V} - \mathcal{V}_o) - T_o (S - S_o), \quad \psi = h - h_o - T_o (s - s_o) + \frac{|\mathbf{V}|^2}{2} + gz$$

$$-W_y = -(W - W_\varphi) = \Phi_2 - \Phi_1 - \sum_i Q_i \left(1 - \frac{T_o}{T_i} \right) + I_{KK} = \Phi_2 - \Phi_1 - \sum_R Q_R \left(1 - \frac{T_o}{T_R} \right) + I_T$$

$$\begin{aligned} -\dot{W}_y &= -(\dot{W} - P_o \frac{d\mathcal{V}}{dt}) = \frac{d\Phi}{dt} + \sum_{CIKAN} \dot{m}(e + Pv - T_o s) - \sum_{GIREN} \dot{m}(e + Pv - T_o s) - \sum_i \dot{Q}_i \left(1 - \frac{T_o}{T_i} \right) + \dot{I}_{KK} \\ &= \frac{d\Phi}{dt} + \sum_{CIKAN} \dot{m}(e + Pv - T_o s) - \sum_{GIREN} \dot{m}(e + Pv - T_o s) - \sum_R \dot{Q}_R \left(1 - \frac{T_o}{T_R} \right) + \dot{I}_T \end{aligned}$$

Bölüm 8 : $r = \mathcal{V}_{A\dot{O}N} / \mathcal{V}_{U\dot{O}N}$, $r_k = \mathcal{V}_3 / \mathcal{V}_2$, $r_p = P_2 / P_1$, $\eta_{\text{diesel}} = 1 - \frac{1}{r^{k-1}} \left[\frac{r_k^k - 1}{k(r_k - 1)} \right]$, $\eta_{\text{Brayton}} = 1 - \frac{1}{r_p^{(k-1)/k}}$

Bölüm 9-Bölüm 10 Gerek yok

Bölüm 12-13 : $y_{mi} = \frac{m_i}{m}$, $y_{ni} = \frac{n_i}{n}$, $M = \sum_{i=1} y_{ni} M_i$, $b = \sum y_{mi} b_i$, $\bar{b} = \sum y_{ni} \bar{b}_i$, $\omega = \frac{m_v}{m_a} = 0.622 \frac{P_v}{P_a} = \frac{0.622 P_v}{P - P_v}$

$$\phi = \frac{m_v}{m_g} = \frac{P_v}{P_g} = \frac{P_v}{P_{\text{Doyma},T}}, \quad \omega = \frac{m_v}{m_a} = \frac{0.622 \phi P_g}{P - \phi P_g}, \quad h = \frac{H_a + H_v}{m_a} = h_a + \omega h_v \cong h_a + \omega h_g,$$