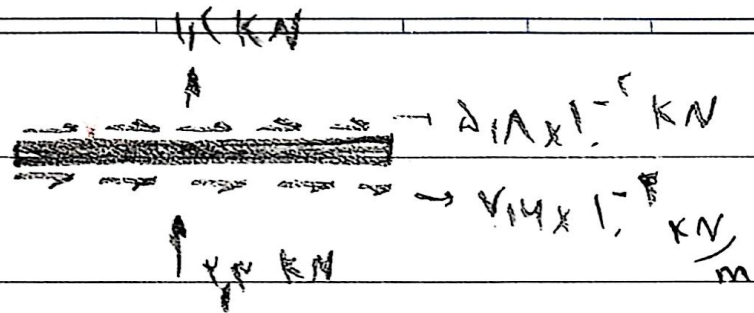




$$F_N = 1.2 + 1.2 = 2.4 \text{ kN}$$

$$F_A = (0.12 + 1.2) \times 1 = 1.32 \times 1 = 1.32 \text{ N}$$

(1-A)

$$\text{drag} = D = (0.12 \text{ kN}) \cos 30^\circ + (2.4) \sin 30^\circ = 1.24 \text{ kN}$$

$$\text{lift} = L = (2.4) \cos 30^\circ - (0.12 \text{ kN}) \sin 30^\circ = 1.94 \text{ kN}$$

(5)

$$D_r = \frac{1}{2} \rho v^2 A C_D = \frac{1}{2} \times 1.224 \times 1.2 \times 1.2 \times 1.0 \times 0.12$$

$$\rightarrow D_r = 1.12 \times 1.0 \text{ N}$$

(4-A)

(5) ^{مميز}

$$Re = 1.12 \times 1.0$$

(23-A)

$$D_r = \frac{1}{2} \rho v^2 A C_D = \frac{1}{2} \times 0.12 \times 1.0 \times 1.0 \times 1.0 \times 0.12 = 0.0072 \text{ (N)}$$

(5)

$$D_r + F_B = W, \text{ given}$$

$$\rightarrow \gamma_w V = \frac{1}{2} \rho V^2 A C_D \rightarrow \gamma_w \left(\frac{\pi}{4} D^2 \right) = \frac{1}{2} C_D \rho V^2 \left(\frac{\pi}{4} D^2 \right)$$

(21-1)

$$\rightarrow V = \sqrt{\frac{\frac{1}{2} \times \frac{980}{C_D}}{\frac{1}{2} C_D}} = \sqrt{\frac{1 \times 9.8 \times 0.001}{1 \times C_D}} \rightarrow V = \frac{0.191}{\sqrt{C_D}}$$

$$\rightarrow Re = \frac{VL}{\nu} = 1471.8 V$$

$$C_D = 1 \rightarrow V = 0.12 \frac{m}{s}, Re = 83, C_D = 1.0$$

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$$C_D = 1.0 \rightarrow \boxed{V \approx 0.13 \frac{m}{s}}, Re = 90, C_D = 1.0$$

(5)

$$\left. \begin{array}{l} F_{x=0} \\ F_{y=0} \end{array} \right\} \rightarrow D_r = T \cos 30 \rightarrow F_B = W + D_r (\text{by } 30) \quad (65.8)$$

$$F_B = W + T \sin 30$$

$$\frac{1}{2} C_D (1000) V^2 \left(\frac{\pi}{4} (0,3)^2 (0,577) \right) = \frac{\pi}{4} (0,3)^3 (1-0,21) (7810) \rightarrow V = \frac{2,3}{\sqrt{C_D}}$$

$$Re = \frac{\rho V D}{\mu} \rightarrow \frac{V(0,3)}{(1,12 \times 10^{-5})} \rightarrow Re = 267857$$

(5)

$$C_D = 0,2 \quad V = 5,18 \quad Re = 1,4 \times 10^6 \quad C_D = 0,2$$

$$0.13 \text{ } CD_s > 10 \text{ } CD_r \rightarrow 13 \left(\frac{1}{4} CD_s \rho u^2 A \right)$$

