

①

$$\left. \begin{aligned} \tau_s &= \frac{F_s}{A_s} & A_s &= \frac{A_c}{\sin \phi} \Rightarrow \tau_s = \frac{F_s \sin \phi}{A_c} \\ \rho_s &= \frac{F_t}{A_c} \end{aligned} \right\} \text{ایکساں کے متویف دایم}$$

موضیہ برائے صورت حاصل دایم :

$$\left. \begin{aligned} \gamma &= 0 \\ \tau_c &= \frac{\sin \phi}{\cos(\phi - \gamma)} = \frac{1}{1.6} \Rightarrow \tan \phi = \frac{1}{1.6} \Rightarrow \phi = 32^\circ \end{aligned} \right\}$$

$$\frac{F_N}{F_R} = 0.5 \Rightarrow \frac{F_R \cos \beta}{F_R} = 0.5 \Rightarrow \cos \beta = 0.5 \Rightarrow \beta = 60^\circ$$

تبرائے $\frac{\tau_s}{\rho_s}$ برابر ہے :

$$\frac{\tau_s}{\rho_s} = \frac{\frac{F_s \sin \phi}{A_c}}{\frac{F_t}{A_c}} = \frac{F_s \sin \phi}{F_t} = \frac{F_R \cos(\phi + \beta - \gamma) \sin \phi}{F_R \cos(\beta - \gamma)}$$

↑
جاننا کہ یہ F_t, F_s کا تناسب ہے

$$\frac{\tau_s}{\rho_s} = \frac{\cos(32 + 60) \sin 32}{\cos 60} = -0.037$$

(الف) (2)

$$\left. \begin{aligned} F_t &= F_R \cos(\beta - \alpha) \\ F_h &= F_R \sin(\beta - \alpha) \end{aligned} \right\} \Rightarrow \frac{F_h}{F_t} = \tan(\beta - \alpha)$$

$$\frac{500 \text{ N}}{1000 \text{ N}} = \tan(\beta - 14) \Rightarrow \beta = 40.6^\circ$$

$$\Rightarrow \left. \begin{aligned} F_N &= F_R \cos \beta = \sqrt{500^2 + 1000^2} \cos 40.6^\circ = 848.9 \text{ N} \\ F_f &= F_R \sin \beta = \sqrt{500^2 + 1000^2} \sin 40.6^\circ = 727.6 \text{ N} \\ F_R &= \sqrt{F_t^2 + F_h^2} = \sqrt{500^2 + 1000^2} = 1118.03 \text{ N} \end{aligned} \right\}$$

$$\mu = \tan \beta = \frac{F_f}{F_N} \Rightarrow \mu = \tan 40.6 = 0.857$$

$$F_S = F_R \cos(\varphi + \beta - \alpha) = F_R [\cos \varphi \cos(\beta - \alpha) - \sin \varphi \sin(\beta - \alpha)] \quad (2)$$

$$F_S = [F_R \cos(\beta - \alpha)] \cos \varphi - [F_R \sin(\beta - \alpha)] \sin \varphi$$

$$F_S = F_t \cos \varphi - F_h \sin \varphi$$

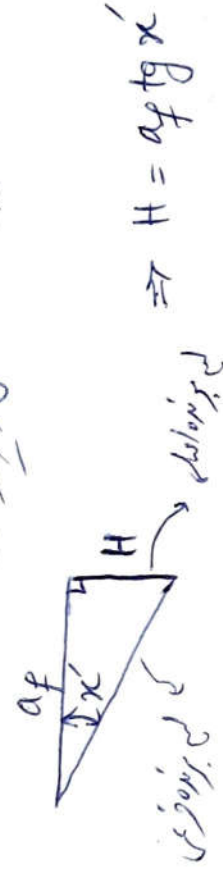
$$\mu_c = \frac{a_f \sin(\alpha)}{a_o \cos(\alpha)} = \frac{\sin \varphi}{\cos(\varphi - \delta)} \Rightarrow \frac{a_f \sin(20)}{1.5 \cos(14)} = \frac{\sin \varphi}{\cos(\varphi - 14)}$$

$$\begin{aligned} a_f \tan \alpha &\Rightarrow R_a = \frac{a_f}{4(\cot \alpha + \cot \alpha')} \Rightarrow 20 \times 10^{-6} \text{ m} = \frac{a_f}{4(\cot 90 + \cot 10)} \end{aligned}$$

