



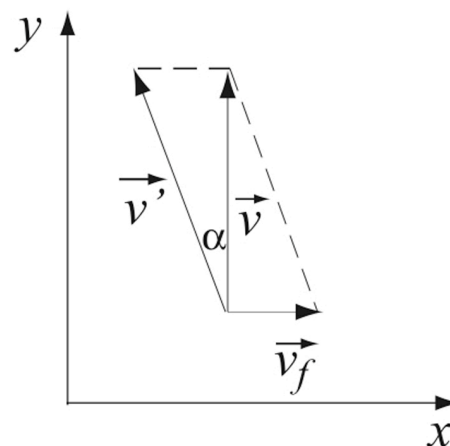
----- SOLUZIONI -----

E1) $\vec{v} = \vec{v}' + \vec{v}_f \Rightarrow v_x = v'_x + v_f = 0$

$$v = \sqrt{v'^2 - v_f^2} = 3,14 \text{ m/s} = 11,31 \text{ km/h}$$

$$|v'| \cos \alpha = |v| \Rightarrow \alpha = 19,45^\circ$$

$$\Delta T = \frac{L_f}{v} = 318,47 \text{ s} = 5'18,47''$$



E2)
$$\begin{cases} k_1(l_1 - l_{01}) = k_2(l_2 - l_{02}) \\ l_1 + l_2 = d \end{cases} \Rightarrow \begin{cases} l_1 = \frac{k_1 l_{01} + k_2(d - l_{02})}{k_1 + k_2} = 1.57 \text{ m} \\ l_2 = d - l_1 = 2.43 \text{ m} \end{cases}$$

E3) $I\alpha = -M \Rightarrow \alpha = -10 \frac{\text{rad}}{\text{s}^2}$

$$\omega(t) = \omega_0 + \alpha t = 0 \Rightarrow t_f = 30 \text{ s}$$

$$\theta(t) = \omega_0 t + \frac{1}{2} \alpha t^2 \Rightarrow \vartheta(t_f) = 4500 \text{ rad} = 716.6 \text{ giri}$$

$$L = K_f - K_i = -\frac{1}{2} I \omega_0^2 \Rightarrow L = -13.5 \text{ kJ}$$

$$\text{oppure } L = M\vartheta \Rightarrow L = -13.5 \text{ kJ}$$

E4) La trasformazione è adiabatica ed irreversibile.

$$Q = 0 \quad L = 0 \quad \Rightarrow \quad \Delta U = 0 \quad T_f = T_i = T$$

$$p_A V_A = n_A RT \quad 2V_A = V \quad \Rightarrow n_A = \frac{p_A V}{2RT}$$

$$p_B V_B = n_B RT \quad 2V_B = V \quad \Rightarrow n_B = \frac{p_B V}{2RT}$$

$$\left. \begin{aligned} p_f V'_A &= n_A RT = \frac{p_A V}{2} \\ p_f V'_B &= n_B RT = \frac{p_B V}{2} \end{aligned} \right\} \Rightarrow p_f = \frac{p_A + p_B}{2} = 2 \text{ atm}$$

$$\begin{aligned} \Delta S &= \Delta S_A + \Delta S_B = \frac{p_A V}{2T} \ln \frac{V'_A}{V_A} + \frac{p_B V}{2T} \ln \frac{V'_B}{V_B} = \\ &= \frac{V}{2T} \left(p_A \ln \frac{p_A}{p_f} + p_B \ln \frac{p_B}{p_f} \right) = 4.3 \cdot 10^{-2} \text{ J/K} \end{aligned}$$