V.L.N

$$= 10 \left(\frac{1}{4} CD_r \rho u^2 A \right)$$

$$\frac{CD_s}{CD_r} \leq 1.4$$

$$CD_s \leq 0.18 \rightarrow Re \leq 1.8 \times 10^5 \rightarrow CD_r \leq 0.125 \rightarrow \frac{CD_s}{CD_r} \leq 1.4$$

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$$Re = \frac{\rho u D}{\mu} \rightarrow 1.8 \times 10^5 = \frac{(1.2 \text{ kg/m}^3)(u)(.1 \text{ m})}{1.789 \times 10^{-4}}$$

$$\rightarrow u = 11.1 \text{ m/s}$$

(5)

$$l_{D0} = 9/3 = 3, C_D = 0.15, \dot{W} = D_R U = 2 (1/2 C_D \rho U^2 A)$$

80-8

$$\dot{W} = (0.15)(1.23)(41.67)(9 \times 3) \Rightarrow \dot{W} = 360.4 \text{ kW}$$

5

$$Re = \frac{UD}{\nu} = \frac{55.56 \times 15}{1.46 \times 10^{-5}} = 5.7 \times 10^7 \rightarrow C_D = \frac{0.072}{(Re)^{0.2}} = \frac{0.072}{(5.7 \times 10^7)^{0.2}}$$

$$= 0.002 \rightarrow \dot{W} = \frac{0.002}{0.15} \times 360.4 = 4.8 \text{ kW}$$

$$D_{Ra} = D_{Rw} \rightarrow 1/2 C_{Da} \rho_a (U - U_i)^2 A_a = 1/2 C_{Dw} \rho_w U_i^2 A_w$$

83-8

$$\left(\frac{U - U_i}{U_i} \right)^2 = \frac{\rho_w A_w}{\rho_a A_a} \Rightarrow \frac{U_w}{U_a} = \frac{0.8}{0.2} = \left(\frac{L_w}{L_a} \right)^3 \Rightarrow \frac{L_w}{L_a} = 4^{1/3}$$

$$\frac{A_w}{A_a} = \left(\frac{L_w}{L_a} \right)^2 = (4^{1/3})^2 = 4$$

6

$$\left(\frac{U - U_i}{U_i} \right)^2 = \frac{1030}{1.23} (4) = 3349.6 \Rightarrow U_i = 0.0313 \text{ m/s}$$

86-8

$$\Sigma F_z = 0 \rightarrow W = D_R = 1/2 C_D \rho U^2 A$$

$$200 = 1/2 (1.2) \rho \left(\frac{dz}{dt} \right) 0.3$$

5

$$\int dt \Rightarrow -9 \times 10^{-3} \int_{900}^0 \sqrt{\rho} dz \rightarrow t_f = 9 \times 10^{-3} \int_0^{900} \sqrt{\rho} dz$$

$$t_f = 9 \times 10^{-3} \int_0^{900} \sqrt{\rho} \left(-\frac{dP RT}{\rho g} \right) = 9 \times 10^{-3} \frac{RT}{g} \int_{P_1}^{P_2} \frac{dP}{\sqrt{\rho}}$$

$$t_f = 18 \times 10^{-3} \frac{287 \times (273 + 15)}{9.81} (\sqrt{1.23} - \sqrt{0.4671}) = 64.35$$

$$F_r = mg = 0.1 \times 100 \times 9.8 = 98 \text{ N}$$

(V4.1)

$$F_d = \frac{1}{2} \rho C_d A v^2 = \frac{1}{2} \times 1.2 \times 0.5 \times 50^2 = 750 \text{ N} \rightarrow F_f = 98 \text{ N}$$

$$F = \frac{1}{2} \times 98 \times 50 = 2450 \text{ N} \xrightarrow{\text{چون سرعت خوانی است}} 98 + 0.5 \times 50^2 = 2450$$

$$\rightarrow 20 + v_m = 20.8 \rightarrow v = 0.8 \frac{\text{m}}{\text{s}}$$

(5)