حالتی که در آن $\alpha = 90^\circ$ باشد

$$R_a = \frac{a_f}{4(\cot \alpha + \cot \alpha')} = \frac{H}{4} \quad (5)$$

در این حالت $\alpha = 90^\circ$ و $\alpha' = 90^\circ$



مطلوبه $\alpha = 90^\circ$ و $\alpha' = 90^\circ$

$$H = a_f \tan \alpha'$$

$$R_a = \frac{H}{4} = \frac{a_f \tan \alpha'}{4} \quad ; \text{مطلوبه}$$

$$\Rightarrow 12 \times 10^{-6} \text{ m} = \frac{a_f \tan 10^\circ}{4} \Rightarrow a_f = 272.2 \text{ } \mu\text{m}$$

$$\hookrightarrow a_f = 0.2722 \text{ mm}$$

مطلوبه ϕ

$$r_c = \frac{a_f \sin \alpha}{a_0 \cos \alpha} = \frac{\sin \phi}{\cos(\phi - \alpha)}$$

$$\frac{0.2722 \sin 90^\circ}{1.5 \cos 14^\circ} = \frac{\sin \phi}{\cos(\phi - 14^\circ)} \Rightarrow \phi = 10.76^\circ$$

$$F_S = F_R \cos(\phi + \beta - \alpha) = 1118.03 \cos(10.76^\circ + 90.6^\circ - 14^\circ) = 888.7 \text{ N}$$

$$\Rightarrow F_{NS} = \sqrt{F_R^2 - F_S^2} = 678.4 \text{ N}$$

$$P_s = \frac{F_t}{A_c} = \frac{1000 \text{ N}}{(100-98)/2 * 10^{-3} \text{ m} * 272.2 * 10^{-6} \text{ m}} \quad (1)$$

$$\Rightarrow P_s = 3.67 * 10^9 \frac{\text{N}}{\text{m}^2} = 3.67 \text{ GJ/m}^3$$

$$\eta = \frac{P_m}{P_e} * 100$$

بافرض اینکه از صفر

توان استفاده شده است:

$$P_m = F_t V_c = F_t * \frac{\pi D_{rev} N}{1000}$$

$$t_m = \frac{l_w}{a_f N} \Rightarrow 505 = \frac{200 \text{ mm}}{0.2722 \text{ mm/rev} * N} \Rightarrow N = 14.69 \text{ rev/s}$$

$$P_m = 1000 \text{ N} * \frac{\pi * (\frac{100+98}{2}) * 14.69 \text{ rev/s}}{1000} = 4570.4 \text{ W} > 40000 \text{ W}$$

این عدد باید اصلاح شود. چون $P_m < P_e$ باشد.

$$\eta = \frac{4570.4}{40000} = 11.426 \quad !!!$$

(صورت سوال ایراد دارد)

$$V_f = V_c r_c = \frac{\pi * 99 \text{ m} * 14.69 \text{ rev/s}}{1000} * \frac{0.2722 \sin 90}{1.5 \cos 14} \quad (2)$$

$$V_f = 4.57 \text{ m/s} * 0.187 = 0.855 \text{ m/s}$$

$$\phi = 10.76^\circ$$

(3) مقدار ϕ در خیلی بزرگ است.

! سؤاچہ - سٹانڈرڈ اسٹریکچر (2)

$$2\phi + \beta - \gamma = 90 \quad \begin{matrix} \gamma = 14^\circ \\ \phi = 10.76^\circ \end{matrix} \rightarrow \beta = 82.48^\circ$$

$$\frac{F_f}{F_N} = \tan \beta = \tan 82.48 = 7.56$$

$$\text{ویراں } b\lambda = \frac{a_p}{\sin \alpha \cos \lambda} = \frac{1 \text{ mm}}{\sin 90 \cos 0} = 1 \text{ mm} \quad (2)$$

$$V_1 T_1^n = C \Rightarrow V_1 T_1^n = V_2 T_2^n \Rightarrow \frac{V_1}{V_2} = \left(\frac{T_2}{T_1}\right)^n \quad (3)$$

$$\left(\frac{100}{120}\right) = \left(\frac{12}{40}\right)^n$$

$$\ln\left(\frac{100}{120}\right) = n \ln\left(\frac{12}{40}\right) \Rightarrow n = 0.157$$

$$V_1 T_1^n = C \Rightarrow 100 \text{ mm/min} \times (40 \text{ min})^{0.157} = C$$

$$\Rightarrow C = 174.8$$